

THE POLITICAL ECOLOGY OF FOOD INSECURITY IN SMALLHOLDER
COFFEE COOPERATIVES IN NORTHERN NICARAGUA

BY

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Abstract

Food insecurity in smallholder coffee growing communities is recognized as a problem “deserving of a response that reflects its reach” (Caswell 2012, 1). Subject to structural factors including unstable coffee prices, extreme weather shocks, food price swings, smallholder coffee farming households must also access sufficient food and healthy diets amidst an historical trajectory that has incentivized homogenization of available land to coffee cultivation, and restriction of food production, leaving them even more vulnerable to seasonal hunger and chronic malnutrition. Although the relationship between coffee and food insecurity is recognized, its multiscale dynamics have not been well understood. In this study I investigate and outline the “chain of explanation” (Robbins 2012, 88) of why food insecurity is so persistent in smallholder coffee growing communities. I explore the manifestations of seasonal and chronic hunger, as well as food resilience, which play out in eight first-level cooperatives that are participants in the Youth Leadership and Food Sovereignty Project executed by the cooperative organization the UCA San Ramón, in the department of Matagalpa in northern Nicaragua. Using a combined framework of political ecology, agroecology, and food security and sovereignty, I focus especially on the relationships that contribute to the phenomenon of hunger and insecurity in the eight cooperatives, identifying factors besides overdependence on coffee production on income that contribute to the phenomenon as it manifests in each of the eight cooperatives. My major findings agree with the established understanding that economic dependence on one cash crop (be it coffee or basic grains) leaves farming households unable to provide for themselves during the entire year. I find that more balanced dependence on two or more cash crops is related to longer periods of household provisioning. I also find that finance cycles that farmers must use to purchase seed and food exacerbate the situation. Other factors include the loss of knowledge of seed selection and saving as well as storage infrastructure, loss of healthy food consumption cultures, lack of access to markets for excess production, lack of access to transport and communication infrastructure, and lack of access to water for irrigation and consumption. However, structural factors including a persistent Green Revolution culture, international commodities markets, and contradictory interventions by the state and the coffee industry itself, lead to the conclusion that any set of strategies aiming to relieve seasonal hunger must move beyond price and beyond farm-level interventions to include the participation of actors at all scales.

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Chapter 1

Introduction

1A. Food insecurity and Coffee: A Problem “deserving of a response that reflects its reach”

One in eight people, or 870 million, in the world currently experiences chronic hunger or malnourishment; the overwhelming majority of these, 852 million, live in developing countries, according to the FAO *State of Food Insecurity in the World 2012 Report* (2012). The FAO report also says that while levels of chronic hunger went down between 1990-92 and 2010-12, improvement leveled off beginning in 2007-2008, corresponding with the onset of the global economic crisis. Food security exists “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”, as defined by the World Food Summit of 1996. Various definitions of food security exist and will be discussed in more detail in this chapter. Chronic hunger and malnourishment are two manifestations of food insecurity.

Food insecurity in smallholder coffee-growing communities in places like Nicaragua or southern México has become a central focus of the fair trade movement, as well as the specialty coffee industry as a whole. After decades of promoting higher fair trade prices in the interest of economic justice for marginalized smallholder coffee farming families, research in the last ten years has shown the impact of alternative coffee markets to be uneven. Although farmers participating in fair trade benefit from various positive impacts in education, investment in infrastructure, and lower costs, basic livelihoods factors are not positively impacted, and they still suffer low income, high

rates of outmigration, and food insecurity (Bacon et al. 2008). Seasonal hunger is the most common manifestation of food insecurity in coffee lands, although chronic hunger and malnutrition also affect families and especially children under the age of five in the most vulnerable communities; transitory food insecurity also occurs in coffee growing communities as the result of periodic shocks such as extreme weather events or coffee price dips that directly affect the availability of food in the community (as in the case of heavy rains destroying basic grains crops) or a family's ability to access food economically (as in the case of price dips), according to Caswell et al.'s analysis of the relatively limited body of studies exploring coffee certifications' impact on food security (2012, 5).

Seasonal hunger, or what is called in Nicaragua "*los meses de las vacas flacas*" or the "skinny cow months", hereafter "thin months" for short, are experienced in coincidence with three other phenomena as shown in Table 1, based on the results of this study: the rainy season between May and November, the period after income from the previous coffee harvest has been spent and cash for purchasing basic foods is scarce, and the period after basic grains have been harvested. Strategies used to mitigate the thin months include limiting the diet to basic grains (risking nutrient deficiencies) or skipping meals altogether (risking caloric deficiency), according to Caswell et al. (2012, 5).

Table 1: Annual Calendar of Production, Occurrences, and Coping Mechanisms in San Ramón, Nicaragua

Event	January	February	March	April	March	April	May	June	July	August	September	October	November	December
Avg. Coffee harvest duration	█												█	█
Rainy season							█	█	█	█	█	█	█	
Avg. thin months (4.63mo)							█	█	█	█				
Highest food prices								█	█	█				
Lowest food prices											█	█		
Plant grains and gardens						█	█							
Harvest grains and gardens											█	█		
Average duration of food harvest	█	█	█	█	█							█	█	█
Coping mechanisms	Limit diet to basic foods						█	█	█	█				
	Skip meals							█	█	█				
	Borrow money from relatives to buy food							█	█	█				
	Take out credit from local store or coop. to buy seed or food					█	█	█						
	Sell grain to pay back credit										█	█		
	Take out credit to fund coffee harvest												█	█
	Pay back coffee credit		█	█										

The consensus in academia and in the coffee industry is that the “problem is global in scale, deserving of a response that reflects its reach”, especially given coffee communities’ extreme vulnerability to multiple risk factors – coffee price swings, climate change, degradation of the means of production, and seasonal changes in food prices (Caswell et al. 2012, 1). However, as I mentioned above, although it is universally acknowledged to be a grave problem at the global scale, knowledge of the complex

causal dynamics of the relationship between coffee and food insecurity is still scarce. Most previous research involving the issue of food security has focused on how certifications impact food security during the period of the coffee crisis in 1999-2004, when coffee prices dipped to historical lows, wreaking economic and social havoc in coffeelands. Given that the problem of food insecurity among smallholder coffee farming families has persisted beyond the crisis and even during periods of high prices (during the 2010-2011 and 2011-12 harvests, for instance), it is evident that the dynamics of why food insecurity persists in coffeelands involve more factors than price (as also evidenced by its persistence even in communities benefitting from fair trade prices), and more research is needed to understand the complex of causes and to propose possible solutions.

“Price is but One Piece of the Pie”: The Coffee Industry’s Response to the Problem

What is the coffee industry’s role in mitigating food insecurity among coffee smallholder households and communities? What strategies can it effectively advocate? Efforts to mitigate the effects of the coffee crisis in 1999-2004 focused on promoting alternative markets that would provide more stable and higher prices to smallholders and decrease smallholder organizations’ vulnerability during market swings. These strategies were complemented by development projects aimed at diversifying coffee markets and strengthening coffee quality by improving farmer production practices. Many of these interventions involved collaborations and partnerships between specialty coffee companies and organizations with development organizations and agencies internationally and locally. However, the focus on higher-paying specialty and alternative markets also had the negative – but not unpredictable – effect of farmers

planting more of their land in coffee, and less in food (Caswell et al. 2012); this is a well-documented tendency among coffee farmers of any size when the market experiences an upswing for more than a year at a time, and it has the effect of reducing smallholder household resilience in the face of subsequent weather or market shocks that affect production yields or prices.

The coffee industry—or at least the specialty coffee industry—recognizes that there is a relationship between higher prices (through specialty or alternative market certifications) and overdependence on coffee. The industry’s understanding of that relationship has evolved since the early 2000s. I argue that even though the marketing may not reflect it, even in the fair trade coffee industry it is accepted that a higher price is but one of a set of complementary strategies (as it was expressed to me by a coffee importer in Nicaragua in 2011), and higher prices must be complemented by other strategies that strengthen resiliency and farmer household livelihoods in an integrated manner.

Table 2 shows a sample of coffee companies and organizations that have interventions into food security as part of their work. First, there is wide, albeit indirect, participation in food security related projects, as evidenced by the sheer number of coffee-industry donors that contribute to supporting the nonprofit organization Coffee Kids’ work in México and Central America. Second, the interventions in food security in the coffee industry range from direct interventions (as in the case of CAN and Sustainable Harvest, both of which directly manage food security projects), to funding local organizations to implement projects (as in the case of GMCR and Coffee Kids). Third, the major fair trade organization in the United States, Fairtrade USA, has no

explicitly-stated focus on food security; this absence says something about the split between the priorities of the actual roasters, importers, and businesses associated with fair trade to intervene in food insecurity issues at coffee’s origins and the organization that certifies the coffee they purchase.

Table 2: Specialty/Fair Trade Coffee Organization Interventions in Food Security at Origin

Organization	Type of Organization	Food Security Focus	Funding
Coffee Kids	Nonprofit (NGO)	Funds 3 FS projects implemented by local organizations in México focusing on “ensur[ing] adequate supplies of fresh, local food. This minimizes the impact of a global rise in food prices and allows families to put food on the table after income from the coffee harvest had dried up.”	Over 60 different coffee-related companies; individual donors.
Sustainable Harvest	Coffee Importer	Ongoing program to increase farm productivity; have trained 1000s of farmers in composting.	They invest a percentage of business income at origin.
Green Mountain Coffee Roasters (GMCR)	Coffee Roaster	\$8.6 million/year (highest category of investment in supply chain outreach); over 20 FS projects benefiting 19,000 families at origin; plans for 2012-13 to expand FS work to 20,000 additional families.	Percentage of gross profit goes to CSR program, including investment in origin communities
Fairtrade USA	Fairtrade Certifier	No programs directly related to FS, instead focusing on cooperative strengthening.	Grants, donations, certification fees

Investments have focused on research to understand food insecurity in coffeelands and in projects designed to alleviate it. The exact value of the industry’s investment is unknown. Much current understanding of food insecurity in coffeelands comes out of research on the impacts of fair trade certifications during the coffee crisis, and coffee businesses associated with fair trade as well as nonprofits funded by the specialty coffee industry have been the primary leaders in moving the discussion among the various

actors forward. In January 2013 coffee companies and the NGO sector involved with coffee grower organizations formed the Coffeelands Food Security coalition, evidence of the industry's growing concern and commitment to addressing the problem. The coalition includes coffee companies Counter Culture Coffee, Farmer Brothers, Green Mountain Coffee Roasters, Starbucks, and Sustainable Harvest Coffee Importers among its industry members, and also includes the international NGO Mercy Corps and a coffee farmer organization in Jinotega, Nicaragua called Asociación Aldea Global. The coalition seeks to promote food security among 150 families over three years (After the Harvest 2013). Interestingly, the US fair trade certifying organization, Fairtrade USA, does not have an active program or efforts directly related to food insecurity in smallholder coffee communities.

Green Mountain Coffee Roasters (GMCR), based in Vermont, has emerged as a leader in the industry efforts to address food insecurity in coffeelands among smallholders. In 2002 GMCR purchased 41 percent of Keurig, Inc., a manufacturer of coffee brewers, and in 2006 purchased full ownership of the company. GMCR retained the trademark on K-cups, which can only be used with Keurig machines, and since 2006 GMCR's sales grew 65 percent a year due to partnerships with other high profile brands (including Starbucks, Newman's Own, and others) to market Keurig Cups, a home brewing technology. This resulted in GMCR dominating 71 percent of the single-serve beverage market in 2011 (Patton 2011). This astronomical growth also increased GMCR's potential reach in its Corporate Social Responsibility (CSR, hereafter) program.

In its own words, GMCR "is focused on creating positive and sustainable change for people and ecosystems in the places where we do business through focused

sustainability endeavors” (GMCR. February 2013). The public corporation invests a percentage of its profits every year in water, health, food security, environmental stewardship, education, and economic development projects in communities all along its value chain, involving coffee growing and processing communities as well as US and Canadian communities where its roasting and distribution facilities are located. It focuses its investments especially on supply chain communities where it sources the coffee it purchases. GMCR’s investment in supply chain communities increased \$435,397 in 2008 to \$14,311,665 in 2011, and extended its impact reach from 876 families to 19,062 during that period (GMCR CSR Report Fiscal 2011, 17), reflecting the enormous growth that corporation experienced in those four years. Its CSR investment priorities are as stated on its supply chain outreach grantmaking webpage:

Human Development through programs that support:

- Sustainable Food Security
- Health and Safety Education and Services
- Community-based Educational Programs and Scholarships
- Potable water and drip irrigation
- Disaster relief

Economic Development through programs that support:

- Financing (pre-harvest, revolving credit, micro-credit, micro-finance
- On-the-Ground Technical Assistance (agronomy) to increase crop yield and quality, and to develop alternative sources of income
- Energy and waste reduction strategies to reduce operational costs
- Climate change adaptation and mitigation

Food security projects are at the top of its list of priorities, making up 61% of its investments, followed by Health and Economic Development projects, each comprising 11% of GMCR's supply chain outreach investment portfolio (*GMCR CSR Report Fiscal 2011*, 19). Nicaragua is by far the place of the largest CSR supply chain outreach investment at just under \$2 million, followed by Guatemala at just under \$1.5 million of the total \$8.6 million supply chain investment.

GMCR's large scale and highly funded interventions in coffee lands food security issues do not only involve investment in supply chain communities to alleviate problems of food security. They also involve investment in increasing the industry's knowledge of the phenomenon, as well as increasing awareness of food insecurity in coffee lands among the industry, consumers, and allies. In 2007 GMCR financed a region-wide study of food insecurity in coffee lands performed by CIAT (International Center for Tropical Agriculture, located in Cali, Colombia), which surveyed 179 households in México, Nicaragua, and Guatemala. The study found that 67% of families interviewed experienced periods of extreme food scarcity of three to eight months (Peysner 2012, 1), firmly establishing the starting point not only for GMCR's subsequent interventions in this area but also for the specialty coffee industry's and the international development sector's recognition of this problem as real and pressing. After GMCR shared the study with international development agencies (including Heifer International, Lutheran World Relief, and Catholic Relief Services) and cooperative organizations working with coffee farming families on the ground, these organizations began designing strategies from the ground up and implementing them in the communities and cooperatives they work in.

GMCR followed up on the CIAT study and its dissemination among its industry, NGO, and cooperative allies, with a film co-produced by The Coffee Trust, a coffee-industry-funded NGO, called *After the Harvest: Fighting Hunger in the Coffeelands*. The film featured farmers from Nicaragua to México telling in their own words how they experience and deal with seasonal hunger and food insecurity. The film premiered in 2011 and has been an instrumental tool for GMCR to educate the specialty coffee industry about food insecurity in coffeelands. The specialty coffee industry is currently more aware and educated about the phenomenon, and it has begun investing heavily in understanding it more and addressing it. We are still far from understanding, however, the structural changes necessary to alleviate the problem or the strategies that will induce these structural changes. I anticipate that with the recent surge of investment on the part of NGOs, coffee corporations, and farmer organizations in food security research and projects since the release of the CIAT study in 2007 and the *After the Harvest* film in 2011, we will be in a position to evaluate the different approaches and strategies being tested in the field in the next few years.

1B. The Global Context of Food Security and Sovereignty: The Evolution of the Problem and Approaches to Address it

This surge of awareness and action on the part of the specialty and alternative coffee industry, international and local NGOs, and coffee farmer organizations themselves arrives on the tail of a global social movement that can trace its roots as far back as the 1948 Universal Declaration of Human Rights (United Nations), in which Article 25 establishes food as a basic human right:

(1) Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

The concept of food security has been defined in different ways over time. In the 1970s, the concept was linked with a sufficient supply of food at the national and global levels, and the main concern was the fluctuation of production in each country and at the global scale, like those of grains and other staple foods stored by governments, private companies, and farmers. At the time of the 1974 World Food Crisis, there was a call to respond to the African food crisis and to the sharp rise in food prices and fertilizer, which followed the rise in oil prices in 1973, and therefore the problem of food supply and availability worldwide became the focus. Global food security essentially consisted of the increase of production and staple foods over time to sustain global demand.

In the 1980s, it became evident that the availability of food was not sufficient in itself to ensure public access to food and that access to food was a major element. The book *Poverty and Famines* by Amartya Sen, published in 1981, demonstrated that many famines have occurred even when there were no shortages of food at the global level or at the national level in famine-affected nations. Access to food depended on income, the rights and privileges that individuals and families possessed and on which they depended, and the social and institutional environment.

At the beginning of the 1990s, a new approach began to incorporate the concept of “nutritional security”. It became apparent that there was undernourishment even in

homes with access to food. On the one hand, there was rising awareness that undernourishment was not only attributable to the inadequate consumption of food but also to general health and sanitation: infections like diarrhea prevent digestion and the overall biological utilization of food, even when an ill person resides in a home with sufficient amounts of food. It was also revealed that there was sometimes an inequitable distribution of food within households (for example, in some cultures more food is given to boys than to girls). All of this demonstrated that the problem of food and nutrition was only one aspect of a broader problem, the features of which were economic, social, health-related, and cultural. Some organizations and authors (for example, UNICEF) often used the concept of “food and nutrition security” to emphasize nutrition and health aspects; however, the concept of food security, as it was defined at the World Food Summit in 1996, fully acknowledges health and nutrition aspects related to the biological utilization of food. Due to this implicit understanding, the addition of nutrition to the term “food security” is unnecessary, but the emphasis on nutritional security—which involves the incorporation of health and food distribution considerations within households—highlights an important dimension of the evolution of the concept of food security.

Over the last decade, these developments have merged into a broader concept of a “safe and sustainable way of life.” Following this line of thought, food security is one of the problems or objectives of poor households and constitutes only one element of a broad list of factors that determine the decisions of poor households in order to successfully subsist, distribute, and minimize risks while ensuring short-term and long-term subsistence. For example, some empirical studies have shown that some households “choose” to be hungry temporarily in order to conserve household assets and secure their

future, instead of fulfilling their immediate food needs and postponing concerns about the future (Caswell et al. 2012).

One of the most widely used definitions of food security is that of the FAO, which states that food security “exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” and, furthermore, “[h]ousehold food security is the application of this concept to the family level, with individuals in households as the focus of concern” (FAO 2010:8). The FAO identified four dimensions that need to be maintained simultaneously in order to achieve food security. These include availability, access, utilization, and stability, and they are briefly explained as follows:

- **Availability** refers to “physical access to food” and is determined by the level of food production, food reserves, and food present locally;
- **Access** refers to “economic and physical access to food” and is determined not only by the availability of food but also by the income of the individuals, the price of foods, and markets;
- **Utilization** refers to “the way in which the body utilizes the various nutrients in the food” and, combined with good biological utilization, this determines the nutritional state of individuals; utilization is determined by good food choices that maximize nutrition, food preparation, a diversified diet, and the way in which food is distributed within the family sphere;
- **Stability** refers to “the stability of the other three dimensions through time”, that is, the availability, access and utilization in uninterrupted form with potential

disruptions caused by a variety of climatic, political, economic, and social factors. (FAO 2008).

More recent definitions of food security, including the one above, reference culture by way of mentioning the significance of food preferences, noting that these are either “culturally or socially determined” (FAO 2003, 27; 1996), though some argue that this reference is quite weak (Schanbacher 2010, 30) and requires more nuance to define how food preferences interact with other factors in food security.

Food sovereignty is a concept that has increasingly gained the attention of scholars and development practitioners in recent years (see Schanbacher 2010), and has not only become a core focus of many civil society organizations, but is included in the national food and agriculture policies of several nations (including Peru and Nicaragua). Formulated and introduced by the transnational peasant organization Vía Campesina in 1996, food sovereignty represents an alternative approach to achieving food security in the sense that it focuses on locally controlled food systems rather than large-scale market-driven strategies.

A recent definition of food sovereignty, developed at the 2007 Forum for Food Sovereignty, defines the concept as “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Declaration of Nyéléni 2007). Windfuhr and Jonsén (2005, 13) summarize ten elements common to most definitions of food sovereignty:

- Priority of local agricultural production to feed people locally;

- Access of smallholder farmers, pastoralists, fisherfolk and landless people to land, water, seeds and livestock breeds and credit...
- The right to food;
- The right of small holder farmers to produce food and a recognition of Farmers Rights;
- The right of consumers to decide what they consume, and how and by whom it is produced;
- The right of countries to protect themselves from under-priced agricultural and food imports;
- The need for agricultural prices to be linked to production costs and to stop all forms of dumping...
- The populations' participation in agricultural policy decision-making;
- The recognition of the rights of women farmers who play a major role in agricultural production in general and in food production in particular;
- Agroecology as a way not only to produce food but also to achieve sustainable livelihoods, living landscapes and environmental integrity.

Additionally, the food sovereignty discourse emphasizes the rights of indigenous peoples to retain traditional production systems and food cultures (Declaration of Nyéléni 2007; Ruelle et al. 2011). This acknowledgement of the value of culture in attaining food security is of particular importance as it expands the reference to the cultural preferences included in the FAO's definition of food security to that of a right of (indigenous) communities and nations to establish their own food systems that are reflective of cultural values and traditions (Ruelle et al. 2011, 164).

In comparing food security and food sovereignty, Windfuhr and Jonsén (2005, 23-24) emphasize that food sovereignty is a comprehensive, rights-based approach to achieving food security. This is perhaps the most key distinction between food security and food sovereignty. As Pimbert (2008, 50) explains, “The mainstream definition of food security ... doesn’t talk about where that food comes from, who produced it, or the conditions under which it was grown.” Drawing on Pimbert’s observation, this analysis included contextual factors underlying the processes by which individuals, households, and communities produce and procure food, giving importance to the context and culture of food production. The analytical framework used in this study identified ten indicators drawn from established food security and frameworks and combined with food sovereignty indicators, which take into account context and culture. Establishing food security must take into account a more complex web of interacting elements that at its core respects the breadth and depth of community participation in defining and shaping their food security.

What Works? Approaches Used to Promote Community Food Security in Coffeelands

As the meaning of the term food security has become more nuanced and expanded beyond food self-sufficiency and beyond the national scale, and as the radical discourse of participation and power of used by civil society groups such as Via Campesina have interacted with traditional international bodies like the FAO, the discourse around how to alleviate food and nutritional insecurity has also shifted. Whereas in the 1970s and 1980s approaches focused on redistribution of food and strengthening of markets, current discourse focuses on the participation of the poor, smallholder farmers as the drivers of food security, and, the goal as one of good nutrition,

not simply enough food. It can be said that contemporary approaches aim to address both the structural as well as proximate causes of food insecurity. The 2012 FAO Report “State of Food Insecurity in the World” argues that:

- In order for economic growth to enhance the nutrition of the neediest, the poor must participate in the growth process and its benefits: (i) Growth needs to involve and reach the poor; (ii) the poor need to use the additional income for improving the quantity and quality of their diets and for improved health services; and (iii) governments need to use additional public resources for public goods and services to benefit the poor and hungry.
- Agricultural growth is particularly effective in reducing hunger and malnutrition. Most of the extreme poor depend on agriculture and related activities for a significant part of their livelihoods. Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty and hunger when it increases returns to labor and generates employment for the poor.
- Economic and agricultural growth should be “nutrition-sensitive”.
- Growth needs to result in better nutritional outcomes through enhanced opportunities for the poor to diversify their diets; improved access to safe drinking water and sanitation; improved access to health services; better consumer awareness regarding adequate nutrition and child care practices; and targeted distribution of supplements in situations of acute micronutrient deficiencies. Good nutrition, in turn, is key to sustainable economic growth.

However, it is clear upon reading the report that the FAO’s strategies, while promoting radical strategies like smallholder empowerment and participation of the poor,

still see agricultural development as a way to increase income of the poor (and thus increasing their economic access to food), and to increase employment (to increase income and thus increase economic access to food). This position is still a stark contrast to the food sovereignty strategies and goals promoted by Vía Campesina and other social movements in building sustainable local food systems to increase local availability and access to food. Other traditional approaches include seed, production inputs, and even food subsidies offered by many national governments, for example México, through its PROCAMPO and Oportunidades programs; in the case of México, it has been shown that although food subsidy programs like Oportunidades do alleviate immediate hunger, production subsidy programs like PROCAMPO have not actually resulted in diversified production and have not achieved their programmatic goals related to food security (Merino 2010, 56). New approaches by other governments have heeded the call for participation by creating municipal level food security committees and other government structures (including Nicaragua and Guatemala) that are part of new legal structures (like Food Security Laws) that attempt to integrate government food security programs and projects into the existing state legal and government structure in varying ways. Their engagement with the smallholder agricultural sector varies widely: in Guatemala, most of the state's food security programs are being led by a joint program called Hambre Cero, but most actions are coordinated by the Ministry of Health, with little coordination with, and very few resources channeled through, the Ministry of Agriculture in that country (Luis Bernal Larrazabal, Director of Livestock Development, Guatemalan Ministry of Agriculture, October 25, 2012). In contrast, Nicaragua has made the promotion of agroecological practices a central strategy of its Food Security Law and its own Hambre

Cero program (speech by Amanda Lorío Arana, Vice-Minister of Agriculture and Forestry, August 12, 2012, Matagalpa, Nicaragua). Thus even among countries within the same region there are major differences in approaches to food security; this variation deserves further investigation.

Approaches utilized by partnerships of the development sector with the coffee sector (described above) tend to describe themselves as community-based and also tend to strike a balance between strategies of income generation and diversification of production for consumption. The Coffeelands Food Security Coalition is focused on promoting the following combination of strategies:

- Improve farming and business techniques
- Develop additional sources of income through home gardens and diversified crop production, and
- Engage more effectively with local government to provide assistance to the hungriest of families (After the Harvest).

GMCR itself supports food security strategies that “help families develop sustainable approaches to overcoming ... seasonal food insecurity, community-based projects have been initiated to directly impact the food security of coffee farming families by diversifying:

1. Land holdings to grow food to eat during the offseason.
2. Sources of income by selling other products”.

These coffee industry approaches are different from traditional approaches, especially those promoted by governments, but they are not as focused on changing the power

dynamics of food systems as the food sovereignty approaches espoused by Via Campesina.

There is a stark lack of comparative studies of different approaches and strategies to address community food insecurity. Moreover, there are no comparative evaluations of national scale policies and state-promoted strategies, as many of these legal structures are in their infancy. The very goals of these different initiatives differ, and evaluating which of the different approaches are more effective in different context than others will be problematic given that the goals of food sovereignty, for instance, are not readily comparable to those of traditional food security.

1C. Research Question and Structure of the Dissertation

In short, this is a study on the relationship between hunger and coffee. There is a recognized relationship between coffee and food insecurity in smallholder communities, but the exact causal dynamics are very little understood (Caswell 2012). The accepted understanding in the coffee industry and among academics studying the relationship between coffee and food insecurity is that overdependence on coffee has led to productive and economic homogenization at the farm level, reducing the availability of locally produced foods and leaving smallholder farmers extremely vulnerable to climate or economic shocks, but it is also established that we understand very little about the relationship dynamics specifically related to coffee and hunger. It is known that finance cycles, geographic isolation (and thus physical access) and outside factors including global and national food prices play a role, but there is a lack of information on how, exactly, all of these factors play out and intersect at different scales.

My main research question is: what are the causal dynamics at different scales that impact food security in smallholder coffee households and communities?

Using PAR, and a multi-scalar analysis of social, economic, environmental, and cultural relationships and elements of place as defined by the relational interactions around coffee smallholders, I explore the manifestations of seasonal and chronic hunger, as well as food resilience, which play out in eight first-level cooperatives that are participants in the Youth Leadership and Food Sovereignty Project executed by the UCA San Ramón. I focus especially on the relationships that contribute to hunger and food insecurity in the eight cooperatives, identifying factors besides overdependence on coffee production on income – that contribute to the phenomenon as it manifests in each of the eight cooperatives. By “shedding light on environmental change and dynamism” I can address “not only the practical problems of equity and sustainability, but also basic questions in environmental science” (Robbins 2012, 3).

I use progressive contextualization, a political ecological technique pioneered by Vayda (1983) that follows the relationships of a problem through its different scales of interaction, generally from the local to the global, to explore the politics and structures surrounding food security, sovereignty, and their relationship to coffee. I do not seek to identify a specific “cause” of food insecurity in coffee-growing regions but to describe the sets of scalar dynamics that contribute to it. Starting with the introduction to food security and sovereignty (FSS hereafter) in this Introduction, I describe the problem of hunger in coffeelands, the specialty coffee industry’s engagement with the problem, and the global history and structures that have influenced the evolution of how food security is engaged with as a human right. In Chapter 2, I review the gaps in understanding the

relationship between coffee and food insecurity, as well as present my theoretical framework. In Chapter 3 I outline my methodological approach, and Chapter 4 outlines the situation of food insecurity in Nicaragua in relationship to the formation and transformation of the land tenure system around coffee in that country since the 1800s and through to the present, and explores the changing engagement of political structures with food insecurity in that country. I present the findings of my research in Chapter 5, and discuss the results and implications in Chapter 6.

Chapter 2

Bridging Political Ecology, Food Security and Sovereignty, Agroecology and Participatory Action Research

Four fields inform the design and implementation of this study: political ecology, participatory action research (PAR), agroecology, and food security & sovereignty. The integration of the four fields allows a complete and useful set of principles and analytical tools with which to analyze food insecurity and seasonal hunger within the multiscale social, political, cultural, economic, and ecological contexts and dynamics of the eight cooperative organizations being studied. The four bodies of knowledge also have the potential to mutually strengthen and enrich each other's principles and practices, as I will explore in the next section. First, I highlight the major themes in political ecology that I draw upon in this research project, and then I explore how the other literatures I draw from complement, and are complemented by, political ecology.

2A. Introduction: Political Ecology: Major Themes

My training and formation as a geographer has been in political ecology. Political ecology can be viewed as an enormously expansive body of literature that has been built upon a series of previous conceptual developments that adapted ecological principles to human behavior and human-environment relations, including human ecology, adaptive dynamics, and cultural ecology (Zimmerer 1996). Existing as a methodology since the 1970s, political ecology is constantly evolving and growing in diffuse ways that are often difficult to recognize. Cataclysmic events in the 2000s, however, revealed the need to

take a hard look at “the swirling political and economic relationships that dialectically produce levees and slums, soils and dams, tourism and hunger, energy and climate, people and things,” and as Paul Robbins states in his book *Political Ecology*, there is “as much or more need for political ecology now” (2012, vii-viii).

Since the 1980s, the political ecological framework has blended political economy with ecology to study issues such as access to resources, environmental degradation, and land use (Zimmerer 1996; Blaikie 1985). Piers Blaikie’s 1985 *The Political Economy of Soil Erosion in Developing Countries* is a classic tome of political ecology, a model study that explored the social and political factors that explain why soil erosion occurs, why traditional conservation programs generally fail, and what possible solutions might be given the social and political reality (Blaikie 1985). Blaikie’s landmark study influenced the path of political ecology, and made way for methodological improvements as well. One critique of political ecology is that it is overly focused on rural themes and developing (or underdeveloped) regions of the world; this bias is due to its conceptual roots in research on development, peasant studies, postcolonial studies, and cultural ecology, but since the 1990s, work identified as political ecology has increasingly been seen focusing on urban and industrialized societies and problems (Robbins 2012, 5; Myers 1999).

Political ecology “seeks to unravel the political forces at work in environmental access, management, and transformation” (Robbins 2012, 3), “identifying broader systems rather than blaming proximate and local forces” (13), using a multi-scale, “progressive contextualization” method of analysis (Vayda 1983, Zimmerer 1996, 177). Although a myriad of definitions of political ecology exist, the common assumption is

that “environmental change and ecological conditions are the product of political process”, according to Robbins (2012, 19-20), meaning that differences in power contribute to strengthening or reducing social or economic inequity, and this view has direct implications on environmental access and change.

I will not review all of its dimensions and debates here, but rather draw out of the vast body of knowledge in political ecology the sets of principles that are the background of my work and that guided my research design, framework, and analysis. These principles include not only central theses generally acknowledged within political ecology as defined by Robbins (2012) (including degradation and marginalization, and conservation and control) but also principles of what a political ecology *is* and *how we do it* (including the principles of “Something People Do”, Gender Equity and Participation, and Scale, themes that I identify as important to political ecology theory and methodology).

“Something People Do”

Robbins argues that political ecology is not just a body of knowledge but “something people do” (2012, 4). This implies that the research a political ecologist does is an *action*, not simply the study of a phenomenon, and that the body of people that call themselves political ecologists are a *community of practice*, as argued again by Robbins (2012, 5). Research, then, is explicitly and necessarily political, as political ecologists “advocate fundamental changes in the management and the rights of people, directly or indirectly working with state and non-governmental organizations (NGOs) to challenge current conditions” (Robbins 2012, 13).

One implication of this view of political ecology is a commitment or even obligation to *act and be an actor rather than an observer or a participant*. I interpret this call for a researcher to be an actor as manifesting in three arenas: using the words of Paul Robbins, in the *community of practice* within academia (among other political ecologists and also among those academics and researchers who do not identify as political ecologists) (2012, 85); in the community of practice of those with whom I collaborate to research a problem such as food insecurity (this community includes the NGOs, farmer organizations, and families); and finally, within the wider community, otherwise known as “the public”. These are all, as Robbins calls it, the “constituency” of political ecology (2012, 86).

How one acts as a political ecologist is a question that greatly interests me, and that I explore in Chapter 6 when I share the results of the participatory action research process of the food security diagnostic study in San Ramón. Robbins argues that the “text,” or the narrative of the contextualized explanation of the political ecology of a problem, is the main tool a political ecologist possesses, and that “the power of political ecology, it is hoped by those who produce it, is ... that it would be difficult to do any of these [social, environmental or political tasks] the same way after having been immersed in such texts” (Robbins 2012, 98); that is, the perspective that a text communicates should influence the behavior of anyone “reading” it, changing their engagement in the problem entirely. These texts are not limited to academic papers or books, but include web posts, internal project reports, documentary videos, and more (21) (I utilize project reports and internal project management documents in my own analysis in this dissertation). These political ecological texts can effect change either by critiquing

existing structures (the “hatchet”), or by highlighting sustainable regulatory systems that already exist and attempting to proliferate them (the “seed”), according to Robbins (2012, 99). I approach my work in food security as a combination of the two: a critique of the overarching structures as well as a recognition and active promotion of the existing best practices at all scales.

As often as one hears the need for more public engagement and more action-oriented political ecology at geography conferences and in journals, the persistent question is *how to act*. I argue that besides using the political ecological “text” as the tool as Robbins argues, the research process itself is an even greater tool for action. This, of course, is not a new idea by any means. Robbins (2012) establishes the imperative to act but does not offer a critique of the methodologies for acting as such. I argue in the next section that established participatory action research (PAR) methods that engage stakeholders at various scales in the definition and description of a problem, and formulation of actions to address it, can greatly enrich the imperative to act and engage that is inherent in political ecology – in the public and academic spheres, and especially among the collaborative actors in the research itself. PAR can also help political ecologists confront head on issues of power in their research – not just the politics of the issue at hand, but also the politics of the researcher as an actor.

Gender Equity and Participation and the Feminist Morphology of Question-making

Feminist political ecology incorporates gender as an important factor in access to resources, political organization, and development on the assumption that gender differences are not rooted in biology but instead are social constructs (Rocheleau et al. 1997, 3). This evolving field has different manifestations: Maria Mies and Vandana

Shiva believe that the Western tendency of reducing human beings to consumers and objects of capitalism is “a direct assault on women and nature” (1993). They preach that a feminist approach towards existence will solve environmental and economic development problems because females are natural nurturers (Shiva and Mies 1993). Other practitioners of feminist political ecology take a different stance, rejecting the biological deterministic stance of Shiva and Mies that women are natural nurturers. Instead, Rocheleau et al. (1997) argue that because women’s roles in society are mental constructs of gender, they are affected by and act on, political economy and environment in distinct ways than men. Rocheleau et al.’s approach has more potential due to its recognition of “pluralities of meanings” in different environments and the embeddedness of gender in class and race, and its rejection of the universalist concept of the natural mother. It takes political ecology and improves its engagement with gender, providing a way to look at reality not only at multiple scales but also at multiple levels of gender, class, and age, acknowledging that reality and meaning cannot be the same across cultures and geographic places, or even across genders and generations.

The themes that feminist political ecology mostly deals with are the division of labor and power, and resource management in relation to marginalized labor (like women or children) (Robbins 2012, 83). The assumption is that processes of environmental change are essentially gendered, meaning that “men and women experience the environment differently and often have different access to and control over ecological systems, as a result of their divergent social and cultural roles” (Robbins 2012, 63). This means that women have different types of knowledge, access to environmental and political resources, and activism than do men.

This assumption should, upon first glance, have an explicit impact not only on how we approach the narrative or text of a problem, but also the methodologies we use to reach the narrative, starting with the identification of the questions the researcher and her collaborators at an NGO, a farmer group, or a community, identify as those to utilize in analyzing a problem within its context. There are two implications. First, researchers should acknowledge that “there is nothing inherent about scale” (Brown and Purcell 2005), and the dominant “masculine morphology” of constructing relationships based on (male) acknowledged linear relationships, is deficient; in turn, a “feminine morphology” of question-making and narrative is fluid and connective, focused on relations between things and fulfilling the “relational politics of the spatial” (Massey 2005, 147). This resonates with my approach to scale as a political ecologist, as I describe below.

The assumption that gender is manifested in social, economic, and environmental relationships also implies that we explicitly engage gender and generation in our data collection, analysis, resulting actions, and reflection on those actions. I will argue in the next section that PAR methodologies offer a useful set of tools and approaches that can assist a political ecologist in engaging with gender and generation in such a way that dominant power structures are not reproduced, but in fact, are critiqued and engaged.

Scale in Theory and in Practice

What people do on the earth is manifested at a number of different scales and, in turn, structures at different scales impact how people behave on the earth. Scale has long been a central concept within political ecology, but it has been treated more as a methodological question (“scales of analysis”) rather than a discussion that questions scale as the “object of inquiry” itself, according to Brown and Purcell (2005, 607).

Paulson et al. advocated for “multiscale research models that articulate selected ecological phenomena and local social processes, together with regional and global forces and ideas” (2003, 205). The focus on research models (methodologies of scale), rather than theories of scale itself, has led to what Brown and Purcell call the “local trap” (2005) in which political ecologists assume that the most effective scale of action to produce social, environmental, and economic equity and justice is the local one. Their proposal to political ecologists is to recognize that scale is fluid and “continually reorganized” (610) rather than inherent, meaning that in a given study scale as the object of inquiry must be determined by the social, economic, and environmental relationships surrounding the problem at hand rather than being assumed as fixed and given. We can, however, recognize that scale in some instances is also fixed in given lengths of time, including for example, state political structures (610). Their proposal for a theory of scale also includes the precept that scale is relational, meaning, “scales are embedded in other scales ... inseparably tied to each other, but the particular way they are related is open to social production” (610).

The socially constructed, fluid, and relational nature of scale and the theorization of scale as an object of inquiry are especially applicable to food systems studies: food crosses many economic scales throughout its chain of production, distribution, and consumption, as it is farmed or raised (with inputs, on land, by people in different combinations), bought or sold (locally, nationally, globally), processed (with energy), and eaten by those can access it in the end. For example, it is mind-boggling just to begin to map out the different physical and political intersections that one piece of fruit can

involve in its lifetime. Ian Cook has made strides in linking concepts of scale as a theory with his practice of engaging with scale in his “Follow the Thing” (2004) essay.

In this study, I have engaged in this concept of scale both in the methodology and in the creation of the political ecological narrative text that resulted from this dissertation as a representation of the problem I studied. I explore the relationships surrounding food insecurity in coffeelands and map them out in Chapter 5. The following are two of the five dominant “theses” or narratives of political ecology identified by Robbins (2012, 21-23) that I explore in this project.

Degradation and Marginalization

Degradation and Marginalization is a narrative of the transformation of environmentally healthy production systems to systems that unsustainably overexploit resources through changes in policy or other larger scale structures, creating an intensification of poverty or marginalization, and in turn proliferating the cycle of increasing overexploitation. Zimmerer writes “[political ecology’s] future contribution could show a considerable success if the nature of environmental modification is more fully and recursively integrated with theories of regional development and underdevelopment” (Zimmerer 1996, 179). This narrative of the cycle of interrelated environmental degradation, development, and marginalization is present throughout the story, in which smallholder coffee farmers have not only come to a point of economic overdependence on coffee for income and food security, but in doing so have lost the knowledge of practices necessary to conserve soil, water, and biodiversity in a monocultural landscape. Both parallel processes leave smallholder households vulnerable and nonresilient to crisis situations.

Conservation and Control

The very act of trying to conserve sustainable, traditional, or “natural” systems can result in control being seized from the hands of the very people living in the place in question. One of the most famous examples of this narrative is that of North American indigenous peoples being excluded over more than a century from territories they had actively managed and from which they extracted their livelihoods for centuries before Europeans arrived to first exploit and then “conserve” those areas. Once the conservators were evicted to reservations, not only did they suffer widespread structural marginalization, but the native tallgrass and shortgrass prairies they had effectively managed through fire (Keeley et al.) threatened to disappear. Similar stories exist in other regions of the world, for example involving indigenous peoples in the Serengeti in East Africa (Bender Shetler 2007).

This theme is laced throughout the story of coffee smallholders in Nicaragua – first in the rise of King Coffee in the 19th century that relegated all indigenous peoples there to peons on the plantations, disrupting their traditional management strategies so reliant on the social organization that was interfered with. It is present again with the Green Revolution (GR), when farmers were convinced that their “messy” coffee cultivation systems were just not productive, and were encouraged by a global hierarchy of chemical companies, international aid organizations, and their own government to abandon established soil conservation and shade management practices in favor of chemical fertilizers, herbicides and fungicides, which in turn assured their dependence on those inputs to produce and thus forfeiting their lack of control over the very landscape they manage. Creating a more productive landscape also meant producing less food on-

farm, again creating a dependence on food grown outside the community (often on plantations), diminishing local control over the food system as a whole.

Many efforts to promote community and household food security and sovereignty, like the project that I write about in this dissertation, are efforts to combine the local technologies that are in threat of extinction with outside technologies that are judged to be “sustainable” (in our project, for example, we are promoting many biointensive gardening techniques, like double-digging, for example), and revitalize local organizations, to reestablish local control of food systems. Political ecology as a field must be careful to ask the same questions of these efforts as they do of traditional development projects – namely, is the effort itself taking control away from the producers themselves in some way by imposing rules or judgments about what is “sustainable”?

2B. Intersections with other Frameworks and Opportunities for Mutual Enrichment

Political ecology is present in the other literatures I utilize, especially in the bodies of knowledge pertaining to agroecology and PAR; in fact, these can be viewed as part of the larger body of knowledge of political ecology. Studies of food security and sovereignty (FSS) can also be considered part of the larger body of political ecology literature, since it deals so explicitly with rural livelihoods. FSS is informed by political ecology, but the FSS literature could benefit from long-held tenets of political ecology, especially the explicit integration of analyses of multi-scalar analyses of human-environment relationships in improving both conceptualization of the causal dynamics (or chains of explanation) as well as methodologies for studying the causes and dynamics of food insecurity. Most food security studies tend to focus on either household or national

scale analyses, and sometimes the community scale, but rarely do they integrate these different scales, and as far as I have seen, they never present a conceptualization of specific scalar relationships related to food insecurity. At the national scale, the politics of the institutions involved, including government agencies and international agencies like the FAO, are not considered, and the stark numbers of the food “balance sheets” often used do not tell the story of how the current situation came to be. Food sovereignty literature, most of it originating with the social movements themselves, come closest to identifying specific political structures and policies that specifically create the situation of a community without food sovereignty.

The literature on FSS can also benefit from more active interaction with the PAR literature. PAR permits a more active engagement and taking into account of cultural factors, which are problematic or absent in most food security studies; the FAO has stated that cultural preferences must be taken into account, but the reference is murky and its applicability is unclear (Schanbacher 2010, 30). Though the food sovereignty social movement discourse addresses cultural preferences explicitly and centrally (see Via Campesina’s 2007 Declaration of Nyeleni), methodologies for studying and evaluating food sovereignty could benefit from the experience of PAR as a field in terms of specific methods for integrating elements of culture into study design, analysis, and formulation of strategies and actions.

The FSS social movement can also benefit from political ecology and PAR principles and practices to avoid romanticizing “local” food systems as a solution, as per the “local trap” (Brown and Purcell 2005). In 1999 Patricia Allen explored the topic of food security and the issues involved in its then-surgingly links with the local food

movement. Citing a movement to promote local food systems as the solution to community food insecurity, she highlighted various problems with local food systems: although they do increase access to food for low-income consumers, decentralize power over food systems, create a sense of place and pride in place, and promote increased awareness of food systems among producers and consumers alike, the idea of local food systems tends to also homogenize “community”. They are also driven by ideologies that are mediated by income, occupation, gender, race, ethnicity, and other factors that can lead to local food system initiatives not addressing the needs of the most disenfranchised residents, and also create power imbalances. Allen argued for solutions wherein the problems are identified locally and by a wide array of actors that address issues of labor (which is often not local), low wages, and high costs of living, and that especially include complementary state interventions – social movements cannot do it alone, she essentially is stating. The political ecological theorization of scale as fluid, socially constructed, and relational, combined with the PAR methodology of including multiple stakeholders in analyzing a problem could help the food security and sovereignty movement to avoid the “local trap” as it were.

PAR is a critical tool for researchers to take the lessons learned in FSS studies to benefit the larger body of political ecology knowledge. Through PAR, FSS studies can feed back into political ecology as a body, and greatly enrich its exploration of academic public engagement. PAR is the instrument through which this can happen. In my work related to this project, and others I am executing, I believe that the quality of the work and also the subsequent impacts, benefit from my interactions with coffee farmers and families, cooperative staff members, other development agency and nonprofit project

managers, professionals in the coffee industry, and students at the University of California, Santa Cruz (UCSC) campus where CAN's offices are located. I am constantly exposed to new questions, insights, and approaches, and also share mine with all of these people, and we all change our own thinking and behavior through this constant dialogue. This is the least formal part of PAR, that of sharing with folks outside the immediate sphere of the research itself; it is the least talked about, but is definitely the elephant in the room, as it is potentially the kind of engagement that is impactful but that we have not quite measured yet, either in the realms of PAR, in food security and sovereignty, or even in political ecology, where public engagement is a subject of constant questioning and debate at national conferences. By engaging explicitly with PAR's body of knowledge on methods of engagement, the body of knowledge in political ecology can become even more relevant to the communities and people affected by the problems being studied. PAR can also help the academic community meet demands to engage the public in its work. Basically, political ecology as a field could utilize PAR to transform itself into what it says it wants to be – engaged and relevant to real human beings and their challenges in living on this earth.

Political ecology and FSS can both benefit from the integration of the body of literature on agroecology. Agroecology makes the physical – and especially the agricultural – landscape present in this study and in any study of human-environment relations that involves food. Agroecology illuminates the multi-scalar networks of food systems, in this way giving an explicit food emphasis to political ecology, enriching this field's focus on the environment as a productive and multifunctional landscape.

Like PAR, classic research in agroecology also emphasizes the value and necessity of participatory methods of investigation (see Thrupp 2000; Bacon, Méndez and Brown 2005; Holt-Giménez 2006; Altieri and Nicholls 2008; Wilson 2011) as these methods have proven to be beneficial in facilitating the adoption of agroecological approaches to agricultural production and development (Thrupp 2000; Bacon, Méndez, and Brown 2005). Of related importance is the emphasis of agroecology and also food sovereignty on the value of traditional and indigenous knowledge as a foundation upon which to strengthen local agricultural and food systems.¹ PAR methods are appropriate to research not only in agroecology but also other related areas, such as food security, indigenous practices, and food sovereignty, precisely because they maintain the integrity of local knowledge by involving farmers and community stakeholders in the research process, thereby empowering communities to be stewards of their own community development (which is a key principle of agroecology²) and community food security. Furthermore, PAR allows for the tailoring of the research agenda, data collection and analysis to the context of the study area and the needs of community stakeholders.

Agroecological methods are increasingly positively linked to strengthening food security (Altieri 2002/2009; De Shutter 2011). This is in part because of agroecology's multidimensional approach to production that emphasizes environmental health, socio-economic well-being, and cultural preservation. This is particularly important for rural communities where the bulk of the world's hungry and malnourished reside (FAO

¹ Vía Campesina (n/d) argues, “[t]ruly sustainable peasant agriculture comes from the recovery and revalorization of traditional peasant farming methods, and the innovation of new ecological practices” (p. 6).

² See http://www.agroecology.org/Principles_List.html, particularly the section on “Empower People”.

2010b), the majority of which are involved in agricultural and food production.³ De Shutter (2011) points out that one of the greatest challenges will be achieving food security for the world's poorest, especially small scale farmers in the global South. He argues for the benefits of agroecology as a vehicle to strengthen food security among small-scale farmers, specifically its focus on empowering small farmers by revaluing their knowledge and participation as experts; its potential to increase incomes of rural farmers with less dependence on external inputs, thereby reinvigorating rural economies; diversifying local agricultural production, which leads to more nutritional diversity; and enhancing environmental sustainability “by delinking food production from our reliance on fossil energy (oil and gas) ... [and] mitigating climate change, both by increasing carbon sinks in soil organic matter and aboveground biomass, and by reducing greenhouse gases (GHGs) through direct and indirect energy use” (235).

In light of the benefits of agroecology and specifically traditional agrobiodiversity for local food systems, I argue that coupling PAR (which I discuss in more detail below) and agroecology enrich political ecology, yielding results that: 1) are the product of involving farmers in the development of the study, interpretation of the data, and identification of strategies joining indigenous with Western knowledge to address the complex causes of food insecurity and avoid the pitfalls of the positivist-reductionist paradigm that attempts to impose one cause and one solution for a given problem (Berkes 2008, 264), and 2) lead to the development of more sustainable, effective, context-oriented, and culturally and environmentally-appropriate strategies for strengthening food sovereignty and enhancing community food security because of their joint focus on local knowledge and practices. In the PAR model used in the study, I emphasized the

³ See <http://www.fao.org/hunger/en/>.

revitalization of traditional production systems and food cultures, which all of the stakeholders agreed from the outset is highly critical for increasing or restoring agrobiodiversity, which in turn is argued to increase resiliency.

2C. Agroecology: Combating “De-peasantization” and Promoting Sustainable Food Systems

There is growing consensus that the agroindustrial food system model has thus far failed to render effective results and has rather been particularly destructive, especially for rural communities and smallholder farmers (Gliessman 2007). The industrial model focuses on highly intensive, high input production to maximize yields using monocultures, modified seeds (e.g., hybrid and genetically-modified varieties), mechanized labor, and fossil fuels in conjunction with market-based approaches to agricultural and rural development. Much of the existing evidence suggests that these practices are not sustainable over the long term either ecologically or socially. The environmental costs have been extreme and include soil erosion, decreased soil fertility, and a decline in overall productivity over the long term; a decline in overall biodiversity and, more specifically, the genetic diversity of food crops; widespread pollution from the increasing use of agrochemicals; increased demand for precious fresh water sources, which the industrialized model requires to sustain yields; and has also contributed to climate change not only through the alteration of the Earth’s soils (thereby increasing the production of ozone-depleting gases by soils) but also through its dependence on fossil fuels for agrochemical production and mechanized labor (Rosset and Altieri 1997; Clay 2004; Rosset 2006; Gliessman 2010). The social costs have been dire: industrial agriculture has threatened local livelihoods through the restructuring of agrifood systems

under the rubric of market-oriented development, especially in recent decades (see McMichael 1994). The subordination of food production to the market imperative has resulted in the disembedding of economic relations between people and land as the distance between sites of production and consumption continues to expand (Friedmann 1993, 220). This trend is also evidenced by the deepening global division of labor between the global North and South that has resulted in subordinating production in the South to the demands of the global market through export-oriented development models (McMichael 2003, 70-71).⁴ As local and national regulation decreases in favor of market mechanisms, power over the agrifood system is increasingly concentrated in the hands of market players, particularly agribusinesses and other transnational corporations involved in food production, processing, and distribution, and out of the hands of local producers and consumers (McMichael 2003).⁵

The agroindustrial food system model has served to further marginalize rural communities and deepened the process of “de-peasantization,” defined both as “the erosion of an agrarian way of life” (Vanhaute 2010, 6) and as “the phasing out of a mode of production to make the countryside a more congenial site for intensive capital

⁴ As Thrupp (2000) explains, one effect of this reorientation of agricultural systems towards export-oriented, market-led development is the homogenization of cultivated varieties, thereby limiting biodiversity in agroecological systems. She further points out, “Although people consume approximately 7,000 species of plants, only 150 species are commercially important, and about 103 species account for 90 percent of the world’s food crops” (p. 269). See also Sauerborn 2002.

⁵ Several other facets of agrifood system restructuring are noteworthy. First, the effects of food aid and “dumping” have created and deepened food dependency in the global South (McMichael 1998) by artificially lowering food prices in such a way that local producers find themselves unable to compete (Rosset, 2006). Furthermore, the recent phenomenon of “land-grabbing” by global financial and investment corporations for the purposes of biofuel and export-agricultural production has only served to further marginalize local populations from land and impact livelihoods (see Bello and Baviera 2009; Zoomers 2010; Rosset 2009, 2011). Lastly, speculation on agrifood commodities as a result of financial deregulation, one of the cornerstones of the neoliberal approach, has also deepened the crisis of local livelihoods (Ghosh 2010).

accumulation” (Bello and Baviera 2009, 27, citing Bryceson 2000). According to McMichael (2008), de-peasantization results from “the combined pressures of evaporation of public support of peasant agriculture, the *second* green revolution (privatized biotechnologies and export agricultures to supply global consumer classes), market-led land reform, and WTO trade rules that facilitate targeting southern markets with artificially cheapened food surplus exports from the North” (p. 209). Related to these factors are other challenges to maintaining traditional food and production cultures, which include a shift away from the use of traditional crop varieties to cash-crops for export (Ghosh 2010), the associated introduction of genetically modified organisms – either voluntarily or involuntarily (see McAfee 2003 on genetic pollution of native maize varieties in Oaxaca, México), and the influx of imported foods into local communities that are culturally inappropriate (see Friedmann 2005, 257). Furthermore, the standardized approach of the industrial model fails to value the diversity of practices that are reflected in traditional agricultural systems, which are the product of specific cultural traditions adapted to local environments. Finally, the subordination of traditional production systems to the industrial approach serves to weaken the ecological integrity of rural communities. This is particularly important in light of the high level of environmental impact of industrial agroecosystems (as noted above) and the relatively low level of environmental impact of traditional systems (Altieri and Koohafkan 2008).

Despite the negative impacts of petrochemical agroindustry, which include increased pest resistance, reductions in insect pollination, water contamination and pesticide drift (which has adverse effects on human as well as environmental health), farmers continue to rely on petrochemical pesticides, according to Wilson and Tisdell

(2001); two theories they propose are the low cost of pesticides, and the political economic contribution of the chemical companies themselves, who often pair the purchase of seed and chemicals, creating a cyclical dependence on the part of the farmer on the chemicals themselves.

In contrast, as Altieri and Toledo (2011) explain, “[a]groecological initiatives aim at transforming industrial agriculture partly by transitioning the existing food systems away from fossil fuel-based production largely for agroexport crops and biofuels towards an alternative agricultural paradigm that encourages local/national food production by small and family farmers based on local innovation, resources, and solar energy” (p. 588). So far these initiatives, as well as those to protect and encourage traditional systems, show much promise as an alternative to agroindustrial systems as they encourage genuine food security, especially for the most vulnerable communities. Research shows that agroecological systems can be just as if not more productive than agroindustrial systems (Altieri and Toledo 2011) and have been shown to increase yields (Pretty 2003; De Shutter 2011, citing Pretty et al. 2006 and the UK Government Research Office for Science 2011). Furthermore, agroecological production is more resilient to climate change and climactic disturbances and disasters (Holt-Giménez 2006; Altieri and Koohafkan 2008) and more energy efficient (Gomiero, Paoletti, and Pimentel 2008), both of which are key factors in the contemporary era of energy and climate change debates. Altieri and Toledo (ibid) delve more deeply into the relationship between sovereignty and resiliency by arguing that “Agroecology provides the principles for rural communities to reach food sovereignty but also energy and technological sovereignty within the context of resiliency ... Agroecology provides the principles to design resilient agroecosystems

capable of withstanding variations in climate, markets, etc., while ensuring the three broadly but inter-linked sovereignties” (p. 607). Thus agroecology is a key strategy to promoting community food security, as it strengthens local control over the food supply and distribution systems.

Improvements in soil health have also been noted, which contribute to the long-term health of the agricultural system (Pretty 2003). Much of the success of agroecological initiatives is owed to the emphasis on agrobiodiversity, which results in reduced vulnerability, high genetic diversity, and the need for fewer inputs.

Agrobiodiversity is also critical for enhancing the variety of foods available to local people for consumption, thus contributing to nutritional diversification (Pretty 2003) through both subsistence agriculture and market distribution, which in turn strengthens livelihood resiliency (Toledo et al. 2008).

Agroecology is defined as “the application of ecological principles to the design and management of sustainable food systems”⁶ (Gliessman 2007, 1) and includes the “integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions” (Francis et al. 2003, 100). In practice, agroecology emphasizes the creation of productive and resource conserving agroecosystems that are “culturally sensitive, socially just, and economically viable” (Altieri 2002, 7; Altieri 1995). Traditional farming systems are a fundamental source of instructional knowledge for developing agroecological principles and practices as many of these systems have evolved and developed over centuries and display multiple characteristics that attest to

⁶ Altieri (2009, 3, citing Gliessman, 1998, Altieri, 1995, and Altieri and Nicholls, 2005) further explains that it is premised on “enhancing the habitat both aboveground and in the soil to produce strong and healthy plants by promoting beneficial organisms while adversely affecting crop pests (weeds, insects, and nematodes).”

their deep relationship and knowledge of the environments in which they were born.

Particularly salient features of these systems that are instructive for agroecology include the following (Altieri and Toledo 2011, 591, citing DeWalt 1994, Koohafkan and Altieri 2010):

(1) High levels of biodiversity that play key roles in regulating ecosystem functioning and also in providing ecosystem services of local and global significance; (2) ingenious systems and technologies of landscape, land and water resource management and conservation that can be used to improve management of agroecosystems; (3) diversified agricultural systems that contribute to local and national food and livelihood security; (4) agroecosystems that exhibit resiliency and robustness in coping with disturbance and change (human and environmental), minimizing risk in the midst of variability; (5) agroecosystems nurtured by traditional knowledge systems and farmers innovations and technologies; and (6) socio-cultural institutions regulated by strong cultural values and collective forms of social organization including normative arrangements for resource access and benefit sharing, value systems, rituals, etc.

A commonly cited example of an enduring, traditional, polyculture system is the genetically diverse Mayan *milpa*, where beans, corn, and squash are grown and symbiotically interact alongside other crops like chile. Adding to the agrobiodiversity and resilience of these systems is the dynamic interactions driven by both human and natural selection, which foster the creation of new varieties adapted to the environmental context (Isakson 2009). Versions and iterations of this basic *milpa* system exist throughout Mesoamerica, with variations in planting cycles, associated crops, varieties, and

techniques utilized, according to local customs, knowledge, and available natural resources.

Agroecological practices promote long-term sustainability precisely because they aim to mimic the original interactions of the natural environment of the area in question (Gliessman 2007, 23). They accomplish this through combining traditional and indigenous knowledge with aspects of modern science and technology, emphasizing “biodiversity, recycling of nutrients, synergy among crops, animals, soils, and other biological components, and regeneration and conservation of resources” (Altieri, Rosset, and Thrupp 1998, 1). Enhancing agrobiodiversity is a key aim of agroecology, and this is not only fostered by increasing the genetic diversity of plants but also by appropriately integrating multiple species of animals, from which important, ecologically-sound sources of fertilizer, pest control, and labor can be derived. Agrobiodiversity contributes to the need for fewer inputs, thus conserving natural resources, and enhances soil fertility.

But agroecology is not only about mimicking the natural environment; it is also about how humans engage with the agroecosystem through their livelihoods. As stated above, agroecology refers to the entire food system, including economic and social aspects. It emphasizes the diversification and conservation of economic resources, empowering local people to be both stewards of and experts on their communities, and seeks to enhance human health and strengthen culture.⁷ It favors small-scale, local production and consumption systems that add to the self-reliance of local communities (Altieri and Toledo 2011). Although agroecological practices in food and farming systems can take different forms in different places, they generally revolve around a set of principles, as defined by Altieri (2012):

⁷ See www.agroecology.org.

1. “Enhance the recycling of biomass, with a view to optimizing organic matter decomposition and nutrient cycling over time.
2. Strengthen the “immune system” of agricultural systems through enhancement of functional biodiversity -- natural enemies, antagonists, etc.
3. Provide the most favorable soil conditions for plant growth, particularly by managing organic matter and by enhancing soil biological activity.
4. Minimize losses of energy, water, nutrients, and genetic resources by enhancing conservation and regeneration of soil and water resources and agrobiodiversity.
5. Diversify species and genetic resources in the agroecosystem over time and space at the field and landscape level.
6. Enhance beneficial biological interactions and synergies among the components of agrobiodiversity, thereby promoting key ecological processes and services.

Implicit in these principles is the questioning of engagement with the global agroindustrial complex and the required divorcing of dependence on the system for farmers and consumers. Also implicit is the impact on the health of the human organism as a result of implementing these principles – healthy soil, healthy water, diverse genetic resources, also mean healthy food, and healthy people – both producers and farmers. Agroecology is, then, focused on the entire food system as a whole.

2D. Participatory Action Research

Participatory Action Research (PAR) emerged in the context of the rise of poststructural social theories. According to Kinden et al., PAR “involves researchers and participants working together to examine a problematic situation to change it for the

better” (2007, 1). PAR treats all participants as competent agents in a collaborative process, incorporating multiple perspectives within a community into the creation of new meanings based on reiterative reflection and action (Kinden et al. 2007, 14), essentially challenging dominant epistemologies of knowledge. These principles are rooted in critical social science theories and practices, especially feminist poststructuralism and feminist political ecology, as well as emancipatory community-based research processes developed in the 1960s and 1970s in Brazil and contemporaneously in Africa, India and other parts of Latin America.

Although PAR’s early roots extend to post-WWII researchers, most narratives of PAR origins identify the point of conceptual identification of PAR as beginning with the work of Paulo Freire in Brazil in the 1960s and 1970s to develop methodologies of popular participation in processes of knowledge creation and social transformation, especially the creation of consciousness of injustice and of using collective consciousness to inform action, most commonly known through Freire’s landmark book *Pedagogy of the Oppressed* (first published in Portuguese in 1968 and in English in 1970). Kinden et al. (2002) describe contemporaneous efforts in India that continued and revised the ideas put forth earlier by Mahatma Gandhi to draw on local knowledges and narratives to resist colonial rule. A second wave of PAR took place in the 1980s in the context of international development; community and rural development contexts continue to be a major focus of PAR researchers and researchers. Those that add “Participatory” to their Action Research projects signal a commitment to the legacies of Freire, Gandhi, and other early PAR practitioners to “political commitment, collaborative processes, and participatory worldview” (2007, 10).

The approach is rooted in a cyclical process of looking, reflecting, acting, and sharing between the investigators and the communities involved, resulting in a process of knowledge production in which reflections about actions are constantly monitored and reintegrated into actions in a dialogic process (Bacon, Méndez and Brown 2005, 2) (see Figure 2). As Méndez et al. (2010) argue, the value of PAR approaches is that “they are done with the participation of communities, produce relevant and necessary data, and facilitate capacity building and support networks” (p. 371).

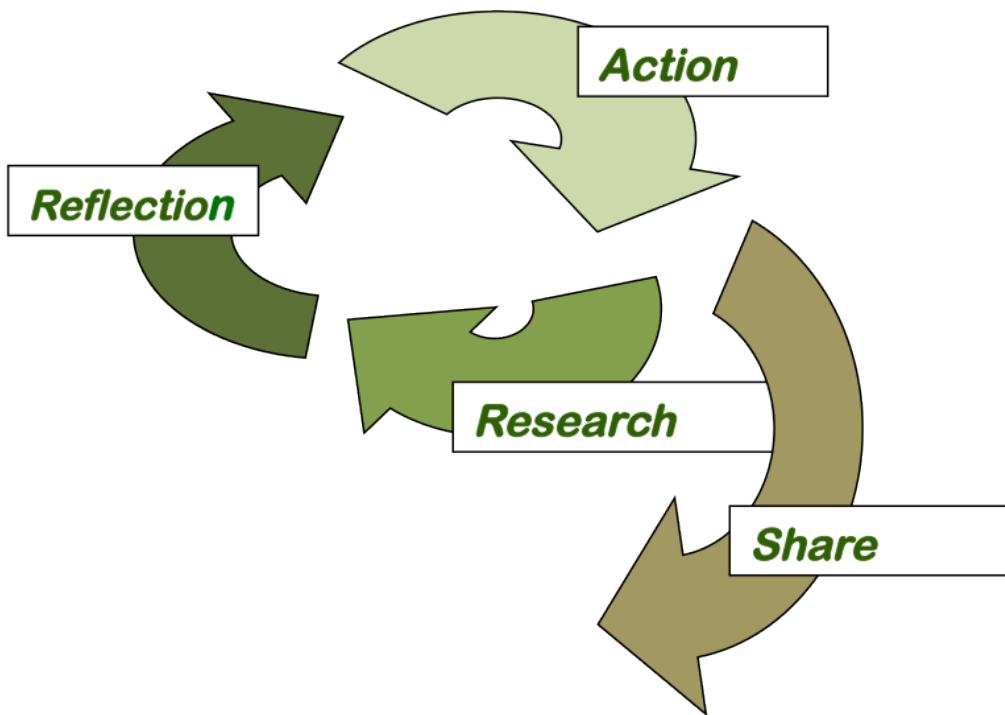


Figure 1: The PAR Cycle (courtesy Christopher M. Bacon, Santa Clara University).

In work related to rural livelihoods, participatory research has had several manifestations and issues. Participatory Rural Appraisal (PRA), which can be defined as “a family of approaches and methods to enable rural people to share, enhance, and

analyze their knowledge of life and conditions, to plan and to act,” has many approaches within its family, including activist participatory research, agroecosystem analysis, applied anthropology, field research on farming systems, and rapid rural appraisal (RRA) (Chambers 1994, 953-956); thus it can be considered a kind of umbrella family of methodologies. PRA parts from its counterpart of RRA in that it is focused on local ownership of the research process, and the designing of actions stemming from local analysis of the problems and issues identified, while RRA is a methodology more related to donor elicitation and extraction of information, according to Chambers (1994, 956). The valuing of the analytical ability of rural peoples and peasants is a tenet of PRA (Chambers 1994b, 1255) that informs the present study, as well as some of the methodologies PRA traditionally uses, including “They do it” (in which subjects themselves perform the research), stories and case studies, sharing of information and ideas, and especially livelihood analysis (Chambers 1994, 959-960), which is the main methodology employed by this study.

Chambers emphasizes that in participatory research, there are different ways that “participation is used” – it can be a cosmetic label used to give a positive face to the work being done without involving real local ownership of the project; it can also describe a co-opting process in which participants contribute their time to an outside-led project process; or it can be an empowering process in which the “we” describes project beneficiaries actively involved in decision making (Chambers 1994c, 2).

Participatory Action Research and Feminism: Addressing Power Inequities and Gaps in Participation

Kinden et al. also argue that many narratives of the origins of PAR do not adequately acknowledge the role of feminism (2002, 11) and, in turn, I argue, of poststructuralism. Feminism is a set of critical social theories from which poststructuralism arguably emerged. Poststructuralist theorizations of the natural and cultural mediating each other or, as described by Gillian Rose, the idea that “culture is materialized ... and matter is enculturated” (2003, 58) were enriched by geographical insights of the role of agency in place, which creates multiple meanings and identities rather than hegemony in place. Following the poststructuralist realization that there is always multiplicity in the generation of meaning came the idea that these multiplicities are not endless, because there are “cracks in the narrative”, according to Murdoch (2006, 9), that is, power inequities and negotiations that make some narratives visible and others not – there are alternative meanings within and between signifying systems that are fluid and changing depending on the power dynamic. Feminists first demonstrated this in terms of the gendering of experiences.

Although sexuality and gendered differences remain central to feminist theory, the feminism critique itself refers to a wider attention paid to differential and shifting human experiences of the world based on gender, class, race/ethnicity, ability, age, and nation as organizers of social life (Sprague 2005, 3), as are space and scale (Kinden et al. 2007, 3). These insights of feminist theorists like Donna Haraway and Sandra Harding, interacted with those from feminist political ecologists like Dianne Rocheleau as to the

importance of decision-making processes and the contexts that shape policy-making processes (Rocheleau 1996, 3-4), form the conceptual and practical basis of PAR.

The “critical” part of feminist theory means that feminist researchers are not solely interested in the functioning of the interaction between social organizing structures like gender and the local generation of meaning, but also in how to take action to make society more equitable (Sprague 2005, 3). PAR’s engagement with space and scale are indicative of its roots in critical social science as well as its commitment to exploring—and changing—the relationality and interaction of the organizers of social life. PAR explicitly commits to the idea that things happen in a place, a place where action can be taken but that connects to a wider context. This grounded connectivity of PAR methodologies is unmistakably poststructuralist in origin and reflective of a specific ground that feminism shares with critical realism, that of the actionable middle ground between structures and agency, or the creation of specific meaning in specific places.

Method is “a technique for gathering and analyzing information” while methodology is “how we use the methods” (Sprague 2005, 5). Methodology, then, is not something technical, but a space of immense potential, from which our very questions emerge, which bridge epistemology and methods. The centrality of the *process* of question making in PAR methodologies is derived from feminist thinking on research and the validity of certain ways of knowing. I think the feminist reasoning on the importance of question making in the research process is best represented by Irigaray’s critique of dominant ways of knowing, or what is known as “masculine morphology” (1985). A masculine, or solid, culture demands a discourse that is “clearly defined, fully knowable, with clear boundaries and no overlaps with other things” (Rose 2005, 59), that is

essentially linear with clear causality and correct, normative answers to questions. In contrast, Irigaray's "feminine morphology" is fluid and connective, focused on relations between things and filling the stationary gaps left by masculinity, which denies nonlinear connectivity (Rose 60) and is instead what Massey calls an "arelational politics of the spatial" (2005, 147).

This critique of how we know what we know (epistemology) is clearly at the heart of PAR methodologies. Question making and answering in a PAR study is a collective, cyclical process of Reflection → Action → Reflection. Methods for doing this often include storytelling, participatory mapping, visualization, diagramming, political action, and dialogue in various forms. These methods arguably reflect the "permeability" of feminist approaches to information gathering (Rose 2003, 62), as they will result in different answers to the questions being asked. The cyclical nature of question making and answering in PAR also reflects this permeability, as the research activities often result in more questions rather than in a definite (masculine) answer.

PAR research still reflects an ideology; it still contains a power dynamic. PAR practitioners are engaged not only in research but also in the fluid processes of negotiating their own place as subject/object in the process. The researcher, even as one actor participating in the reflection/action dialectic, is still the researcher and has a modicum of control over the process given her role as a bringer of information, resources, connections and contacts, and embodiment of historical legacies. Her necessary goal of completing a project to earn a degree or publish a paper also shapes the process to a degree that cannot be ignored. Complicating the PAR process further – especially in the context of a project with a funder and multiple stakeholders – are power relations

associated with agendas that donors, researchers, farmer organizations, and other actors may have. A PAR researcher needs to be cognizant of these things, and that very cognizance is a legacy of feminist thought; the process of identifying the specific mechanisms of power and acting on them is a challenge to the dominant hierarchy of value (Sprague 2005, 8), a basic feminist tenet.

2E. Food Security and Sovereignty

“Food Security” is a term that has shifted over the last fifteen years or so from being a topic that applied primarily at the national scale and used mainly by governments, to being a topic and issue coopted and adopted by everyone from farmer social movements (like the movements Via Campesina and Campesino a Campesino in Latin America), major nonprofit organizations and NGOs (like Catholic Relief Services, Heifer International, and Lutheran World Relief), as well as local community groups and farmer organizations. This shift has been concurrent with shifts in the scale of reference of the term food security, from national to local or regional.

In this section I first discuss the core elements of food security and food sovereignty as distinct concepts, and then present and discuss the framework of food security and sovereignty used in the study, and present in a table how it intersects with the other fields informing this study. The value of this approach for data analysis is that it permits both the measurement of food security goals, as per the Food and Agriculture Organization (FAO) approach described below, and allows for the consideration of other factors, processes, and approaches that may enable the sustainable and long-term achievement of these goals – factors that are place-based and may have subjective cultural meanings.

One of the most widely used definitions of food security is that of the Food and Agriculture Organization (FAO), which states that food security “exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” and, furthermore, “[h]ousehold food security is the application of this concept to the family level, with individuals in households as the focus of concern” (FAO 2010, 8). The concept of food security has been extensively treated in the literature (e.g., Schanbacher 2010), and thus we focus here on the four “dimensions” of food security identified by the FAO that need to be maintained simultaneously in order to achieve food security. These include access, availability, utilization, and stability, and are explained in Table 3 below.

Table 3: Four Dimensions of Food Security (adapted form FAO)

Availability	Denotes the physical availability of food and is determined by the level of food production, food reserves, and the food trade.
Access	Refers to the economic and physical access to food and is determined not only by the availability of food but also the income of individuals, the prices of food, and markets.
Utilization	Refers to the biological ways that the body makes the most of the nutrients in food; satisfactory utilization is the result of good care and feeding practices, food preparation, diversity in the diet, and the distribution of food among members of the household.
Stability	Connotes the stability of the other three dimensions over time, which implies the uninterrupted availability, access, and utilization of food with potential disruptions being caused by a variety of climactic, political, and social, and economic factors.

More recent definitions of food security, including the one above, reference culture by way of mentioning the significance of food preferences, noting that these are either “culturally or socially determined” (FAO 2003, 27; see FAO 1996), though some argue that this reference is quite weak (Schanbacher 2010, 30) and requires more nuance to define how food preferences interact with other factors in food security.

Community Food Security “works to build a community-based food system grounded in regional agriculture and local decision-making” (Allen 1999, 119); this is distinct from the anti-hunger movement, which focuses more on short-term hunger alleviation strategies, and does not focus on where or how food is produced (see Table 4, from Allen 1999, 120). It has been strongly argued that “if hunger and undernutrition are a function of people’s lack of control over the food production and distribution system, then it is essential that empowerment strategies are developed in order to reassert ownership” (Allen 1999, 120 citing Poppendiek 1997, 175). Food Sovereignty has emerged as the framework to achieve community food security through empowerment.

Table 4: Comparison of community food security and anti-hunger concepts (adapted from Allen 1999)

	Anti-hunger	Community Food Security
Model	Treatment; social welfare	Community development
Unit of Analysis	Individual/household	Community
Time frame	Shorter-term	Longer-term
Goals	Social equity	Individual empowerment
Conduit System	Emergency food, federal food programs	Marketplace, self-production, local/regional food
Actors	Government, aid agencies	Community organizations
Agriculture relationship	Commodities; cheap food sources	Support local agriculture; fair prices for farmers
Policy	Sustain food resources	Community planning

Resilience as a Key Element of Food Security

Food resilience is a term more and more often used in conjunction, and sometimes interchangeably, with food security. Often it is explained as a goal of food security, and other times as an indicator of food security. I would argue that food resilience is both. Resilience in general terms involves three principles, according to the Resilience Alliance (Gibbs 2009):

1. The amount of change the system can undergo and still retain the same controls on function and structure.
2. The degree to which the system is capable of self-organization, and
3. The ability to build and increase the capacity for learning and adaptation

Applying these principles to local agricultural systems means valuing the ideas of learning, adaptation, innovation, novelty and self-organization in addition to the general ability to persist during a disturbance, disaster, or other extreme event (Folke 2006).

Thus what distinguishes *resilience* from the much used and more commonly known term *sustainability*, is the element of learning and innovation, of change over time and the ability to adapt to that change. Resilience is at heart an ecological concept, emphasizing dynamism over a static state as the dominant reality of life on earth, and taking as an undeniable foundational principle that human beings' existence is fully intertwined with their environment (Folke 2006). Understanding this concept, resilience is “not only an outcome but a process which uses different resources and capacities to attain a result that is adaptive” and also improving (Anonymous 2012, 6); in other words, managing a system for resilience can enhance the likelihood of that system being sustainable (Rockström 2003).

Social-ecological resilience is the adaptation of the principle of resilience of systems to the human context. Folke et al. (2003) developed a conceptual model of building resistance in social-ecological systems, citing mechanisms of risk management, adaptive capacity, and mitigation that humans use to build resilience. Food resilience, that is, the resiliency of the food system, is of critical importance, as it has been shown that “resiliency to climate disasters is closely linked to the level of on-farm biodiversity”,

a key element of agroecological farming systems; diversified plots also have more topsoil and, in the case of coffee production, plots with diversified shade have been shown to conserve more ground water and thus promote resilience to drought for the crop and associated species being cultivated (Altieri 2012, 14). Human livelihoods are closely linked, then, to the resilience of the food system and their ability to manage risk and adapt to extreme climate events like storms and drought. Table 5 is based on Folke et al.'s model of building resilience, with examples of secondary processes related to food systems resilience taken from strategies implemented in CAN's own work in various community food security initiatives in Mesoamerica over the last three years. The weakness of Folke's model is that it does not concretely integrate indicators of access, availability, and usage, focusing instead on adaptability of knowledge systems and social structures, and not so much on practices. I argue that the framework of Food Security and Sovereignty in the next section serves as a more adequate framework to measure resilience, as it integrates elements of food security, sovereignty, and resilience, many of which overlap.

Table 5: Folke et al.'s model of building resilience, adapted to food systems

	Secondary process	Examples of secondary processes in food systems resiliency
Learning to live with change and uncertainty by:	Evoking disturbances	Burning cover crop to increase soil fertility
	Preparing for surprise	Storing food, creating disaster management plan; investing in disaster infrastructure and kits
	Learning from crises	Changing crop storage techniques
	Creating and sustaining social mechanisms for participation and conflict resolution	Forming a cooperative or committee to manage a community seedbank
Nurturing diversity for reorganization and renewal by:	Nurturing ecological memory	Creating school gardens that promote local varieties and production, consumption techniques
	Sustaining social memory	Creating local jobs to prevent outmigration.
	Enhancing social-ecological memory	Promoting pride in local practices and traditions, Revitalization of local heirloom varieties, creating new traditions with young people.
Combining different types of knowledge for learning by:	Combining experiential and experimental knowledge	Knowledge exchanges and implementation of new knowledge on-farm or in-kitchen.
	Expanding from knowledge of structure to knowledge of function	Identify sources of seasonal hunger.
	Building process knowledge into institutions	Training technicians in agroecological science and practices, and how to teach them.
	Fostering complementarity of different knowledge systems	Identification of best practices in local agriculture and agroecological science, and teaching both to farmers.
Creating opportunities for self-organization toward sustainability by:	Recognizing the interplay between diversity and disturbance	Tracking relationship at farm level between disturbance, crop diversity, and seasonal hunger
	Dealing with cross-scale dynamics	Creating new market linkages in income generation strategies
	Matching scales of ecosystem and governance	Creating local food security committees
	Accounting for external drivers of change	Identifying the role of market swings in creating crop shifts and seasonal hunger.

Food Sovereignty as a Means to Achieve Food Security: A Combined Analytical Framework

Food sovereignty is a concept that has increasingly gained the attention of scholars and development practitioners in recent years, and it has not only become a core focus of many civil society organizations but is also included in the national food and agriculture policies of several countries. Formulated and introduced by the transnational peasant organization *Vía Campesina* in 1996, food sovereignty represents an alternative approach to achieving food security in the sense that it focuses on locally controlled food systems rather than large-scale market-driven strategies, and values cultural preferences as human rights.

A recent definition of food sovereignty, developed at the 2007 Forum for Food Sovereignty, defines the concept as “the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems” (Declaration of Nyéléni 2007). Windfuhr and Jonsén (2005, 13) summarize ten elements common to most definitions of food sovereignty:

- priority of local agricultural production to feed people locally;
- Access of smallholder farmers, pastoralists, fisherfolk and landless people to land, water, seeds and livestock breeds and credit...;
- the right to food;
- the right of small holder farmers to produce food and a recognition of Farmers Rights;

- the right of consumers to decide what they consume, and how and by whom it is produced;
- the right of countries to protect themselves from under-priced agricultural and food imports;
- the need for agricultural prices to be linked to production costs and to stop all forms of dumping;
- the populations' participation in agricultural policy decision-making;
- the recognition of the rights of women farmers who play a major role in agricultural production in general and in food production in particular;
- agroecology as a way not only to produce food but also to achieve sustainable livelihoods, living landscapes and environmental integrity.

Additionally, the food sovereignty discourse emphasizes the rights of indigenous peoples to retain traditional production systems and food cultures (Declaration of Nyéléni 2007; Ruelle et al. 2011). This acknowledgement of the value of culture in attaining food security is of particular importance as it expands the reference to the cultural preferences included in the FAO's definition of food security to that of a right of (indigenous) communities and nations to establish their own food systems that are reflective of cultural values and traditions (Ruelle et al. 2011, 164).

Up to this point, I have been using the word "indigenous" without defining it precisely. Much of the discourse of food sovereignty (especially the Declaration of Nyeleni, which emphasizes indigenous peoples as the major agents of sovereignty), and of agroecology refers to indigenous, local, and traditional knowledges interchangeably, perhaps conflating these three classifications of peoples and knowledges where they

should be justifiably differentiated. It is important to acknowledge here that the body of knowledge and discussion around “indigenous” knowledges and culture is a rich body of literature on its own. This study does not deal directly with indigenous communities or populations; however, in the communities which were studied, the word “indigena” (indigenous in Spanish) is commonly used to refer to local or traditional agricultural practices, recipes, and knowledges, things which would more accurately be described as “traditional” or “local” given that these communities are not culturally indigenous, but mestizo. Berkes differentiates between the study of traditional ecological knowledge and indigenous ecological knowledge, reflecting that the study of indigenous knowledges as such is relatively recent (2008, 6), but maintaining that what we are essentially talking about is local peoples’ knowledge of their local ecology, and how they relate to the environment through knowledge, practice and belief (2008, 2-6). Recognizing this, and also reflecting how word “indigena” is used in the communities in this study, “indigenous” is to be taken as “local” or “traditional” when used in this dissertation.

It is also significant in the context of this study to emphasize that both agroecology and food sovereignty share a focus on local control and empowerment of local peoples over their food systems; agroecology then becomes a critical tool, coupled with the principles of food sovereignty, to achieving local food security, because it values and integrates local knowledges as an equal part of the toolbox that rural peoples can use to gain control over their food systems, echoing Berkes’ statement that “traditional knowledge, especially of the ecological kind, have practical significance for the rest of the world” (2008, xiii). In comparing food security and food sovereignty, Windfuhr and Jonsén (2005, 23-24) emphasize that food sovereignty is a comprehensive, rights-based

approach to achieving food security. This is perhaps the key distinction between food security and food sovereignty. As Pimbert (2008, 50) explains, “The mainstream definition of food security ... doesn’t talk about where that food comes from, who produced it, or the conditions under which it was grown,.” key principles of agroecology as a practice and as a science. Drawing on Pimbert’s observation, this study sought to include contextual factors underlying the processes by which individuals, households, and communities produce and procure food, giving importance to the context and “culture” of food production.

The four dimensions of food security described above combined with indicators of food sovereignty, which take into account culture and context, are presented and elaborated in Table 6. Establishing food security must take into account a more complex web of interacting elements that at the center respects the breadth and depth of community participation in defining and shaping their food security. Table 6 is a revised food security-food sovereignty framework, which combines elements of both, and provides a base from which to explore food security in relation to food sovereignty. It should be acknowledged that the elements pertaining to food sovereignty, like self-sufficiency and participation, are difficult to evaluate, since their respective values are so often culturally specific. This makes it essential that a participatory political ecology framework is employed to evaluate these factors, to ensure that the subjective and affective natures of these factors are included in the analysis. Table 6 outlines the dimensions of the combined FSS framework and identifies how the dimensions intersect the other field informing this study (Agroecology, PAR, and political ecology themes).

Table 6: Combined FSS Framework and Intersections with Other Fields

Dimensions of FSS	Description	Intersections with other fields
Availability	Refers to the uninterrupted supply of food in the required quantity and quality (nutritious and safe). Sources include national production, food reserves, and food aid.	Agroecology and promotion of production diversification; PE narratives of conservation & control and degradation & marginalization; scale to analyse PE dynamics of availability; PAR to identify locally preferred tools for increasing availability.
Access	Signifies that the entire population can acquire food without interruption, which depends on the purchasing power to buy food if they do not produce it, the existence of infrastructure and transportation systems to enable the transfer of food, and other adequate food distribution channels.	PE narratives of conservation & control and degradation & marginalization in regards to water access, roads, seed, food prices; PAR to create local storage and distribution systems.
Consumption	Indicates that individuals have the knowledge required to choose foods with high nutritional content, the best combinations of food, and exercise hygiene in the handling, preparation, and preservation of foods.	PAR to identify local existing knowledges, key local actors, and disseminate them; Agroecology to identify appropriate food prep technologies and infrastructure (low-wood use stoves, for example).
Biological Advantage	Means that people have the necessary health conditions to benefit from the nutritional content of the foods they eat. This implies health conditions, safe water, and basic sanitation.	PE narratives of conservation & control and degradation & marginalization esp. in regards to water resources;
Agricultural Production Systems and Agroecological Practices at the Local Level	Refers to both the creation and strengthening of production systems at the local level to feed people living in these areas and emphasizes the establishment of sustainable agroecosystems that take into account the complex interactions between all components of the agroecosystem.	Agroecology to strengthen food production, polyculture, soil and water conservation, pest management practices for environmental and human health; PAR to identify and disseminate such local practices.
Local Access to Productive Resources	Refers to all the resources necessary to sustain production at the local level and includes access to land, water, seeds, and compost/fertilizer.	PE narratives of conservation & control and degradation & marginalization esp. in regards to access to seed, land, and water; scale as a way of explaining the socio-political history of access to productive resources.
The Role of Gender in Agricultural Production and Food Preparation	Refers to the division of labour between men and women in food production and preparation.	PE narratives of conservation & control and degradation & marginalization, and gender equity, especially regarding women's and youth access to land and the means of production; PAR to strengthen women's and youth participation in environmental governance processes.
The Preservation of	Implies the importance of preserving	PAR to engage and identify local

Indigenous (Local) Knowledge	indigenous knowledge, traditions, and value systems in the processes of food production and preparation.	knowledges and disseminate them; PE narratives of conservation & control and degradation & marginalization in regards to the tension between technologies of “progress” and the GR and traditional knowledges.
Food Self-Sufficiency	Means that communities have the capacity to produce all the food required to sustain them.	PE narratives of conservation & control and degradation & marginalization, esp. in regards to local structures of governance; Agroecology to identify opportunities for local resource self-sufficiency (fertilizers production, etc.); scale to define “local”.
Community Participation	Refers to the civic participation of community members, including opportunities to participate in community projects, community decision-making, and initiatives to strengthen community relations as well as other forms of community engagement.	PAR; PE narratives of conservation & control and degradation & marginalization, and gender equity.

2F. Food Security and Sovereignty in Coffee Lands: Gaps in Understanding the Relationship between Food Insecurity and Coffee

Coffee lands are especially vulnerable to chronic hunger, seasonal hunger, and malnutrition for a number of reasons. First, rural populations dependent on coffee either as plantation workers, smallholder farmers, or service providers to the coffee industry are subject not only to global economic crisis, but to the fact that coffee, like petroleum, is an extremely volatile commodity, experiencing often-violent swings in prices every twenty years or so. The last price dip lasted approximately four years (1999-2003) and resulted in mass exodus from rural communities and the disruption of local, national, and regional economies and entire farming systems (International Coffee Organization 2002, 2). For smallholders who depend on coffee for cash income to supplement their subsistence farming, the crisis was especially harmful as the loss of income meant less access to food, medicine, education, and communications as well; it also left them more heavily in debt,

forcing them to abandon farms and look for work in cities or other countries, according to the ICO (2002, 2). Coffee is a perennial crop, which is even more problematic in a volatile market. When there are upward price swings for more than one year, smallholders are often motivated to plant more of their land in coffee, often replacing food crops and in effect “putting their eggs in one basket” so to speak; when the price drops again, it is difficult to replace the coffee bushes with a better-paying crop, leaving farmers in a situation of over-dedication to coffee, with less economic (and food) resiliency to market swings over time.

Strategies to address this overdependence promoted by the ICO as well as development organizations included diversification into additional or alternative economic activities, and especially the diversification into coffee product segmentation, or different kinds of coffee markets, not just green bean export markets (ICO 2002, 4); there was little effort at the time to diversify production into food crops for auto-consumption or subsistence, but rather a focus on income-generation strategies to appease the perceived overdependence on coffee as a cash crop for smallholders.

As I describe in more detail in Chapter 4, alternative market certifications, often accompanied by international social movements, stepped in with efforts to alleviate the situation of smallholder coffee farmers during the coffee crisis; fair trade certification brought higher, fixed prices with the intention of reducing vulnerability among smallholder families, but research on the impacts the fair trade and organic certified markets on smallholder families revealed that higher prices were simply not adequate by themselves as solutions, and that other factors needed to be addressed, including the continued and even increased overdependence on coffee that resulted from the improved

prices that the certified markets brought. Méndez et al. state that “certifications did not have a discernible effect on ... livelihood-related variables, such as education and incidence of migration at the household level ... and contributions derived from [certified markets] premiums has limited effects on household livelihoods” (2010, 236). Basically, certifications cannot solve the problem of vulnerability and instability that exists for smallholder coffee farming families.

Bacon in turn points out that membership in a coffee cooperative organization that sells to alternative markets reduces the risk of smallholders losing their land titles during periods of low prices by four times (2008, 168), suggesting that vulnerability is reduced by selling through a cooperative to a certified market, but he also notes that farmers in his study still noted a decline in their quality of life during the period of the crisis. This observation suggests that coffee farmer livelihoods and their security cannot be simply addressed by income-centered approaches, but must be complemented by efforts to “increase access to land, build stronger producer organizations, promote access to alternative markets, increase government investments in rural health and education, and diversify income sources” Bacon (2008, 170).

Since the body of research on the coffee crisis emerged in the mid-2000s, the discourse in academic and development circles, as well as within the coffee industry, around farmer livelihoods and vulnerability has focused more heavily on household and community food security and food resiliency. Smallholders produce 70% of the world’s coffee (Eakin et al. 2009). In a recently published research brief, Caswell et al. ask why the reality of persistent food insecurity among coffee smallholders has “remained hidden for so long” and also analyze the existing body of knowledge to explore what its causes

are, and what the possible solutions are (2012, 1). The answer to the first question could have to do with the coffee industry's, fair trade movement's and international development complex's single-minded focus on increasing access to markets for smallholders and developing smallholder organizations' business capacities, or it could have to do with the unbelievable notion that a farmer could not have enough food. Whatever the reason for the issue not becoming apparent until the mid-2000s, the basic understanding among all of these actors is that the rural areas where some of the world's best specialty coffee is grown are vulnerable to various "food security risk factors." Caswell et al. list in their summation of what we know about the relationship between food insecurity and coffee: "1) depletion of natural resources from which the population makes its living; 2) environmental degradation; 3) shocks such as natural disasters and conflict; and 4) seasonal changes in food production and food prices" (4, citing FIVIMS, 2012), but there is little understanding of the dynamics of the relationship between coffee and food insecurity experienced in coffee growing regions, much of our knowledge being based on "anecdotal evidence or outcomes generated by organizations as part of internal evaluations" (2012, 5).

Recognizing the dearth of empirical information about the incidence and causes of food insecurity in the very communities from that it sourced its coffee, Green Mountain Coffee Roasters (GMCR) funded a study in 2007 to study these issues at the scale of Mesoamerica. This landmark study, which laid the foundation and influenced the approach of the entire specialty coffee industry to addressing this issue, found that within the three countries surveyed (Nicaragua, Guatemala, and México), 67% of the 179 households surveyed were experiencing extreme scarcity of food between 3 and 8 months

of the year (Peyser 2013). Six other studies reviewed by Caswell et al. (2012) in their research brief support this finding: in studies ranging from n=25 to n=469, at least 44% and up to 100% of coffee smallholder families surveyed experience “thin months” or periods where they are unable to meet basic food needs.

The occurrence and extent of food insecurity in coffeelands, and especially among smallholder producers, is well established. All of the research reviewed by Caswell et al. (2012) suggests that the periods of hunger are limited to three seasons: during the rainy season when roads are muddied and travel is restricted, limiting delivery of goods to isolated communities; the season when food crops are being planted and resources are dedicated to this activity; and the beginning of the coffee harvest, when cash from the previous year’s harvest has already been used up and payment has not yet been received from the new harvest. The exact dynamics of the relationship between food insecurity and coffee are still not clear (2012, 5-6). We know that the combination of overdependence on coffee as a cash crop at the expense of less food production, insecure land tenure, and the overarching vulnerability of being subject to volatile coffee prices and cyclical food prices contributes to insecurity (Caswell et al. 2012, 6), but our knowledge is still scarce on the specific causal dynamics besides those listed above.

Recent shocks make it imperative to better understand the systemic and immediate causes of food insecurity in coffeelands, and to look for solutions that decrease smallholder vulnerability to these shocks. A rise in global food prices in 2011 and 2012 (Central American Business Network, 2012) combined with erratic and extreme weather events in Mesoamerica that have led to flooding and loss of basic grains crops for two years running in northern Nicaragua, necessitate a better understanding and

the identification of solutions that decrease vulnerability. Caswell et al. (2012) propose a set of multi-stakeholder and multi-scale strategies that will promote immediate food security but also long term community food sovereignty that will lead to household resilience in the face of increased climate and market shocks (9-10):

- Increase production of food crops for consumption (rather than just for income generation);
- Provide farmers with adequate support to maximize food production potential and balanced nutrition;
- Increase awareness within the coffee industry around food insecurity in coffee-growing regions;
- Develop long-term, multi-stakeholder interventions (instead of short term, narrowly focused projects);
- Encourage research that leads to empirical evidence of the dynamics and best practices of food security.

Essentially, the proposal of the specialty coffee industry is to increase our understanding of the relationship between coffee and food security, change the dynamics of development projects aimed at coffee farmer food security to actually address the structural factors that coffee smallholders face (including environmental degradation, natural resource depletion, climate and market shocks, and seasonal changes in food prices) and promote best practices, and improved the availability of foods locally while improving their usage and consumption among smallholder households.

Chapter 3

Methods and Methodologies to Measure Household and Community Food Security and Sovereignty

In this chapter I first discuss the challenges of measuring community food security and sovereignty, before presenting the background of the Community Agroecology Network and the history of the Youth Leadership and Food Security Project in San Ramon. I follow this with a discussion of the evolution of CAN's PAR model and approach, and then outline the methods and methodologies utilized in this study.

3A. Challenges in Measuring Household and Community Food Security and Sovereignty

Measuring community and household food security, and knowing how and if different kinds of approaches work or not are made more challenging for two main reasons. First is the problem of the existence of food security measurement and monitoring at different scales—the national, regional, community, household, and individual—and the rash of sets of indicators and instruments used among and across all of these scales, according to Carletto et al. (2012, 1). FAO indicators for global food security (which include global food prices and global cereal stocks) and national scale food security (national net imports of food and national food production to create national “food balance sheets”) may be adequate to paint a picture of food supply and availability at the national and global scale, but they are sorely inadequate for measuring community food security. They do not capture the local dynamics of the physical environment, social relations, politics, gender and generational relations, and especially the element of culture that the FAO urges is so important to food security (2012). Other indicators used

by agencies at different scales fall into categories presented by Carletto et al. (2012) of undernourishment (per capita dietary food energy supply, a FAO indicator) household survey food consumption data (kilocalorie consumption count) dietary diversity (to measure dietary quality, rather than caloric consumption), food consumption score (a frequency-weighted variation on dietary diversity, and an indicator required by GMCR in its food security project monitoring), household food insecurity access scale (a scale which measures household access and anxiety related to access), non-food factors (including individual-scale health, hygiene, access to basic services, and other factors that affect food consumption), and the coping strategy index.

These factors are sometimes used alone and sometimes in combination. In the field of nutrition, where household food security is a highly treated topic, coping mechanisms are often used as surrogate measures of household food security; however, using coping mechanisms risks the same danger of not taking into account cultural, social, or political contexts. If they are used as a measure, they “need to be culturally relevant and focus tested” (Renzaho 2010, 1) and combined with objective measures to create information useful for informing appropriate policies and actions for promoting food security at the household and community scales, but the fact is that no single indicator or surrogate measure will capture the state of food security at any scale. The field is essentially open for models of measuring and monitoring food security at the household and community scales that are comprehensive, culturally relevant, and applicable and adaptable across contexts.

Second, measuring food sovereignty is especially difficult, as the indicators themselves will be valued differently from place to place, given sociopolitical contexts

and relationships. I will argue that PAR is an essential tool for promoting and evaluating community food security and sovereignty, as it is the most effective way to define cultural factors and values that influence food security at the local level, to integrate locally-defined goals as indicators of food sovereignty into any strategies proposed, and to measure change over time, placing perceptions and perceived benefit on par with objective quantitative indicators of change.

3B. The Community Agroecology Network (CAN) and the Youth Leadership and Food Sovereignty Project

The study that is the subject of this dissertation was performed as a diagnostic analysis for a GMCR-funded project called Youth Leadership and Education for Sustainable Development and Food Sovereignty. The project came about as a result of various events and relationships. I was hired by CAN in July 2010 after I returned from my last stint of fieldwork, nine months with a coffee cooperative in Uganda. I had actually had a long but indirect relationship with CAN since 2001: Christopher Bacon, who would later be my colleague at both United Students for Fair Trade and then at CAN, was my primary contact and mentor during the 10 weeks of undergraduate field study I did with CECOCAFEN Cooperative and the Union of Agricultural Cooperatives in San Ramón (UCA San Ramón) in Nicaragua in 2002, where I began over a decade (so far) of learning and collaboration with coffee cooperatives in Mesoamerica, Brazil, and East Africa. I worked with CECOCAFEN and the UCA San Ramón for three years until 2005. The UCA San Ramón is the subject of this present study, and the long-term relationship and trust we have has definitely contributed to more open dialogue and during the participatory research process. I also worked with another CAN-affiliated

researcher, V. Ernesto Méndez (currently at the University of Vermont) in the summer of 2005 (when I left Nicaragua) to perform a diagnostic study on rural tourism with three coffee cooperatives he works with in Tacuba, El Salvador. When I applied for the job of Associate Director of CAN in May 2010, it was with the explicit encouragement of these two longtime mentors, and when I began working with CAN in July 2010, I was coming to work with colleagues and coffee organizations that I already knew well and who knew me as well.

I was hired as Associate Director, and managing a research program was not part of my initial job description; the job was supposed to involve more organizational development, grant writing, and program supervision. However, upon attending the annual meeting of CAN-affiliated researchers in San Cristobal de las Casas, Chiapas, México in July 2010, my new job rapidly changed focus. The researchers worked (and in most cases, lived) in four regions in México, two regions in Nicaragua, and one in El Salvador. All of them agreed that food insecurity was an urgent issue, based on direct experience in coffee-growing regions where increased youth outmigration was seen as a food insecurity outcome. They all agreed that as a network, we should do something to understand what was happening and do something to address the problem with the local organizations they all work with. After two more months of consultation over email, phone, and Skype, we outlined a project that would include our partners working with three rural communities in the highlands of Veracruz, México, and myself as a researcher working with the UCA San Ramón in San Ramón, Nicaragua; the project would focus on using education to build youth leadership of community or cooperative food security and sovereignty actions that would employ the creation of economic opportunities, the

building of pride in local food systems and traditions, and community and school gardens as places of education and production. It was approved by GMCR in November, 2010, and project implementation began in February 2011. I was at first designated the project manager, but that role expanded over time into the chief researcher first for the project, and then for an entire research program, as CAN became more engaged in food security and sovereignty issues and took on more funded projects in México.

CAN is a network of eight partner regions in Mesoamerica, and eleven organizations working in those regions; among the organizations are local nonprofits, coffee cooperative organizations, and universities. CAN Santa Cruz, the US-based office, has a distinct relationship with each organization, based on the particular set of collaborations that we have with them. Our mission and vision unites us as a network of organizations and researchers (www.canunite.org):

Mission

Our mission is to sustain rural livelihoods and environments by integrating research, education, and trade innovations.

Vision

Our vision is for a global economy where people, healthy food systems, and the environment come first.

Also on CAN's website, our programs promote:

- Agroecological farming practices that produce healthy food and healthy environments
- Food security to end seasonal hunger

- Alternative trade models that foster direct relationships between producers and consumers ensuring a fair price for farmers
- Youth empowerment so that the next generation has the knowledge, skills, and opportunity to reduce hunger

CAN's Core Principals are:

Food Security and Food Sovereignty

Food security refers to sufficient, safe and nutritious food that fulfills household dietary needs and preferences. Food sovereignty recognizes that people and communities have the right to decide what they eat and how it's grown. CAN joins others around the world in the quest for food sovereignty. We work toward transparent trade relations with small producers, agroecological farming practices that produce nutritious and environmentally sound food, and the empowerment of youth leaders to develop community self-sufficiency.

Agroecology

Agroecology is the design and management of sustainable food systems. It uses a whole-systems approach to agriculture and food systems development based on traditional knowledge, alternative agriculture, and local food system experiences. CAN views agroecology as a path toward food sovereignty. In addition to producing healthy food in an environmentally sound way, agroecology reduces farmers' dependency on corporate-produced chemical inputs, returning control of food-producing resources to small farmers.

Interculturality

Relationship building with our community partners through an intercultural approach is central to CAN's work. Interculturality refers to sustained relationships between cultural groups based in mutual humility, trust, accountability, and learning. The transformation of food systems requires a collective effort that generates new social relations of equality and liberation between men and women, ethnic and racial groups, social classes and generations.

Participatory Action Research (PAR)

PAR is a research methodology that combines research and action for social change. Community-based organizations and researchers collaborate to identify problems and action agendas through a reflection process. Thinking with — and not for — communities, leads to strategies that are more likely to be sustainable. Using a PAR approach, CAN shares the voices of those not traditionally heard with policy makers, researchers, and institutions, and works with farmer-collaborators to make research findings accessible to community members. All of CAN's Action Research Initiatives began with collaboratively designed participatory diagnostic studies that resulted in community-based strategies to achieve food security and sovereignty.

Although CAN's Mission and Vision have remained the same since it was founded in 2002, its work has evolved over time from creating alternative coffee market chains and promoting intercultural field experiences for students to including rural food security and sovereignty action research projects, leading in 2012 to the formulation of the above Core Principles.

Before the pivotal 2010 researcher meeting in Chiapas that guided CAN's work over the following years, research performed by CAN staff Christopher Bacon and V. Ernesto Méndez exploring the role of alternative coffee market certifications on mitigating the effects of the devastating coffee crisis of 1999-2004 had revealed that the benefits of coffee certifications were limited: they did help improve access to credit, provide a level of stability, and contribute to improvements in infrastructure, but certification did little to improve livelihoods or standards of living of smallholder coffee farming families (Méndez et al. 2010; Bacon et al. 2008). Bacon et al. established that even families benefiting from fair trade certification continued to experience seasonal hunger during the time of year after the cash income from coffee has dried up and before basic grains are ready to harvest. Food insecurity persisted in coffeelands. Acknowledging this point further at its 2010 meeting, CAN as a network recognized this problem as region-wide and decided it needed to be addressed.

Bacon has continued working with CAN as an affiliate researcher, and since 2009 has led a CAN PAR project in Las Segovias, Nicaragua focused on building community food security in eighteen first-level cooperatives, working with an umbrella cooperative organization called PRODECOOP. The project primarily emphasized the building of local basic grains storage and distribution centers to be managed by the first-level cooperatives themselves to ensure reliable (by forgoing seasonal fluctuations in local grain markets) availability of basic grains as well as the identification and promotion of "best practices" for food security with a secondary focus on production diversification into vegetables. This project has undergone two separate research cycles, first as part of the diagnostic study finished in 2010, and recently during the three-year evaluation of the

project, currently being completed. The lessons learned from this experience in Las Segovias included: inclusion and full integration of women and youth into planning and implementation is key to the success of any strategy promoted; considering that youth are the primary beneficiaries and participants in food systems; and a greater focus on diet and nutrition education and strategies is complementary to efforts at diversifying production and increasing local access and availability of basic food—without focusing on consumption, the gap between production and nutrition remains wide as people do not easily shift their consumption habits just because there is a greater diversity of foods available locally.

These lessons learned led to a clarification of principles guiding the project in Las Segovias. They also led to a strengthening of CAN's commitment to Participatory Action Research (PAR hereafter) approaches to working with partner organizations and families. When I developed the Youth Leadership and Food Security Project in 2010, I adopted these tried and true principles as those to guide the project in San Ramón and in Veracruz, México, and I worked with the partner organizations to integrate them into our visions and strategies (as listed in the CAN Food Sovereignty in Las Segovias Project Annual Report October 2012):

- Agroecology
- Cooperativism and/or strengthening of community-based organizations
- Gender and generational equity
- A focus on improving short term food security while building long term food sovereignty

- An intercultural approach that revalues indigenous agroecological knowledge and also seeks hybrids of diverse knowledges
- Experimentation, learning/unlearning/relearning, and praxis

Since 2010, CAN’s Action Research Initiatives (ARI) program has grown to four projects (one of which was a 12-month project, and is not listed below in the table of current projects). As the director of the program, I have learned with each experience how to work with partner organizations to define goals, apply lessons learned and adjust them to new local contexts (such as implementing food security projects in non-coffee growing regions), and evaluate progress based on mutually defined criteria and processes.



CAN’s Current Action Research Projects

Project	Dates	Focus	Location/ Counterparts	Funders
Food Security & Sovereignty in Las Segovias, Nicaragua	2010-2015	Decrease seasonal hunger through improved local access to basic foods and cooperative empowerment	PRODECOOP Cooperative & CIIASDENIC (NGO) in Las Segovias, Nicaragua	GMCR
Youth Leadership and Food Sovereignty	2011-2015	Youth leadership of production, consumption, and market strategies; diet diversification, and market diversification for income generation.	UCA San Ramon, Nicaragua & VIDA AC (NGO), Las Altas Montanas de Veracruz, MX	GMCR
Food Security in Quintana Roo, Mexico	2011-2012	Improve agroecological production practices and diversify markets for improved nutrition and increased income generation.	3 communities in Quintana Roo, Mexico	Kellogg Fndn.

Figure 2: CAN’s Current Action Research Projects (author’s table)

3C. The Evolution of a Model and its Tensions: Reflections on CAN's PAR Principles and Practices

The approach, methods, and methodologies I employed in this study are rooted in a history of experiences of CAN-affiliated researchers in PAR processes and projects over the last ten years in coffee-growing communities in Central America. With each project CAN researchers have learned new ways of implementing the iterative cycle of learning, reflection, and action, adapting the process to different types of relationships and social structures, and improving it along the way. The doctoral research of Christopher Bacon and V. Ernesto Méndez (both part of the original group of researchers who founded CAN), while Ph.D. students at the University of California, Santa Cruz in the early 2000s, laid the foundation for the PAR model I have developed while managing the ARI program at CAN since 2010. After going through and reflecting on two iterations of the PAR cycle with coffee farmer organizations in Matagalpa, Nicaragua, and Tacuba, El Salvador, Bacon and Méndez developed a set of five principles for PAR research (Bacon et al. 2005, 11). Here I list these PAR principles and offer my reactions and reflections on them based on my experience implementing PAR projects over the last two and a half years.

1. PAR activities can support different ends depending on the values of the organizations and academics involved in the process”, that is, PAR research can also serve conventional purposes, not just community development and environmental conservation efforts (citing Fox 2004);
2. If people involved in a PAR process want to create an opportunity for more participation they will need to engage the many manifestations of

difference...recognize the way that cultures arrange these differences into hierarchies, and work to create forums that provide more opportunities for marginalized voices;

In this study, this approach required the explicit focus and involvement of youth and women in the PAR process from the outset, since it is a given that these two groups are the most marginalized within the cooperative and community structures, and they are also the explicit beneficiaries of the project itself. I also sought to manifest this principle by placing a capacity-building focus throughout the PAR cycle, especially in this first iteration of the base line study, by training staff as well as cooperative youth leaders in basic PAR principles, processes and methodologies.⁸ Although this principle has guided both the project and research design, I feel that we have not adequately addressed the hierarchy of the cooperative structure itself. The points of consultation with cooperative members and beneficiary families have been limited to workshops in which we share preliminary analyses of data as well as proposed strategies, and participants agreed or disagreed or added other insights and ideas to the working document. However, I do not feel that we have adequately addressed or included participants' own ways of knowing and understanding the subject matter, nor their limited levels of education (as demonstrated in Chapter 5) into the process – we did use varying ways of presenting the findings, but we did not open space for participants themselves to present their own understandings to us. I am currently opening a dialogue with the UCA San Ramón about a process in the future to evaluate how cooperative members would best like to engage in these processes in the future. So, the tension of hierarchies is something that will require

⁸ This resulted in the UCA San Ramón taking on a more leading role in the design and implementation of the 2-year evaluation study that we are currently completing at the writing of this chapter.

ongoing and complicated dialogue, even as we are conscious of it and know we need to address it transparently.

3. There are tensions between social change and scholarly agendas ... Researchers are generally paid by universities and rewarded according to their ability to publish examples of how specific cases advance and/or contradict more general theories...[while community participants] are interested in using more general principles to create specific strategies for change” – two very distinct approaches and goals, which must be acknowledged from the outset of any project to achieve an effective process (citing Fox 2004).

This tension is related to the one I discussed above. Farmer beneficiaries want to know what actions will be implemented to solve their problems of chronic and seasonal hunger, while I as a researcher seek to understand how their experience will enrich my own understanding of why they are experiencing it in the first place (and publish that knowledge and get paid for it). The tension is also a tension of hierarchy, as one of these distinct interests might be prioritized by whoever has power – more often than not, me, as I am both the researcher and the project manager in this project, holding two powerful roles. I entered this PAR process knowing this, but was not fully aware of the consequences until I began writing this dissertation and placing priority on understanding what contributions this study had to the larger body of knowledge around food insecurity, rather than how the results should be fed back again into the PAR cycle to improve farmer livelihoods on the ground.

4. The PAR process is context dependent, often requires more time, and is more complicated than most conventional research.

In my work, this principle has resulted in differences in research processes, roles, and results depending on the partner institutions with which I work (for example, I work in partnership with a university in Quintana Roo, México, which includes a team of professional researchers and students involved in research design, data collection, and analysis, while in San Ramón, Nicaragua, I work with a team of agronomists, project managers, and youth leaders, who have very different needs and approaches in the research process). It also depends on the social structures themselves (in Quintana Roo, we designed the process to work directly with community members from the outset while respecting and including the *ejido* and municipal officials, and in San Ramón the existing cooperative hierarchy required that we consult with varying levels of the structure during each step and iteration, including the UCA San Ramón Board of Directors, the staff, the first-level cooperative Boards, and the families themselves. Needless to say, this process was complicated and time-consuming, and continues to be).

5. The fifth principle reminds all participants to think beyond themselves and their organizations towards playing a part in larger cycles.

This principle is both the hardest and easiest for me as a researcher to remember – easiest because I am constantly working with organizations like the UCA San Ramón, whose daily rhetoric and language revolves around resistance to the dominant repressive economic model and social change, but most difficult because on a daily basis I am focused on competing priorities and interests of our donor organization (Green Mountain Coffee Roasters) and their requirements for monitoring and evaluation of the projects they fund, as well as deadlines, CAN’s interest in my moving forward with publishing and disseminating the work we do, as well as constantly reframing our work to fit the

interests of possible donors and foundations, and the interests of the UCA San Ramón as an organization primarily committed to commercializing coffee and other commodities. Keeping in mind that we are all part of a larger change process is sometimes lost amid all of these competing interests and priorities.

I have acknowledged and reflected on the contradictions and tensions inherent in these principles laid out by Bacon and Méndez, with the intent of demonstrating that it is an ongoing process to engage with these principles in ways that are as effective as possible for everyone involved, and that the ways I have engaged with them has been very context or place-dependent.

Experiences with PAR processes in CAN projects since 2009 have led to PAR principles more focused on, and derived from, the organization's work in promoting community food security and sovereignty with partner organizations in four different places in Nicaragua and México, as outlined in Chapter 1. I entered the process of research design in the Youth Leadership and Food Sovereignty Project in 2010 with these principles guiding my collaboration with the UCA San Ramón, its staff, the youth leaders who would serve as research assistants, and the project beneficiary families themselves:

1. Agroecology (as a science, a practice, and an instrument for social change)
2. Cooperativism and/or strengthening of community-based organizations
3. Gender and generational equity
4. A focus on improving short term food security while building long term food sovereignty
5. An intercultural approach that revalues indigenous agroecological knowledge and also seeks hybrids of diverse knowledges

6. Experimentation, learning/unlearning/relearning, and praxis

However, there were significant differences between the project in Las Segovias that informed the development of these principles prior to 2010, and the project in San Ramón, which initiated in 2010. The first difference was the changing dynamics of the relationship GMCR would have with the organizations (including CAN) they fund in terms of specific demands related to monitoring and evaluation of projects; it essentially meant that certain indicators would be required to be utilized to evaluate the impact of the project over the long term; this affected our input selection process, as we needed to integrate not only established and proven indicators of food security, community-preferred and identified indicators, but also donor-identified indicators. One of the challenges at the outset was how to balance the agendas and requirements of each of the partners in the project. GMCR was fully supportive of our participatory approach to the project planning and implementation, having only defined with the other partners the project focus – food security and youth leadership. However, GMCR had been in the process of developing a set of requirements for monitoring and evaluation for the projects it funds, as its project portfolio was growing. Although these requirements were not a prerequisite yet when we performed the diagnostic study in San Ramón, they would be required during any future monitoring of the impacts of the project, which meant that we needed to design the initial diagnostic study so that it would produce data that would be comparable with any impact analysis we would perform at the end of the project cycle two years later. In the end, however, I believe that all of these inputs into the design of the research process and the identification of the indicators specifically only strengthened the project.

Second was the specific and emphatic focus from the outset on youth and women (gender and generational equity); the Las Segovias project had *not* included gender nor youth as an explicit focus, and it had negatively influenced the impact of the project on the beneficiary households; by focusing solely on the heads of household (mainly men), the project had missed an opportunity to engage in the actors that have the most influence on home provisioning – women. We learned from this experience and, besides shifting the focus in the Las Segovias project towards women and youth, we also made gender an explicit focus and a central guiding principle in the Youth Leadership and Food Sovereignty Project from the beginning. It affected research design as it forced us to really question how youth leaders should be involved in the research itself, what their role was, and also how to measure change as a result of their involvement as leaders. In the end eight leaders were selected from the eight cooperatives, who were integrated into the research process first by attending training and exchange sessions in Santa Cruz, California, in May, 2011, in which they learned basic research processes and techniques, basic agroecology principles and practices, and basic project management skills. This process laid the foundation for their integration into the project as promoters of the family gardens and as research assistants who would take field data through surveys, focus groups, and interviews.



Figure 3: The author (left) with the youth leaders after field-testing the survey instrument, receiving their field research kits, San Ramón, March 2011

Third was the difference in the focuses of the two projects. While the Las Segovias project emphasized the creation of local food storage and distribution systems, the identification and promotion of best food security practices at the farm level, and farmer experimentation in the *milpa*, the San Ramón project more strongly emphasized production diversification in the form of shade tree diversification (fruit, wood, and fuel species) and family vegetable gardens, the promotion of more diversified food preparation and consumption techniques, and the building of youth leaders as key actors in the creation of community food security and sovereignty. This of course meant a shift in the focus on agroecology from the milpa system to gardens, and a resulting shift in the

set of indicators we would use to establish a baseline, and to later measure change and impact (see Section 3B).

All of these considerations and existing realities were integrated into the design of the research process in San Ramón.

3D. The Youth Leadership and Food Sovereignty Project in San Ramón, Nicaragua

The Youth Leadership and Education for Sustainable Agriculture and Food Sovereignty Project, or Youth Leadership and Food Sovereignty Project for short, was launched in February of 2011. The project description, components, strategies and desired outcomes, as developed by me, Clara Palma of VIDA AC in Veracruz, México, and Yadira Montenegro of the UCA San Ramón, Nicaragua, were the following as laid out in the original proposal submitted in 2010.

The overall goal of the project was to establish a youth leadership and community agriculture program to empower youth in rural communities, strengthen local cultures of food production and consumption, and increase access to food year round. This could be achieved through capacity-building with participating communities, with a specific focus on youth (ages 17-25) to promote and implement sustainable food production practices at the family and community levels, and by impacting rural/agricultural livelihood opportunities for youth, youth knowledge and skills in local sustainable food production, youth pride in rural culture and livelihoods, community access to sustainable means of food production, and access to fresh and locally grown food throughout the year. CAN and its partners defined the goals and strategies based on the needs to establish year round access to healthy food in participating rural communities, preserve and promote

local sustainable food cultures, as well as stem the tide of youth outmigration from these communities, where people, especially youth, eat less fresh, healthy, locally grown foods and are turning more to prepackaged chips and other high-fat processed foods available at the local *pulperia* when they do have cash. The two problems of rural malnutrition and the loss of local food cultures were seen by CAN and its partners as both interrelated and interdependent. Local and traditional food cultures are seen by CAN's partners to be related to the influence of mass media that values packaged foods and urban livelihoods as "progress" and modern, while traditional foods and farming are seen as backwards and old fashioned. The role of transnational food companies' marketing in promoting the rejection of local foods in favor of packaged, processed foods is undeniable.

The overall strategy proposed to address these interrelated problems of malnutrition, preservation of local and sustainable food cultures, and youth outmigration was to empower local youth leaders to develop school and community gardens as spaces of education and community capacity-building to promote a culture of healthy and sustainable food production, preparation, and consumption among local families. The transformation of food cultures is complementary to, and supportive of, efforts to increase food security and sovereignty.

The main project strategy has three interrelated components. The first component is to utilize intercultural exchange for youth capacity building and network development around agroecology and garden management, and healthy food cultures skills. The second component is the development and implementation of education and capacity building programs aimed at educating children, youth, and farmers about sustainable and healthy food systems, using school and/or community gardens as the spaces of learning

about local, healthy, and sustainable food production, preparation, and consumption. The third component is the implementation of the sustainable production practices learned in trainings at school/community gardens, on individual family farms to diversify and extend family-level agriculture, in effect increasing access to more diverse foods, and reopening access to traditionally produced foods, during the entire year. Farmers and their families will be supported in implementing the practices they will have learned in the garden workshops.

The roles of CAN Santa Cruz and the partner organization UCA San Ramón in project development and implementation were defined together. The UCA would work directly with eight member first-level cooperatives⁹, selecting youth promoters, local model farmers, community groups, schools, and families to work with. The UCA would take primary responsibility for engaging stakeholders in designing and developing their specific education and capacity building plans around school/community/family gardens, addressing their own particular cultural and production contexts. CAN would provide technical assistance in youth promoter capacity building, school/community garden curriculum development, and project planning and implementation, and will also lead fund development and administration of the initiative. The CAN researcher (myself) would play a key role in advising the partner organizations during the planning and implementation stages.

CAN brought the two project coordinators from the Veracruz highlands in México (Clara Palma from the local NGO VIDA AC) and San Ramón, Nicaragua (Yadira Montenegro from the UCA San Ramón) to its office in Santa Cruz, California in

⁹ Nicaraguan Cooperative Law defines two levels of cooperative organizations: first level, which are organizations that farmers directly belong to, and second-level or Unions of Cooperatives.

February 2011 for three days of project orientation and planning. This first meeting was a key moment in the PAR process as the first thing that the two coordinators did was to differentiate their goals and their strategies to be more in line with the institutional and cultural realities of their respective places. In San Ramón, the biggest change was to focus on youth leaders supporting family gardens, and place a more focused emphasis on production diversification through the family gardens in order to achieve higher diversities of foods available as soon as possible. This focus on home production diversification was in contrast to the strategies adopted by VIDA AC in Veracruz, which was to focus on youth leadership through youth-administered home gardens and school gardens. In this way, during the project orientation, the projects took distinct forms from each other and from the original proposal. It was a testimony and justification to the need for constant reiteration of the PAR cycle to integrate local needs and perspectives into strategy development, to make actions more and more relevant to the people and institutions participating in them.

The timing of the project launch was just after the end of the coffee harvest, but just before the onset of the rainy season and the planting season that starts in April. This meant that all project planning had to occur rapidly in order to plan and establish gardens in late April when the rains came, and choose and train the youth leaders to support them, before planting was to occur, or the project would need to wait an entire year to implement the production diversification and agroecological education components. This also meant that we were planning and implementing the household and community food security diagnostic study (on which this dissertation is based) at the same time that the first project actions were being implemented. In San Ramón, the objective of the

diagnostic study was to establish a baseline about the conditions and problems concerning food security and sovereignty and youth leadership in eight grassroots cooperatives affiliated with the UCA San Ramón in the municipality of San Ramón and collaboratively produce a strategic plan based on the results of this analysis and the PAR process with the various stakeholders involved.

3E. The Structure of the PAR Process in San Ramón

The basic PAR cycle as described in Chapter 2 (courtesy of Bacon) of Looking→Reflecting→Acting→Sharing in repeating iterations over time informed the design of this study, along with the considerations of the guiding principles, actor relationships, actor priorities, and project goals described above, and resulted in the process illustrated in Figure 6. This dissertation encompasses the process up to and including Step 4; Step 5, which is implementing the action plans and monitoring and evaluating change resulting from actions, is part of the second iteration of the PAR process between CAN and the UCA San Ramón, which will not be included in this dissertation. In Figure 5 below, I map out the relationships of the actors involved in the PAR process, including GMCR and the families themselves. In Table 7, I give specific dates and actions during the PAR process, and name the actors that participated in each step and action.

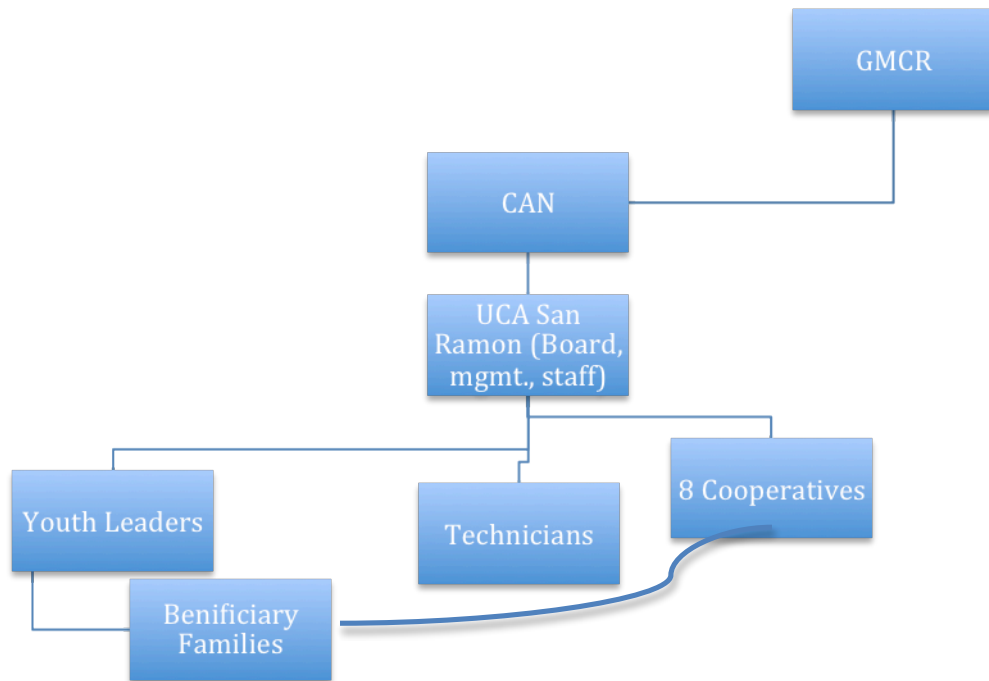


Figure 4: Actors in the San Ramón PAR Process

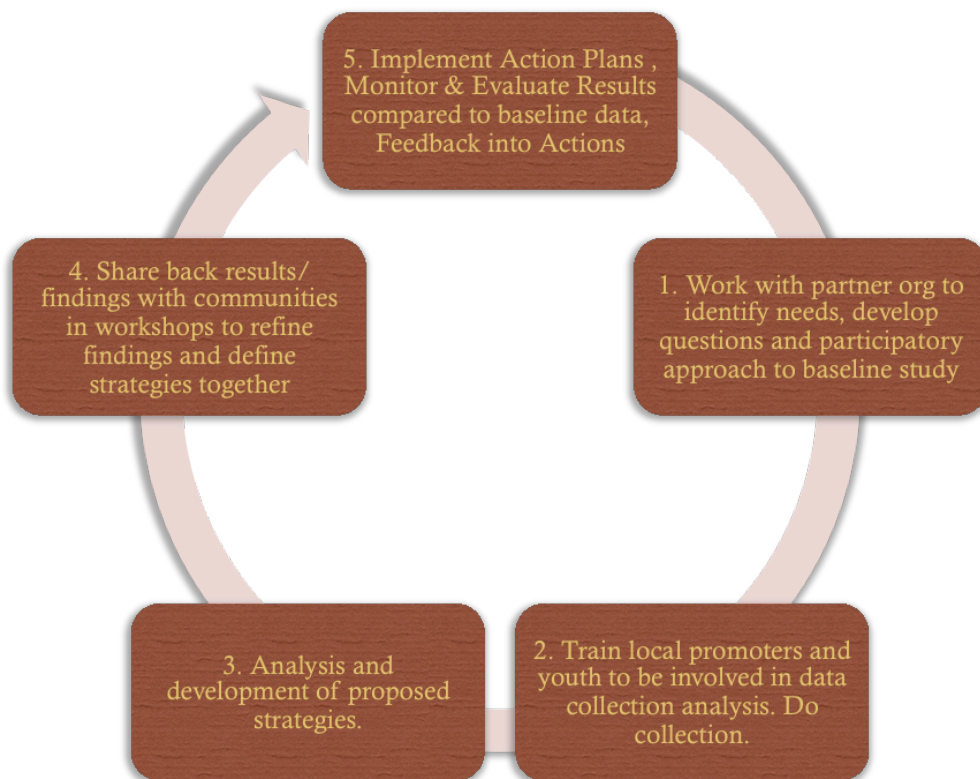


Figure 5: The PAR Process in San Ramón

Table 7: Steps, Actors, and Timeline of PAR Research Process in San Ramón

Diagnostic Steps	Participating Actors	Timeline
Development of project goals, activities, and proposal to GMCR	Researcher/project manager (Heather), UCA SR staff	October 2010
Initial training of youth leaders in basic PAR principles and research skills	Youth Leaders and researcher	May 2011 (in Santa Cruz, CA)
Formulate questions and indicators, identify study instruments	Researcher, UCA SR staff	May 2011
Train UCA staff and organizers on techniques and study instruments; field test instruments and revise for final version	Researcher, UCA SR staff, youth leaders	June 2011
Data Collection (surveys, focus groups, interviews)	UCA SR staff, youth leaders	July-October 2011
Data entry, processing and analysis, development of preliminary report of results	UCA SR staff and researcher	November-December 2011
5 Shareback workshops with UCA SR Board of Directors and staff, youth leaders, and members of 8 cooperatives; identification of main problems and strategy lines/actions	UCA SR staff, researcher (present at 2 workshops), and youth leaders, UCA SR Board, beneficiary families	December 2011-January 2012
Compile input from all workshops and draft Strategic Plan Proposal	UCA SR staff and researcher	January-February 2011
Sharing of Food Security Strategic Plan Proposal with UCA SR Board, staff, and 8 participating cooperatives, for feedback	UCA SR staff, youth leaders, and researcher (present at 2 workshops)	March 2012
Finalize 5-year Food Security Strategic Plan	UCA SR staff and researcher	April 2012
Implementation of revised plan	UCA SR staff, youth leaders	April 2012-December 2015
Development of ongoing Project Monitoring and Evaluation Plan	UCA SR staff and researcher	May-July 2012
2-year evaluation: design, data collection, preliminary analysis (<i>second iteration of PAR cycle</i>)	UCA SR staff, researcher, youth leaders	October 2012-February 2013
Sharing back of preliminary results of evaluation, integrating workshops inputs into final analysis, & adjusting of 5-year Action Plan	UCA SR staff, researcher, youth leaders, UCA SR Board, beneficiary families	March-April 2013

PAR does not take a uniform form every time it is applied, meaning that there are varying levels of participation in a given PAR process. A scale of types of participation used by Bacon et al. (2005) and modified from Biggs (1989) (see Table 8) identifies four levels of participation in PAR ranging from low (contractual), low-medium (consultative), medium-high (collaborative), and high (collegial). My goal in this project was to engage the UCA San Ramón, its staff and Board, the youth leaders and project

beneficiaries in a collegial research relationship in which I would “work with [them] to develop and strengthen their autonomous research and development capacities and practice” (Bacon et al. 2005, 3), but I characterize the relationship as closer to collaborative during this first iteration of the PAR cycle due to a series of limitations limiting the collegiality of the relationship at the very beginning, but with the goal that the process would be more on the side of collegial during the second iteration of the PAR process (I believe we have achieved this in the 2-year evaluation process we are currently implementing at the time of this writing).

Table 8: Types of participatory research (adapted from Bacon et al. 2005, modified from Biggs 1989)

Level of participation	Types of participatory research	Objective
High	Collegial	Researchers work with local actors to develop and strengthen their autonomous research and development capacities and practice.
Medium-high	Collaborative	Researchers and local actors collaborate as partners in the research process.
Medium-low	Consultative	Researchers consult local actors about their problems and develop research to help solve them.
Low	Contractual	Researchers contract local actors to provide land or services.

There were various limitations to the PAR process being fully collegial. The first limitation can be described as differences in perceptions about the goals of the research. The UCA San Ramón is a second level coffee cooperative that not only focuses on commercializing its members’ coffee crop and promoting social development among its members, but also implements various types of rural development projects in the municipality. Development project monitoring and evaluation requirements tend to focus on measuring *output* rather than *outcome*; that is, activities or investments rather than the impact of the activities or investments on people. The UCA’s own tendencies in monitoring projects have been in line with this strategy. With GMCR’s new monitoring

and development guidelines for its projects, as well as CAN's larger interest in creating a body of knowledge around the larger causes of food insecurity, I worked closely with the UCA San Ramón to create a system to measure not only the number of workshops, activities, infrastructure investments, etc., but also the impact of the various activities and investments, starting with the diagnostic baseline study in 2011. This meant that I had to "impose" requirements and, in the UCA's perspective, the extra time and cost of learning and performing impact evaluation activities. But the end result is that we all learned how to do this better.

This created a second point of tension, which was the learning of different ways of creating a comparable baseline of data. The UCA staff, for instance, favor the use of focus groups resulting in lists of phenomena with no quantitative information about rates of occurrence of the phenomena; generally these are along the lines of asking how participants feel about something or how they are experiencing it, but not accompanied by information about how many respondents replied in different ways, giving no indication of the weight of the different responses. In the research design process we had to go through many iterations of focus group and survey design that incorporated information that the UCA San Ramón valued, but that would also create valuable quantitative information that could be used for later comparison of impact.

Recognizing these limitations at the beginning, I accepted that I would direct the design of the research project, but at the same time I recognized the opportunity for capacity-building at the level of the UCA San Ramón staff and the youth leaders, and I approached every step in the design, data collection, analysis, and sharing of the study as an opportunity for capacity building. Alongside this, we were all conscious during the

PAR process up to and including Step 4, that our PAR approach was in itself an experiment in creating strategies that would perhaps more effectively address the problems described by project beneficiaries themselves through the process.

3F. Choosing Indicators of Community Food Security and Sovereignty

We encountered two interesting challenges in choosing indicators for the diagnostic study of food security and sovereignty in the eight cooperatives: first, widely-used existing indicators of food security apply to the national scale as mentioned above, but are less practical when trying to apply them to community food security; second, the integration of food sovereignty indicators was determined by the process of participation itself through the learning experience of sharing preliminary research results and constructing action plans.

Existing indicators of food security have tended to focus on the study of national-scale food security. A proposal developed in 2002 by the Nutrition Institute of Central America and Panama (INCAP) and the Panamerican Health Office (OPS) developed sets of indicators for each of the four dimensions of food security: availability, access, consumption (or “dietary behavior” as it is written in the proposal) and biological advantage (2002), but the indicators proposed for each of these dimensions are geared towards the national or regional scale, or are designated as “urban” or “rural”, and also depend on national databases of aggregated data, making it very difficult to apply the indicators proposed to the family and community scales. A set of indicators proposed for Nicaragua in 2006 also follows the four dimensions of food security used by the FAO, but proposes adding others to create a more nuanced view of food insecurity that would

not just focus on food sufficiency, but nutritional diversity, which greatly influences health (64-72):

- Level of caloric intake
- Dietary diversity
- Dietary quality
- Basic foods consumption (most frequently consumed foods)
- Period of sufficient provisioning
- Obesity
- Consumption of micronutrients

These proposed indicators make an analysis of national food insecurity much more dynamic, and also come closer to indicators that can be practically used at the community and family scales.

Given the dearth of resources on community food security indicators, we utilized a set of indicators originally used in the CAN Las Segovias Project diagnostic study in 2010, adapting them through a consultation process with the UCA San Ramón team of technicians to the socio-cultural and environmental context of San Ramón and adding indicators that would correspond more closely to the strategies and desired impacts of the San Ramón project (more comprehensive indicators of production and dietary diversity, for instance).

Integrating food sovereignty principles into the selection of indicators of the study proved more challenging. In Cuba, researchers at the Universidad Central de Las Villas (UCLV) have been working on developing indicators of food sovereignty that are practical for use at the smallholder farm level. Acknowledging that the core principle of

food sovereignty is local control of food systems, the researchers at UCLV argue that first, “the definition of sustainability must be clearly defined by participants so that the indicators developed can measure the trend toward or away from said definition” (Reardon et al. 2012, 919). This idea implies that participants (in our case, project beneficiaries) define the indicators themselves, which can possibly limit the transferability of a study design from one place to another and limit comparability (I face this challenge currently in my efforts to synthesize the results of four CAN FSS projects). It is, however, consistent with CAN’s PAR principles, and with the principles of agroecology, which value local understandings of reality.

We originally chose indicators for this diagnostic study based on adaptations from the Las Segovias project, as mentioned above, and on Via Campesina’s food sovereignty indicators, but during the process of analyzing the original data taken, sharing it back with the various actors, and constructing the resulting action plans with broad participation of staff, youth, and project beneficiaries, we narrowed down our set of indicators to those listed in Table 9. The indicators are a mix directly linked to project impact goals, indicators identified by the UCA San Ramón and CAN as lending a more expansive view of overall change in the long term, and those identified by beneficiaries themselves as they critiqued the preliminary analysis in the share-back workshops. Thus the indicators that we ended up using were not the same as the ones we started with at the design-stage of the study; instead, I argue that they more closely represent the priorities of each of the actors involved.

The resulting dimensions of food security and sovereignty (FSS) make up the analytical framework utilized in the final analysis:

- Cooperative profiles
- Socioeconomic profiles of families
- Access to and availability of food
- Consumption and utilization of food
- Agroecological practices
- Food security strategies and coping mechanisms
- Youth leadership
- Local Access to Productive Resources
- The Role of Gender in Agricultural Production and Food Preparation
- The Preservation of Indigenous Knowledge
- Food Self-Sufficiency
- Community Participation

The following table lists the goals of the project linked with specific questions for monitoring, related indicators, and the instruments used for data collection.

Table 9: Indicators Related to Project Goals, with Respective Instruments Utilized

Categories	Goals of Project	Monitoring and Evaluation Questions (expected results in 2-5 years)	Baseline and Impact Indicators (Diagnostic 2011)	Instrument
Cooperative Profiles		Basic profiles of 8 cooperatives	Years membership of the UCA SR	Existing data
			Distance to municipal seat and services;	Existing data
			Average parcel size of members	Existing data
			Gender distribution of overall membership	Existing data
			Location/climate zone	Existing data
Socio-economic Profiles of Households		Socioeconomic Profiles of Households	# families per household	Survey
			gender distribution of household members by age group; gender distribution of heads of household	

			age distribution of household members	
			Levels of education	Survey
			Household access to water	Survey
			Household access to basic services	Survey
Access and Availability	1. Families have year-round access to sufficient and diverse foods, which are available locally.	What is the length and severity of seasonal hunger in the 8 cooperatives?	Length of the thin months by cooperative	Survey
			Severity of the thin months by cooperative	Survey
			Access to land	Survey, existing data
			Parcel size, land use, and production diversity	Survey
		Are the participants in garden programs creating more family gardens/growing more vegetables in their family gardens? What percentage of participants are involved with fruit tree nurseries and trainings plant fruit trees on their farm and how many seedlings or grafts do they plant? Does the implementation of the project protect or improve the variety and the availability of foods that are consumed on the farms within the community?	Duration (months) of food harvested (basic grains)	Survey
			Diversity of fruit trees on-farm	Survey
			Diversity of animals on-farm	Survey
			Diversity of vegetables produced	Survey
			# seasons basic grains produced	Survey
			What foods are available in local stores? Do families sell food produced to local stores?	Survey
				Interviews
			Of the basic foods consumed, what % is bought and what % is produced?	Interviews
		Other available foods other than those that are produced on-farm.	Survey	
Food Consumption and Utilization	3. Producing families in the participating cooperatives adapt and implement the food consumption practices that they learn in training sessions on their own farms and plots.	Do the families and youth that participate in trainings and garden programs consume adequate food during the year, and consume a more diverse diet?	Sources of income to increase access to food	Survey
			What are the main foods consumed during the year?	24 hour dietary recall, Focus Group
			Of that which is produced on the farm, what proportion is consumed and what is sold?	Survey
			What do people eat on a typical day?	24 hour dietary recall

			Who prepares traditional dishes and why? Who does not prepare traditional dishes and why not?	Focus group
			Of that which is produced on the farm, what is sold, where, and why?	Survey
Agroecological Practices	Households in the participating cooperatives adapt and implement the agroecological practices that they learn in training sessions on their own farms and plots.	Are households implementing improved agroecological practices that increase soil fertility, water usage, environmental sustainability and productivity?	Soil management practices	Survey
			Composting and Fertilizing practices	Survey
			Access and usage of irrigation, and for what crops	Survey
Food Security Strategies and Coping Mechanisms	Households are implementing FS strategies that decrease the period of the thin months, increase availability and access to diverse foods year round, and increase resilience.	What factors reduce the impact of the lean months of participating families the most? What factors reduce the time during which families experience scarcity or the lack of access to food? What percentage of participants in training groups about seed storage and sharing and other food security strategies implement these strategies afterwards?	Prices of basic grains during different seasons of the year in local stores	None
			Strategies utilized to obtain food when there is not enough food or enough money to buy food?	Focus group
				Interviews
			Storage strategies (sacks, silos, etc.)	Survey
			Funding and other assistance received during different seasons of the year	Survey
			Access to food specifically for young children	Survey
			Finance Cycles	Survey
			Food security strategies and coping mechanisms: What are the most important means by which to supply the food families consume during a “normal” year and in a “crisis” year? i) Self-production for self-consumption? ii) Stored food (at home or in another place)? iii) Purchased iv) Bartering/exchange v) Gifts (friends, family) vi) Gathered (if in collectively-shared areas, which ones? What part comes from shade trees...) vii) Donations (how are they received... form of distribution) viii) Other means - for example, working for food)	Survey, interview, annual calendar

			What are the best practices for preventing food insecurity at the family and community levels?	Survey, interview,
			Climate change adaptation	Survey
			Strategies to manage drought	Survey
Youth Leadership	1. Youth organizers facilitate education projects focused on food sovereignty that can include groups of producers and the use of gardens as training sites for good agroecological practices in participating communities.	Do young adults lead training sessions focused on food sovereignty themes and other social and environmental campaigns in their cooperatives or communities?	Involvement of youth in local organizations, institutions, and cultural activities	Survey, Interviews
			Personal and family migration, why?	Interviews
			What is the impact (and benefits) in both families and the community of youth migration?	Interviews
		Are gardens used as informal and formal learning and training spaces for youth and productive families?	N/A for the diagnostic (for monitoring)	
	2. Create a positive perception of rural livelihoods among children and young adults, while building the capacity of Young adults to work as professional farmers.	Does participation as leaders in the project create a more positive view of rural and agricultural livelihood among youth?	What are the views of rural life and rural livelihoods among young adults, women and men? What do young adults want to do with their lives?	Surveys, interviews
Food Sovereignty	1. Improved local access to productive resources, including land, water, seeds, compost/fertilizer	Do households have sufficient access to the means of production to meet their self-defined needs?	Levels of access to water, land, seeds, and compost/fertilizers	Surveys
	2. Improved empowerment of women in food production and preparation, control over household food system	Do women bear fair burden of feeding their households, and are they sufficiently empowered to create economic opportunities to improve their household provisioning?	Level of shared labor in food production and preparation, level of women's participation in food usage.	Surveys, focus group
	3. Improved usage of local production technologies and consumption cultures.	What proportion of households are preserving and implementing traditional and locally developed production and consumption technologies?	# families utilizing traditional and locally grown foods; # families consuming traditional recipes and recipes utilizing locally grown foods.	Surveys/focus groups.
	4. Increased food self-sufficiency	To what degree do households produce enough food to sustain themselves?	% of food consumed that is produced on-farm	Surveys

3G. Sample Sizes and Instruments

This study examined eight cooperatives in six communities located in the municipality of San Ramón, Matagalpa, utilizing survey instruments, focus groups, semi structured interviews, document analysis, and participant observation. The methods I chose to employ were determined by the need to address the context of this story at multiple scales determined by the relationships that surround the issue as it manifests on the ground.

Surveys and Survey Sample

The survey sample from each of the cooperatives was comprised of six to eight households with each household comprised of one or more families, for a total of 313 individuals organized into 76 families in 59 households. The number of households surveyed comprises about 40% of the total membership of the cooperatives themselves, meaning the data is highly representative of the reality experienced by all of the households in the participating cooperatives since the study involved almost half the households of each cooperative. With respect to the gender distribution of the study participants, 158 males and 155 females (including youth and children in households) participated in household surveys. Table 10 offers a summary of the breakdown of the survey sample.

Table 10: Survey Sample Broken Down by Cooperative, Age, and Gender

Cooperative	# households surveyed	# families	Total # members in coop.	Age Group	Male within households surveyed	Females within households	Total age grp/cooperative of households surveyed	Total # people in households surveyed	Average # people/household surveyed
Amigos de Bonn	8	9	10	0-5	2	6	8	39	4.88
				6-16	3	2	5		

				17-35	11	7	18		
				36-65	4	3	7		
				65+	0	1	1		
Danilo González	7	7	33	0-5	1	0	1	36	5.14
				6-16	8	6	14		
				17-35	6	7	13		
				36-65	3	5	8		
				65+	0	0	0		
Denis Gutierrez	6	8	15	0-5	1	2	3	30	5
				6-16	4	0	4		
				17-35	6	9	15		
				36-65	3	5	8		
				65+	0	0	0		
Ramón García	7	16	17	0-5	1	2	3	36	5.14
				6-16	4	1	5		
				17-35	10	8	18		
				36-65	4	6	10		
				65+	0	0	0		
Silvio Mayorga	8	8	14	0-5	1	3	4	41	5.13
				6-16	6	16	22		
				17-35	2	6	8		
				36-65	4	3	7		
				65+	0	0	0		
Simón Bolívar	7	8	28	0-5	0	1	1	31	4.43
				6-16	4	4	8		
				17-35	6	3	9		
				36-65	3	6	9		
				65+	3	1	4		
Sixto Sanchez	8	10	16	0-5	4	3	7	52	6.5
				6-16	13	4	17		
				17-35	9	5	14		
				36-65	6	7	13		
				65+	1	0	1		
Sofio Sanchez	8	10	15	0-5	0	3	3	48	6
				6-16	8	9	17		
				17-35	12	5	17		
				36-65	4	6	10		
				65+	1	0	1		
Total	59 households	76 families	148 cooperative members	0-5	10	20	30	313	5.31
				6-16	50	42	92		
				17-35	62	50	112		
				36-65	31	41	72		
				65+	5	2	7		
					158	155	313 total		

					males	females	individuals in study		
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Focus Groups

To complement the quantitative information on the eight categories of indicators acquired from household surveys, we also employed focus groups to bring out qualitative information and perspectives of project beneficiaries that might not otherwise come out of the surveys, and to assist in developing a common understanding of the themes at hand (Bosco and Herman 2010, 193), namely chronic and seasonal hunger, how these are experienced, and why these phenomena exist. We employed focus groups at two points in the PAR research cycle: during the initial data collection phase and again during the analysis phase in which we employed focus groups to share back the results of the preliminary data analysis and integrate participants' perspectives and understandings into the analysis itself.

We utilized a focus group during data collection to engage specifically with women beneficiaries, be they the primary project beneficiaries as heads of household or the wives or daughters of male heads of household. The reasoning was that as the surveys were performed at the household level, it could be that women's voices were not fully integrated into the survey process, since it is culturally the norm for women to defer to the voices of their husbands in group situations. Thus we felt it necessary to create spaces where women felt free to talk about their experiences and understandings, apart from their male counterparts. The focus group with women participants (20 women) focused on farm mapping, creating an annual calendar of activities in the home and on the farm, discussing most commonly used coping mechanisms employed during the year

and during the season of hunger, and to explore changes in food preferences over time (what did we eat before, and what do we eat now?). A second focus group during the data collection stage engaged 20 youths from the eight cooperatives in exploring the themes of perspectives on migration, dreams of the future, perspectives on *la vida campesina*, and difficulties that youth have in accessing education, money, recreation, and other things they identify as wants and needs.

We performed five more focus groups during the data analysis phase, respectively with the UCA staff and Board, the youth leaders group, and three with beneficiaries (men and women) from the eight participating cooperatives. In these focus groups we shared preliminary analyses of the data collected from the surveys, initial focus groups, interviews, and asked participants to agree or disagree with different points or findings, and add understandings as to why or why not. We then integrated the new information and understandings into the final analysis, presented in Chapter 5.

Interviews

We performed eight semi structured interviews with members of the group of cooperative youth leaders, with the intention of gaining first-person perspectives on the role of youth in the cooperatives, how they experience the challenge of food insecurity, and how they see themselves interacting with their communities, their families, farms, and *campesino* life in the future.

Participant Observation and Document/Discourse Analysis

I personally had a great advantage in performing participant observation during this study, being that I am not only the principal researcher in the development of project monitoring and evaluation but also the project manager, responsible for communicating

and reporting from different levels, from the donor to the first-level cooperatives, financial management of the project, and overseeing implementation processes as well. I am also privileged to have close interactions with the specialty coffee industry, actors in the fair trade movement and certification industry, and with Nicaragua government officials working within the realm of food security and sovereignty politics and policies. This gave me the opportunity to observe and participate in the different dynamics at different scales, as well as add reflections from all of these interactions back into the implementation of the diagnostic study and the project actions themselves.

Analysis

I utilize all of the data collected through the various methodologies described above to create a narrative of progressive contextualization from the farm level to the overarching political structures and politics in the relational scales that surround the issue of food insecurity in San Ramón. In terms of analysis of farm-level survey data, the small sample size (59 households) did not permit using advanced statistics; instead I utilized basic descriptive statistics and visual analysis of the graphic representations of the data. A future study would be valuable to test if the differences detected visually or with basic statistics are indeed real or significant.

Chapter 4

Food Security in Context: Nicaragua and the UCA San Ramón

Chapter 1 examined the historical evolution of food security at the global scale and the responses of the coffee industry to the persistence of food insecurity in the very communities it sources coffee from. Chapter 2 explored our existing understanding of the relationship between coffee and food insecurity among rural smallholder producers. In this chapter I shift to Nicaragua and consider the historical relationships between coffee, land tenure, revolution, the state, and food security, as well as introduce the UCA San Ramón cooperative organization, which is the main subject of this study.

4A. Context: Coffee and the Resurgence of Cooperative Organizations as Key Actors in Rural Development in Nicaragua

The Coevolution of Coffee Agribusiness, the Landholding Class, and the Somoza Regime

Coffee was first established in Central America by the Conservative regimes that were in power after independence in the 1820s. The Liberals who later came into power after 1850 expanded and amplified the incentive programs begun by the Conservatives before them, and they improved transportation infrastructure necessary for export. Coffee's entry into Nicaragua reportedly took place in Jinotepe in the 1820s by Dr. Manuel Martus, who brought it from Costa Rica where he had been studying medicine. Cultivation began intensively in the Sierras de Managua by 1849, spurred on by incentives mandated by national legislation, which granted large coffee plantation owners tax and military service exemptions, subsidies, low-cost inputs, and cash awards. A railroad installed in the region, as well as the Vanderbilt steamship line that crossed the

Lago de Cocibolca, also helped the cause of getting product to market. All of this led to the beginning of a coffee-export economy by the mid-1960s (Revels 2000,18-20).

The success of coffee cultivation in the southern uplands inspired the development of coffee production in the “undeveloped” mountains of the North-Central region. Production began in the highlands of Matagalpa, Jinotega, Estelí, and Nueva Segovia in the 1850s, although large-scale production was not in place until the 1870s (Revels 2000, 18-21). The first coffee plantings were introduced close to the towns of Matagalpa and Jinotega, in order to be close to the transportation infrastructure, as roads suitable for horse or vehicle travel were not available until the 1950s in remote areas (interview with Omar Chacon, UCA San Ramón, December 2004).

The Nicaraguan government began to focus on the development of the Northern Highlands in the 1870s by promoting foreign immigration to the area, even allowing new landholders to retain their native citizenship. Foreigners were given 350 manzanas of land (245 Ha) and offered subsidies to plant coffee. Beginning in 1879, the government offered new planters five cents per tree to any owner who could plant more than 5,000 trees. In 1889 lot sizes were increased to 500 manzanas, if owners could commit to planting at least 25,000 trees. Most of those who benefited from these policies were Germans, English and North Americans, although native Nicaraguans also benefited and settled in the highlands during this period of the late 1800s (Revels 2000, 22).

The Matagalpa indigenous group populated the region before coffee arrived to the North Central Highlands. They had a history of armed resistance against the Spanish and a natural geographic isolation from economic or population centers after independence. But there were only a few thousand of them. According to Revels, by the middle of the

19th century low population density and an open frontier to the north and east combined to ensure that land was abundantly available in the Highlands to anyone willing to settle and claim it (2000, 22). The indigenous people had long occupied the best agricultural lands of the Highlands, but efforts by the government to appropriate the lands, combined with armed suppression of resistance, led many indigenous people to seek other, more marginal lands, or they moved to the agricultural frontier, opening up space for new investors and settlers. As a result, the land ownership regime changed from communal indigenous ownership and vacant public lands to private ownership, involving as many as 24,000 manzanas in Matagalpa alone by 1891. By 1909 coffee had become the dominant feature of agriculture in the highlands, *latifundia* dominated more than half the total private agriculture lands in Matagalpa and Jinotega, and indigenous peoples had effectively been marginalized from these prime lands (Revels 2000, 21-23).

This tradition of large haciendas in the Northern Highlands and in most of Nicaragua carried forward into the era of the rule of the Somoza family, which lasted from the beginning of the twentieth century until its overthrow by the Sandinistas in 1979. The class structure of pre-revolutionary Nicaragua was a result of, and a necessary condition for, its capitalist agricultural development (Moburg 1983, 220). This observation is supported by Enriquez (1991, 10):

The landowning class, which coalesced to promote the expansion of coffee production during the late nineteenth century, initiated the first stage of consolidation of the Nicaraguan state and began the intimate relationship between the state and agroexport production that still exists today. The state played a crucial role in the development of agroexport production and the marginalization

of the peasantry. It provided infrastructural, financial, and technical assistance to this budding capitalist class and legitimated the concentration of land and labor essential for the expansion of export-crop production. The strength of the state grew as this sector developed.

Under the rule of the Somoza family, land had increasingly been concentrated into larger holdings and fewer hands with the argument that production required economies of scale: the belief was that productivity and efficiency were only possible with large-scale estates. In 1950, according to Moburg (1983), minifundia and family farms of fewer than 35 hectares constituted 72 percent of all Nicaraguan farms, but they occupied only 15.2 percent of the nation's cultivated lands. By 1963 over 79% of the country's farms were of this size, but the land area under their control had slipped to 13.7 percent of the total (221). This growing marginalization of the peasant and agricultural proletariat sectors is reflected in the distribution of the means of production among the economically active population (Table 11).

Table 11: Pre-1979 Rural Class Structure in Nicaragua (Enriquez 1991:5-6; Moburg 221)

Class Sector	Grouping	Property size	Type of Production	Portion of EAP
Bourgeoisie	Large landowners	>500 Mz (350 Ha)	Specialized Export crops	0.5%
	Medium-size landowners	50-500 Mz (35-350 ha)	Export and domestic crops	4.5%
Peasant sector	Rich and middle peasantry	10-50 Mz (7-35 ha)	Domestic basic grains, some export production	21.6%
	Poor peasantry	<10 Mz (7 Ha)	Subsistence production and seasonal wage labor	36.4%
Agricultural Proletariat	Full time laborers	0	Year-round wage laborers	19.8%
	Part-time laborers	0	Seasonal wage laborers	17.3%

The inherent economic and social inequality of this system was exasperated by fluctuating market prices (Table 3), which affected the largest and most vulnerable classes of peasants and agricultural proletariat. Somozista agrarian reform programs executed during the 1960s and 1970s were designed to mitigate these problems without affecting the existing social structure (Enriquez 1991, 13).

But by the late 1970s, doomed reforms and political repression had failed to appease the majority, and the bourgeois class had begun to distance itself from the state (13). This dissatisfaction led peasants and bourgeoisie alike to finally be more receptive to the political organizing of the Frente Sandinista de Liberación Nacional (FSLN). FSLN workers' committees were organizing peasant and rural proletarian opposition on the haciendas, taking advantage of the convergence of large numbers of workers during the harvests (Revels 2000, 222). Beginning in 1978, many were involved in occupying haciendas and beginning to organize agricultural collectives, known as *Comunas Agrícolas Sandinistas* (Sandinista Agricultural Communes) (Revels 2000, 222-223).

Agrarian Reform and the Birth of the Cooperatives 1981-1986

Revolutionary governments are put into place not to implement reforms, but to create radical social change. Anastasio Somoza's regime was overthrown in 1979 by the Sandinista movement, and once the initial drama of the overthrow subsided, the Sandinistas found themselves with the task of changing the nation's socioeconomic structure; they would do this by redistributing the means of production while trying to maintain levels of production to ensure foreign exchange (Enriquez 1991, 14-17). The government's relationship to the social structures it created would impact how these

organizations would deal with the adversity of the end of the Sandinista Revolution (and the end of government support) once the country's politics shifted ten years later

Immediately after the overthrow of Somoza and his cronies, the Sandinistas confiscated 800,000 hectares (23.2% of Nicaragua's cultivated land) of land through government decrees 3 and 38 (Moburg 1983, 223; Enriquez 1991, 88). Over 980,000 hectares of land were expropriated from large holders between 1979 and 1989. This land formed what was known collectively as the Area Propiedad de Pueblo (Area of the People's Property) (AAP), and constituted about 20% of Nicaragua's agricultural land (cultivated and uncultivated) (Enriquez 1991, 88). About 30% of the total confiscated land was redistributed to landless peasants. Initially after the confiscations of 1979-1980, the Sandinistas established agricultural communes on the intact farms to ensure continued efficient agricultural production. These formed the basis of the first form of agricultural cooperative in revolutionary Nicaragua, the Sandinista Agricultural Cooperatives (CAS), in which land was under collective legal title and worked collectively. Others were organized as individual farmers in cooperatives, known as Credit and Service Cooperatives (CCS), sharing services such as credit and technical assistance (Enriquez 1991, 88; Moburg 1983, 223).¹⁰

By 1982, it was reported by the Nicaraguan Ministry of Agricultural Development and Agrarian Reform (MIDINDRA) that about 53% of Nicaraguan landed peasantry were members of agricultural cooperatives (MIDINDRA 1982, 35). As a result of the agrarian reform measures, the amount of farmland in the possession of major holders was

¹⁰ Land was distributed under Edict No.782, The Agrarian Reform Law, and cooperatives were formed under and governed by Edict No.826, the Agricultural Cooperative Law (MIDINDRA 1982:29-48 and 55-70).

reduced from 36% to 11%, while smallholders increased their holdings by 20%, ten times what they previously owned (Wearne 2000). In the case of both the CAS and the CCS, the relationship between the state and the cooperatives was an intimate one in which the cooperatives were dependent on the state for marketing, technical assistance, and agricultural credit, and in turn they were obliged to participate in political workshops provided by the government in which they were inculcated into revolutionary politics (Moburg 1983, 223).

But the political turmoil resulting from the world's reaction to the Sandinistas upset the social progress. The United States-sponsored *contra* war began shortly after the consolidation of the Sandinista state, and the guerrilla attacks as well as the embargo obstructed the state's ability to deliver basic services and fulfill basic functions for the Nicaraguan people, especially in the northern frontier regions. The cooperatives suffered as the violence of the contra war escalated after 1981. The aggression meant the loss of a third of the coffee and basic grains production in these zones, which are fundamentally produced by small farmers. This loss was not caused by military destruction itself but by the impossibility of planting or harvesting due to the danger to human life (Spalding 1987, 205). The political consolidation of the cooperatives was also affected as people frequently had to flee from their farms, and the government agents often could not get into affected zones to simply buy products from the cooperatives (Spalding 1987, 205). Morale went down and people stopped producing, exacerbating the tricky food-security situation in which Nicaragua as a country already found itself. As ten years of revolution ended in 1990, the 3,820 agricultural cooperatives (MIDINDRA 1982a, 44) formed

during the agrarian reform faced a new government, a new economic system, and new challenges.

4B. Food Security in Nicaragua: The State Refocuses on Rural Smallholders and Food Security

The following description of the context of food insecurity in Nicaragua is based on an analysis offered by Cáceres and Lacayo of the Luciernaga Foundation and Servicios de Información Mesoamericana sobre Agricultura Sostenible (SIMAS). The analysis was based on a study performed on food sovereignty in Nicaragua in 2010.

Global Structures and Local Consequences

Food insecurity in Nicaragua originated during World War II, in which countries in Latin America, which depended heavily on agricultural inputs from the European countries greatly affected by the war, experienced not only a shortage of inputs for production but also a loss of their major markets in those places. Strangely enough, in this same period, at the global scale it became apparent that the export capacity of countries that produced more than they could consume was greater than the import capacity of those countries with a production deficit. This revealed that the global system had structural problems. The FAO responded in the 1950s by increasing demand (instead of reducing production) through the industrialization of mass produced food products, creating a global addiction, so to speak, to processed foods in the 1950s and 1960s. At the same time, many countries, including those in Latin America, focused their development on industry and manufacturing rather than agriculture (Caceres and Lacayo 2010, 9). This resulted in mass migrations from rural to urban areas, also provoking the need to maintain food prices low through artificial subsidies (a practice that remains

common today). The subsidies were meant to benefit smallholder producers, but in the end they mostly benefited large-scale producers. Thus agriculture as a livelihood became expensive and not profitable for small-scale farmers in countries like Nicaragua.

In the early 1950s the rise in the costs of agricultural production in turn provoked a response from some countries to refocus on food self sufficiency instead of purchasing basic foods from countries with excess production. The results was a situation of overproduction at the global scale, and the FAO responded by forming the Basic Foods Committee in 1953, which was charged with finding a way to make agricultural growth grow in step with need for food. The solutions the committee found was to create what is called food aid, or the gifting of basic foods to countries in development, as well as the creation of agreements among countries as to production levels. Food aid was later recognized as having played a major role in weakening smallholder production and food security in developing countries, and it continues to do so today (Roche 1994; Tadesse and Shively 2009).

Complementing these dynamics were other global scale changes that took the form of the Green Revolution in the 1960s, the results of the World Food Conference in 1974 in Rome, and then Structural Adjustment Policies in the 1980s (Caceres and Lacayo 2010, 2-10). The Green Revolution resulted in the genetic evolution of stronger agricultural pests, widespread contamination of water, soil, and human bodies with herbicides and fertilizer residues, massive soil loss, and the further marginalization of smallholder farmers due to their lack of access to GR technologies and resulting inability to compete in the market. It also led to a widespread dependence on petroleum, a major ingredient in chemical fertilizers. When OPEC raised petroleum prices in 1973, this in

turn created a crisis in the agricultural sector because it meant that chemical fertilizers would be made inaccessible to farmers because of their higher cost. The World Food Conference was organized in 1974 by the United Nations to deal with the immediate food crisis that resulted, but also to look for strategies and solutions for the long term that would make the world food security system more efficient as well as promote healthy practices in food consumption and distribution. The result was the creation of six international initiatives of cooperation, as well as a framework of food sovereignty as a right and responsibility of each state to implement using its own resources.

With the petroleum crisis in 1979, many countries implemented harder monetary and fiscal policies. This shift resulted in shrunken economies and a resulting demand for imported products, which coincided with a strong reduction in global food prices, and thus the global economy entered even more strongly in crisis; foreign aid and credit to developing countries almost disappeared (Caceres and Lacayo 2010, 7). Global instability was rampant. Global financial institutions responded with Structural Adjustment programs in the 1980s, which offered countries access to credit in exchange for certain conditions, including reduction in state spending, monetary devaluation, market liberalization, and the privatization of public companies. The impact on developing countries was catastrophic: a reduction of social programs, price spikes, and a growth in unemployment (Caceres and Lacayo 2010, 9). At the same time, developed countries experienced increased debt, constricted markets for their agricultural exports, drastic falls in the prices of agricultural products, and increased illegal practices such as dumping of basic grains, which in turn resulted in the fall of food prices in developing countries, further weakening the plight of smallholder producers whose rising costs were

far above their income from production (Lacayo and Caceres 2010, 17-22). The situation provoked a global response in the form of free trade agreements in the 1990s, which were overall disadvantageous for developing countries (22-23).

The 1990s also saw a global recognition of the problem of hunger, and various responses and international structures established as a result. Beginning in 1992 with the International Conference on Nutrition in 1992, organized by the WHO and the FAO, and continuing with the World Food Summit in 1996, representatives from governments and non-governmental organizations sought to move hunger and food security to the center of the international agenda, with a special focus on nutrition (Caceres and Lacayo 2010, 22). The adoption of the Rome Declaration on World Food Security and the World Food Summit Plan of Action at the World Food Summit helped to influence public opinion and provided a framework for bringing about important changes in policies and programs needed to achieve the summit's goals.

From the 1990s through the 2000s, there have been further shifts in which the debate around food security shifted to the theme of food sovereignty and how to achieve it. Via Campesina largely led this global shift in the discourse, and it occurred through various international forums (2001 in Cuba, 2002 in Rome, and 2007 in Mali). The result was a new discourse focusing on countries not simply assuring the availability of food, but rather that “food and agrarian policies should be defined in each country in line with its sustainable development and food security goals, in which implies the protection of domestic markets instead of the importing of cheap excess products from the international market or the dumping of products at prices below the costs of production” (Caceres and Lacayo 2010, 27). Over the process of the various international forums, the

focus evolved from food insecurity and hunger to critically analyze the causes of those phenomena, which include global economic, agricultural, and commercial policies that limit communities' access to the natural resources and means of production, including water, seeds, land, forests, technology, and knowledge (Caceres and Lacayo 2010, 28). Since 2002, further analyses have concluded that smallholder agriculturalists are key contributors to food security at every local level, and thus at a global scale, and that smallholders should be part of creating any solution proposed or implemented (Caceres and Lacayo 2010, 31).

Food Security in Nicaragua: Structures and Politics

Before the Sandinista revolution in 1979, the Nicaraguan economy and social structure was very much based on the agroexport model facilitated by its high concentration of land in a few hands (Lacayo and Caceres 2010, 10). Production was centered on sugar cane, coffee, intensive Green Revolution cotton production, and beef cattle. The majority of the population was rural and made its living working on the large plantations or providing services to them. With the triumph of the revolution in 1979, food turned into an explicit political focus on the new government. Starting with the National Food Program (PAN) in 1982, the Sandinistas sought to create a new structure of food policy, production, and distribution in the country, one of the first concrete efforts at promoting national food security in the world (35). Further legislation in 1987 stated “it is the right of Nicaraguans to be protected against hunger” (Article No. 63), and this new legal framework of food security led to the consolidation of different projects focused on basic grains production, nutrition, and small-scale family, community, and

school garden production aimed at improving local availability and access to foods at the household and community levels (35-36).

This explicit focus on food security at both the national and community levels changed dramatically in the 1990s. The Liberal government that won the 1989 election and replaced the Sandinistas in 1990 placed little emphasis on smallholders or rural workers in its policies or programs, instead focusing on the development of large-scale agriculture for export (Lacayo and Caceres 2010, 32). Legislation was enacted (including Law No. 290) that weakened and atomized the state agencies that had been established to work with the agricultural sector. However, during this period of government abandonment of the smallholder agricultural sector, many of the organizations that were formed during the revolution continued working with smallholders and building the campesino social movement. UNAG and its Campesino a Campesino Program (originally imported by the exiled Guatemalan campesino activist Manuel Huz during the 1980s) continued to work with smallholder agriculturalists in the valuation and dissemination of campesino technologies and knowledges, providing technical assistance, and implementing rural development projects often funded by international agencies; the Association of Rural Workers (ATC) continued organizing rural laborers; and FENICOOP, the National Federation of Cooperatives, continued building the cooperative movement, establishing more agricultural cooperatives (especially in coffee-growing regions of the country) and establishing links with international organizations and markets (Lacayo and Caceres 2010, 36-37). The social movement, syndicate, and cooperative sectors had effectively taken on the work of rural development in Nicaragua in the 1990s.

A shift began in 2007, coincidentally two years after the end of the coffee crisis. Daniel Ortega, a lifetime leader and the face of the revolutionary Sandinista Party, was elected in November of 2006 to President, overtaking fifteen years of right-wing pro-rich rule. Ortega's approach to running the country was a dramatic shift from his predecessors, but it was in line with his history and political leanings. On the left, many admire him for his focus on the poor. On the right, a surprising number supported his hands-off approach to business. Ortega became a member of the Sandinista National Liberation Front in the early 1960s, and by 1967, he was in charge of the Sandinistas' urban campaign against the ruling Somoza family. He was eventually arrested for taking part in a bank robbery and sent to prison. After being released in 1974, he was exiled to Cuba. Upon the Sandinista victory in 1979, Ortega was part of the process of defining the architecture of the revolutionary government. He was named coordinator of the junta in 1981 and three years later was elected president. He served as president from 1984 to 1990, when he was defeated in his bid for re-election by Violeta Chamorro of the right-wing Liberal party. He was defeated again in 1996 and in 2001, though he remained active in Nicaraguan politics. In 2006, Ortega ran again for president as the Sandinistas' candidate, and won. He won a second term in November, 2012.

Since 2007 when Ortega assumed the presidency, the structures and laws governing food security and sovereignty in Nicaragua have changed and evolved over time, involving various laws, ministries, agencies, and programs over time. Various legal structures and laws governing food security and policy already existed before Ortega won the presidency in 2007: the Nicaraguan Constitution itself includes five articles that refer specifically to food security, sovereignty, food as a human right, and natural resource

management: Law No. 295 (1999) governs the promotion, protection, and maintenance of breastfeeding; Law No. 219 (1996) governs and ensures the quality of food production and processing; finally, Decrees No. 40-2000 and 65-2000 in 2000 established the National Commission of Food and Nutritional Security (CONUSAN) whose responsibility was to “prioritize, plan, coordinate, monitor, and evaluate policies, strategies, and actions in which food is developed in Nicaragua” (64).

But although all of these structures existed when Ortega took the presidential seat in 2007, that year saw the beginning of the shift of Nicaraguan policy to food security and sovereignty that involved a major overhaul of the legal structure pertaining to the rural sector, the structure of government intervention in rural development, and its goals with respect to the national economy. The first major overhaul of the new government was the National Human Development Plan (PNHD), which established food security and sovereignty as a transversal concept across all of the government agencies dealing with human and economic development policies of the country (Lacayo and Caceres 2010, 39) (the PNDH is in its second iteration of 2012-2016 currently). This plan was followed immediately by the National Assembly’s passing the Law of Food and Nutrition Security and Sovereignty (SSAN) in June, 2007, a proposal that had originally been put forth by a group of civil society organizations during the last Liberal administration. The law not only strengthened state operations regulating food security, but it also established the CONUSSAN (National Council of Food Security and Sovereignty) as well as created a new Executive Secretariat for SSAN (SESSAN) (Lacayo and Caceres 2010, 65), a model that has since been copied by other Central American countries, including Guatemala in 2012. The law also established a National SSAN System (SINASSAN),

which included committees or commissions at different scales of government: the CONASSAN and SESSAN mentioned previously, the COTESSAN (Technical Sector Councils), the CORESSAN (commissions governing SSAN in the autonomous regions of the country), the CODESSAN (departmental or state commissions), and finally the COMUSSAN, or municipal commissions governing SSAN work at the municipal level. All of these newly established structures interacted with other agencies and actors as determined in the SSAN System established by the law, as well as programs established in relation to food security and sovereignty at the national level. The most relevant of these programs was the Programa Hambre Cero (Zero Hunger Program) that focuses primarily on development among poor rural families and marginalized urban families; recently the program has refocused its interventions towards smallholder production of basic food products (Lacayo and Caceres 2010, 78). The most recent changes in Nicaraguan laws and legal structure governing food security and sovereignty include the reform of Law No. 290 and the creation of the new Ministry of Family and Community Economy in 2012; the new ministry absorbed the Hambre Cero program and other FSS programs, and it took on fifteen different responsibilities, among them promoting micro and small businesses in rural areas (*El Nuevo Diario* July 7, 2012).

There are contradictions in the Nicaraguan government's stated approach to food security and some of its actual practices that demonstrate the persistence of the Green Revolution culture. The program Hambre Cero and the new Ministry of Family and Community Economy both use language that places agroecology as a key strategy to ensuring community food security, and the Nicaraguan Food Security Law explicitly states that agroecology is a key strategy. However, other government programs,

according to interviews with government officials, offer production “packages” that include agrochemicals as part of government assistance to smallholder farmers to improve yields. Thus it appears that the right hand is following one strategy while the left is following another. Another criticism of the Hambre Zero program has been its lack of transparency and its restriction of participation to a few select NGOs (Food First Information and Action Network, 2008). A further critique is the lack of implementation of the local COMUSSAN; as of late 2012, only three local food security committees were actually functioning (San Ramon municipality among them).

4C. The Union of Cooperatives Augusto Cesar Sandino (UCA San Ramón) and its Focus on Food Security and Sovereignty

This section lays out the historical context that led to the creation of cooperatives and the co-development of the cooperative movement with fair trade in Nicaragua.

The Co-Growth of Alternative Markets and Cooperative-Led Rural Development: 1990-2001

The election of Violeta Barrios de Chamorro of the National Opposition Union (UNO) as president in 1990 resulted in the implementation of more liberal economic policies and some fundamental changes to the decade-long Sandinista agrarian reform measures. These included the repatriation of some lands confiscated by the Sandinistas to previous owners; the provision of individual land titles to CAS cooperative members (in contrast to the collective title that they had previously held); legalizing the sale of land received through the agrarian reform; privatizing the properties held in the state farm sector (the APP), and redistributing these properties to the 25,000 to 60,000 peasant families that still needed land, including ex-combatants on the contra-side (UN Economic Survey 174-75; Amador et al. 1991: 27-8). There were two main problems with this

strategy: first, the total property of the AAP was not enough for all land-poor families; second, factions within the UNO disagreed about the extent to which the UNO would break with Sandinista reforms (Amador et al. 1991, 9).

The result was a decade of uneven outcomes: some cooperatives continued working collectively while securing their legal title to the land, while others took individual land titles (and the legal right to sell).¹¹ The UNO government adopted a policy of focusing on the elimination of debt in the agricultural sector, rather than increasing access to the means of production; the result was a great reduction in the availability of credit and technical assistance; similarly the government no longer offered guaranteed prices for commodities such as coffee (Amador et al. 1991: 28).¹² In his report on “Law, Institutions, Deeds and Realities of the New Government”, Freddy Amador writes of the abandonment of the agricultural sector by the new government:

The liberalization of external commerce, even being a stimulus for agroexport production, can also have negative effects at the different levels of power and commercial experience, as much in the traditional sector as in the reformed sector. It remains to be seen to what point the intermediaries who operated before 1979 will return, and what consequences this will have for small and medium individual producers (Amador 1991, 29) (My translation).

¹¹ Competition for uncooperativized small-scale coffee producers is tough, however, and there are examples of base cooperatives that broke up in the early 1990s, that have recently reorganized themselves into new cooperatives and associated with larger cooperative export entities, like CECOCAFEN.

¹² Although these services were still available through the National Union of Agriculturalists and Cattlemen (UNAG) and the Agrarian Reform Institute (INRA), now Sandinista organizations not associated with the state (Amador et al 1991: 29).

With respect to coffee, there was no longer an export policy or marketing board, and small and medium producers were left to the whims of whichever intermediaries reestablished business in Nicaragua to do the selling and exporting of the coffee harvest. At the same time, Nicaraguans who had left the country in 1979 were returning, many of them claiming that their lands had been unjustly confiscated by the Sandinista regime. The Sandinistas had mandated that anyone associated with Somoza or the National Guard would legally have their lands confiscated. When Violeta Chamorro became president, a commission was created to handle claims of unjust confiscations. Lands that were still in the hands of the state were returned to previous owners, but lands already distributed to campesinos in cooperatives were left in the hands of the new owners, and state lands were given to the claimant instead under Edict 10-90 (de Groot and Plantinga 1990 ,6). The problem was that conflict still existed in many regions over government lands claimed by cooperatives or lands now owned by cooperatives and claimed by previous owners (Amador 1991, 20). In Matagalpa, members of cooperatives protested on the highways to defend their lands and violence erupted between them and returnees from Miami (interview Eddy Tenorio; CECOCAFEN 2004).

The collaboration between cooperatives in the organization of these protests and legal battles led to the formation of various Unions of Cooperatives in Matagalpa (including the UCA San Ramón), with the help of the National Union of Agriculturalists and Cattlemen (UNAG) and financing from international aid agencies such as Cooperación Danesa (Danish Cooperation). The next challenge, after securing land tenure for its members, was to look for markets for the coffee being grown by

smallholder members, since the Liberal government essentially had no programs no support for smallholder organizations, instead focusing its support on large farmers.

CECOCAFEN (Center of Northern Coffee Cooperatives) was formed in 1996 as a joint effort of the UCA San Ramón and a group of first level cooperatives, with the purpose of fulfilling and specializing in the role of exporting the Matagalpa cooperatives' coffee. It legally became a third-level umbrella cooperative with a specialized function of commercialization. CECOCAFEN formed with less than 700 members in three organizations, but by 2001 it had grown to include nine member cooperative organizations, a total of 1200 small producers. CECOCAFEN exported its first containers to Europe in 1997. These first containers were 100 percent Fair Trade coffee and this trend continued for the next two harvests. Things began to change in the 2000-2001 harvest cycle as a result of global as well as local events.

First, CECOCAFEN was growing: finding markets with good prices was priority. In line with this issue was the old problem of control over the commodity chain and quality. In 1999, CECOCAFEN purchased its own dry mill with the profits from selling to the Fair Trade market as well as financing from an international aid organization. This move internalized costs and gave the organization the ability to deal with much higher volumes of coffee, as well as generate additional income by selling milling, storage and commercialization services to nonmembers.

Second, in the north, the presence of Fair Trade coffee was growing the U.S. market, and Transfair USA, founded in 1999, was beginning to link producer organizations in the Global South to importers and roasters in the U.S. CECOCAFEN exported its first container to the U.S. in 2001 and, although it was not sold at official

Fair Trade prices, it was a step towards securing a place in the North American specialty market. CECOCAFEN began sending representatives to the yearly trade shows put on by the Specialty Coffee Association of America (SCAA) with financing from Transfair USA.

These first few years of experience exporting coffee revealed to the organization the quality demands of the North American specialty market, which had been developing during the 1990s. Buyers were demanding better quality as a condition to continue buying the coffee. One Fair Trade roaster, Paul Katzeff of Thanksgiving Coffee Company in Fort Bragg, designed a quality improvement and cupping laboratory project that was financed by USAID and executed by Thanksgiving Coffee and Christopher Bacon, a Ph.D. student at the University of California, Santa Cruz. The results of the project were the installation of nine quality control cupping labs in CECOCAFEN and ten other first and second level coffee cooperative organizations in Northern Nicaragua, as well as the training of professional cuppers in the cooperatives (Katzeff 2002). The laboratories continued to be used to today to characterize and categorize coffees (making the marketing and selling process much more efficient) as well as the training of youth cuppers from the base cooperatives themselves.

A project to promote farm transition to organic production began in 2001 as well in response to three outside factors. First, the new buyers in the United States were demanding more organic certified coffee for an emerging niche market; second, since consumers in the U.S. equate social justice with environmental justice, more Fair Trade buyers also wanted their coffee to be certified organic; and third, the development agencies (such as USAID) that were beginning to take an interest in

coffee cooperatives were promoting organic production. The result of the changes of 1997-2001 was a competitive position in the organic and specialty markets, and improved infrastructure and knowledge of product and market. This enabled CECOCAFEN to be able to sell its members' coffees at an overall better price¹³, continue its normal operations of offering credit and technical assistance to its members, and execute projects. More importantly, CECOCAFEN now had the organizational structure and collective capital that would determine how they would deal with the emerging coffee crisis and subsequent changes in priority.

Cooperatives Confront Crisis by Diversifying Markets and Entering into Rural Development: 2001-2005

According to Bacon, "People's vulnerability to the falling prices depends upon their location in the coffee commodity chain and their access to assets such as land, credit, employment, and social networks" (2005a, 503). When coffee prices fell to an all-time low of \$0.40 per pound green during the 2001-2002 cycle (ICO 2005), coffee producers in Nicaragua felt the blow, which exasperated the situation left by four years of catastrophic natural disasters such as Hurricane Mitch in 1998 and the 1999-2001 drought in Northern Nicaragua (Bacon 2005a, 502). At the national level, the crisis caused a 30 percent reduction of employment in the coffee sector, which annually employs 45,000 permanent jobs and 200,000 seasonal jobs, and the value of Nicaraguan coffee exports fell by \$60 million in 2001-2002, more than 55 percent from the previous cycle (Rivera Bolt 2002, 5). Over 132 farms closed or went bankrupt in Matagalpa alone (CECOCAFEN 2003), leaving thousands of people out of work and

¹³ Only 40% of CECOCAFEN's production is sold at Fair Trade or organic prices. The rest is sold at conventional market prices (Bacon 2005a:505).

many with nowhere to go (many permanent workers lived on the farms). Even small-scale farm owners were affected, as many supplemented their farm incomes with part-time or seasonal work on local haciendas. Since CECOCAFEN sold 60 percent of its production to the conventional market, its producers were affected by the low prices (which were about \$0.20 less than the actual costs of production), but that 40% of production sold at Fair Trade prices was what kept CECOCAFEN's member farmers above water, although many farmers did stop investing in their farms (Bacon 2005b).

But crisis often creates opportunity. Recognizing that having access to markets and better prices means nothing if the overall social and productive vulnerability of farmers remains high, CECOCAFEN shifted strategies towards human and community development. Already having a staff of trained technicians and administrators, mobilizing the organizational infrastructure to take on new projects was not difficult. At the same time, the so-called coffee crisis was perceived by NGOs as a development issue: Coffee Kids, a North American NGO financed largely by actors in the coffee industry, partnered with CECOCAFEN to implement social projects that would create women's solidarity savings and credit groups, as well as a scholarship program to help finance the education of the sons and daughters of cooperative members (see www.coffeekids.org). Coffee Kids trained personnel at CECOCAFEN to manage these programs and offered seed money to initiate them; today these projects are run by CECOCAFEN technicians and financed largely by CECOCAFEN itself. CECOCAFEN administrators see these two projects as a way of creating stronger family economies, increasing women's participation in the cooperatives, and creating loyalty to the cooperative and expertise within its ranks.

In 2002, the international development arms of the Catholic and Lutheran churches engaged together in a large-scale project called the Coffee Project. The project involved promoting Fair Trade coffee among their congregations (through the traditional “coffee hour” held after services). On the production end, Lutheran World Relief (LWR) and Catholic Relief Services (CRS) promoted agricultural diversification and organic transition projects in Central America and Peru and, in the case of CECOCAFEN, a community-based Fair Trade tourism project (www.lwr.org; CECOCAFEN). CECOCAFEN was able to take on the goal of developing communities through women’s organizations, scholarships, diversification and ecotourism because of its developed organizational infrastructure and knowledge.

CECOCAFEN did continue to develop its place in the market during this time in new and creative ways. With training provided by consultants from a British Fair Trade NGO, CECOCAFEN built its capacity to engage in the market, learning about hedging and other methods used to decrease vulnerability during price fluctuations (CECOCAFEN, Area de Comercialización). CECOCAFEN is also entering into a new relationship with one of its long-time clients, Equal Exchange, buying shares in the roaster cooperative itself. It has also formed an umbrella organization at the national level called CAFENICA, whose purpose is to do collective marketing as well as political lobbying to get the government to make better policies for the small farmer sector. The organization is, effectively, becoming an actor in, rather than an object of, the market, meaning that its goal is to use collective power to access better markets.

The emerging close relationship between large nonprofit development organizations and the specialty and fair trade coffee industry led to rural development

projects being offered hand-in-hand with coffee contracts, an established trend that continues today as exemplified by GMCR's direct social investment in cooperatives from which it purchases coffee. The UCA San Ramón in 2012 implemented rural housing projects for the government, gender equity projects funded by foreign NGOs, and six other nonprofit social and economic development projects, besides providing technical assistance and commercialization services to its members.

San Ramón and the Union of Agricultural Cooperatives in San Ramón

Nicaragua is a country of roughly six million people, of which 48% live in rural areas (this is a major change from 2008, when 75% of the population was rural). It is the poorest country in Central America and the second poorest in the western hemisphere, according to the CIA World Factbook 2013. The CIA Factbook 2013 also offers other relevant information about Nicaragua: 52.5% of the population is under the age of 24, roughly evenly split between males and females, and the population is growing at 1.06% per year. It has an average life expectancy of 72 years, with women having a higher life expectancy (74 years) than men (70 years). Its GDP per capita is \$3300, ranking it 172 in the world; 17.5% of the total GDP is from agriculture. 42.5% of the population lives below the poverty line. The prevalence of malnutrition among children under five years old was 5.70 in 2007, which is about half the rate in 1998 (10.3), but higher than the 2005 rate (4.30) (IndexMundi 2013).¹⁴

Figure 7 shows the department of Matagalpa within the context of Nicaragua. The town of San Ramón was founded on August 31, 1994, and is located in the central

¹⁴ Prevalence of child malnutrition is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population ages 0-59 months (IndexMundi 2013)

part of the department of Matagalpa approximately 13 kilometers from the city of Matagalpa and 142 kilometers from Managua.



Figure 6: Department of Matagalpa, Nicaragua

<http://upload.wikimedia.org/wikipedia/commons/8/81/NicaraguaMatagalpa.png>

The municipality of San Ramon is bordered to the north by the municipalities of El Tuma, La Dalia, and Matagalpa; to the south by Muy Muy and Matagalpa; to the west by Matagalpa; and to the east by Matiguas. Its municipal jurisdiction includes an urban area with eight neighborhoods and a rural area with 10 *comarcas* (subdivision of a

municipality) and 96 communities (subdivision of a *comarca*). The municipality covers 427 square kilometers and has an average altitude of 690 meters, an average yearly rainfall of 1,500 cubic millimeters, and an average yearly temperature of 23 degrees Celsius. It is located in the wet central highlands of Nicaragua and has primarily high broadleaf vegetation and pine forests with clay loam soils.

San Ramón is located in one of the poorest municipalities of Nicaragua, and has marginal tax income when compared with other municipalities of similar standing, a condition resulting in limited investment in economic projects directed towards rural women. The poverty of women is not only the result of material factors but also the consequence of social and cultural factors, including gender inequality, limited employment and educational opportunities, unstable and poorly-paid employment opportunities, multiple jobs and/or tasks, lower levels of health and well being, little participation in different social spheres, limited autonomy, violence, limited access to economic and social resources to support them, and few training programs to help them develop their knowledge of entrepreneurship.

The historical roots of the UCA San Ramón dates back to the revolutionary decade (1979-1989) when the Sandinista government instituted a land reform process with the fundamental objective of giving land to peasants (both male and female) who did not have land. During this period, about 13% of the country's land was distributed to cooperatives and, more specifically, in the municipality of San Ramón, more than 8,000 hectares were distributed to different cooperatives. Given this situation, cooperatives became important economic agents, re-adapting their individual orientation to organize in blocks in such a way that allowed them greater organizational power, thereby defending

their rights, management, marketing, and production (i.e. they faced adversity as a united force). In this way, five first-level cooperatives united and initiated a process of creating a second tier cooperative. This integration took place in 1992 and resulted in the founding of the Augusto César Sandino Union of Agricultural Cooperatives (UCA San Ramón), a second-level organization founded on the general law of agricultural cooperatives and agribusinesses in the Republic of Nicaragua and registered with the national registry of agricultural cooperatives and agribusinesses described on page 222 of Resolution 274-94. The granting of legal personality was published in the Official Registry of Nicaraguan Laws (*La Gaceta, Diario Oficial*) No. 244.

The process of forming the UCA San Ramón was initiated by leaders formerly employed by the Sandinista party, by the departmental Agrarian Reform offices, and by the National Union of Agriculturalists and Ranchers (UNAG) for the purpose of protecting land rights, but the new organization quickly started filling the gap left by the new government (which had ceased supporting rural smallholders) by offering technical assistance and access to credit to its members, who produced both coffee and basic grains (corn and beans). By 1994, the UCA San Ramón had expanded its membership and services to the point that it had difficulty managing its increasingly growing and diverse functions. In the late 1980s and early 1990s, the Fair Trade coffee market had been established in the Netherlands (1988) and in the United Kingdom (1991) to help small farmers who were being affected by the fall of world coffee prices that resulted from the disbanding of the International Coffee Agreement (Low and Davenport 147). This was a continuation of the tradition of “solidarity buying” begun by Europeans in the 1980s to

help revolutionary Nicaragua bypass the U.S. embargo and raise foreign exchange by providing a market for its coffee.

The UCA San Ramón exported its first container in 1995 and its management quickly realized that exporting was a very expensive and specialized function. Up until 1995 the cooperatives associated with the newly formed UCA San Ramón had sold their coffee crop to the larger agroexport companies that did indeed establish themselves in Nicaragua immediately after the end of the Revolution.¹⁵ The cooperatives paid for services such as processing and marketing, but at the same time they had no control over quality control processes during the milling and packing of the coffee. The UCA San Ramón, UCA Carlos Fonseca Amador (UCA Matagalpa), and three other base cooperatives formed La Central de Cooperativas Cafetaleras del Norte (CECOCAFEN). The process involved many of the same leaders involved in organizing the UCA San Ramón in 1992.¹⁶ CECOCAFEN formed with the explicit goal of marketing coffee to the Fair Trade market in Europe, freeing up the UCA San Ramón to focus on providing direct services to its members, including technical assistance, social and economic development projects, and other services.

¹⁵ Some of these agroexport companies went on to form large conglomerates, such as AGRESAMI, which owned much of the production infrastructure in Matagalpa, including 13 haciendas and 6 of the 40 dry mills in the department. AGRESAMI later went broke and disbanded during the economic crisis of 2002. The thirteen haciendas, which were repossessed by the Central Bank, are still in the process of being redistributed to their former workers, who are organizing into collectives under the Association of Agrarian Workers (ATC).

¹⁶ Pedro Haslam was Manager of CECOCAFEN since its inception in 1997 (and is now the Minister of Family and Community Economy), and Blanca Rosa Molina, a soldier during the uprising, was head of gender education programs at the UCA San Ramón since 1997, President of CECOCAFEN since 2002, and has been manager of the UCA San Ramón since 2005.

Over the years, the UCA San Ramón has developed a strategy that can be described as social and entrepreneurial and has transformed itself into a cooperative business organization that, in addition to having social ends, has also taken actions aimed at increasing the incomes of its 21 cooperatives and thus for those individuals who belong to them. It promotes the following:

- Funding and technical assistance to improve agricultural productivity and support marketing initiatives to strengthen fair trade and international marketing.
- Execution of projects to further food sovereignty and security.
- Foster the production of dual-use cattle and industrial milk production.
- Improving productive infrastructure.
- Program for Sustainable Agriculture aimed at improving agricultural production through the use of appropriate and environmentally friendly technologies.
- Improving housing conditions.
- Development of a scholarship program to expand access to high school and university study to youth who promote activities in their cooperatives, like social work.
- The development of agroecotourism that among other activities includes 36 home-stays with families in the community and 14 bilingual guides, all of whom are youth, and provides accommodation and other services to young trainees from other countries, including the United States and Denmark.
- Training program in gender equality aimed at a network of female gender advocates and a network of youth to promote sensitivity among men and women of the cooperatives, the main purpose of which is to deconstruct gender

inequalities within families as well as strengthen citizen participation in advocacy issues and human rights.

Cooperatives affiliated with the UCA San Ramón use their productive lands for agriculture, with the production of conventional and organic coffee being one of the principal areas that generates employment among farming families. Twelve cooperatives dedicate themselves to the production and cultivation of more than 1,000 manzanas (700 hectares) of conventional and organic coffee, which represents some 27,000 *quintales* (100-lb bags) of dried parchment coffee. Other important products include meat and dairy cattle and the production of basic grains (corn, beans, and sorghum), which are important for the population's food security. In addition, in order to diversify agricultural production, squash, passion fruit, malanga (taro), yucca, citrus fruits, and bananas, associated with the production of coffee, cacao, and other crops are cultivated. In its own words, the UCA San Ramón's Vision and Mission are:

- | | |
|---------|---|
| Vision | Entrepreneurial and participative cooperative, focused on environmental advocacy with gender equality and generational change; example par excellence in the sustainable development of their associates. |
| Mission | Strengthen abilities of member cooperatives, partners, and their families that to facilitate the ownership and development of their organization with equity and effective participation. |

Currently the UCA brings together 21 cooperatives that directly serve 1,080 associates, of which 36% are women, and this represents about 20% of San Ramón's rural population of about 6,000 people. The UCA is a cooperative that is run by an

assembly of female and male delegates from the 21 cooperatives. They elect a board of directors, a supervisory board, and credit and education committees, which are likewise directed by general management, that works on behalf of the organization's members.

When the agrarian reform took place in San Ramón, part of the land was distributed to women to create cooperatives and they were also part of an initiation process for a training program in gender issues directed at male and female members. This program created a certain level of sensitivity among the leaders of the UCA and led to the creation of the organization's first gender equity strategy in 1996. During this period of time, they began to develop special programs specifically for women and began to raise awareness around issues of personal growth, as well as social projects aimed at housing, land legalization, comprehensive health care, and literacy. These activities have helped to maintain the motivation and organization of the women in their cooperatives.

The Youth Leadership and Food Sovereignty Project is being implemented and studied in the context of a major shift over the last decade at the global, national, and local contexts in our understanding of food security and sovereignty, the actors that are engaging within it, and the approaches being taken. In the next chapter I examine in detail the results of the diagnostic scale, which present the interacting scalar dynamics of food insecurity and seasonal hunger in eight first-level coffee cooperatives.

Chapter 5

Seasonal Hunger and Food Insecurity in 8 Cooperatives

What does food insecurity look like in the eight cooperatives studied, what are its structural and proximate causes, and what are the specific factors of place that affect the severity of food insecurity in each place? This chapter presents the analysis of data collected on the nature of food insecurity in the eight cooperatives studied, offering insight into the similarities and differences among the cooperatives and their families and the intersection of the physical, cultural, and socioeconomic elements of place at various scales with food insecurity. I start with profiles of families and homes surveyed, and then move on to describe food insecurity using food security and sovereignty indicators presented in the FSS combined framework in Chapter 3. In Chapter 6 I discuss the structural and proximate causes of food insecurity in light of major differences among the cooperatives that may affect the nature and severity of food insecurity among them.

5A. Profiles of Cooperatives

The eight cooperatives vary greatly from each other both in terms of physical characteristics as well as social. First, their histories as member cooperatives of the UCA San Ramón vary: as shown in Table 12, four of them were founding cooperatives of the UCA in 1991, three joined the UCA one year later in 1992, and one – Amigos de Bonn Cooperative – joined in 1996 after it was formed with the assistance of the sister city organization from Bonn, Germany (hence the name “Friends of Bonn”). In terms of how close the relationships of the base cooperatives are with the UCA San Ramón, however, the time of membership in the UCA is outweighed by distance from the municipal seat,

where the offices of the UCA San Ramón are located. Amigos de Bonn and Silvio Mayorga Cooperatives, both located in the community of Santa Lucia, lie the farthest from San Ramón (Figure 6) and, until 2010, the road leading to the creek that lies at the entrance to the community was impassable by vehicles, isolating these two cooperatives from the UCA and the UCA's services. The road to these two cooperatives is still dirt, but is now passable, and a bus arrives twice daily, although not all the way to the community. Ramón García and Danilo González Cooperatives are two of the three closest to San Ramón, and both have buses that go all the way to the communities in which they are located; both of them are also closely tied to the UCA San Ramón – the General Manager of the UCA is from Danilo González Cooperative, and the President of the UCA is from Ramón García Cooperative.

Land holdings also vary among the cooperatives, which is an indicator of access to land in general. The range of average amount of land per member is from 5.6 to 14.4 ha. However, it must be taken into account that this is not the actual amount of land available to a member; cooperatives often have land dedicated to forest reserves, and five of the eight cooperatives participating in this study are also *colectivas*, or cooperatives where the land is held in collective title, with each member having certain plots of land assigned to her to produce coffee, basic grains, and other products. As we will see in the section on Food Access and Availability, the way that each cooperative uses land also varies, with some cooperatives dedicating the majority of their land to coffee production. Thus more land per member is not an indicator of food production capacity.

Membership in the cooperatives is overwhelmingly male (77%), but two of the cooperatives (Ramón García and Sofio Sánchez) have almost equal or more female membership.

In Northern Nicaragua, people often refer to micro regions as “Wet Zones” or “Dry Zones”. They are referring colloquially to the amount of rainfall that the area receives. Generally, coffee is only grown in the wet zones, not in the dry zones; this pattern also has to do with the fact that the dry zones are also areas of lower elevation, as can be seen in Table 12 in the case of Ramón García Cooperative, which has the lowest altitude (568 meters) and is classified in the dry zone; it is also known as warmest than the other communities, and does not in fact have a high amount of coffee production, as we will see later in this chapter. Specialty coffee for export, referred to in the coffee industry as SHG or “Strictly High Grown,” is grown above 1000 meters, but high quality coffee can still be produced in areas above 700 meters (in fact, CAN purchases coffee from the Denis Gutiérrez Cooperative, which has an average elevation of 800 meters). However, coffee grown below 700 meters rarely passes muster as specialty-grade coffee and is often sold locally for national consumption in Nicaragua, where consumers are not so demanding, although that is changing as well.

Table 12: Profiles of Cooperatives

Cooperative	Community	Ramón	Road access/ public transport to community	Altitude range (m)	Average Altitude (m)	Climate Zone	# Female members	# male members	Mz/Ha land total/coop	Average land per member	Member of UCA SR since
	San Ramón			650	650						
Amigos de Bonn	Santa Lucía	20	Dirt road, no bus	650 - 900	775	Wet zone	2	8	80mz / 56ha	10mz/7ha	1996
Danilo González	La Reyna	3	Paved road, bus	700 - 1050	875	Wet zone	2	31	699mz/ 489ha	21.18mz/ 14.83ha	Founder (1991)
Denis Gutiérrez	La Pita	3	Dirt road, no bus	700 - 900	800	Wet zone	2	13	308mz/ 217ha	20.53mz/ 14.4ha	Founder (1991)
Ramón García	El Trentino	4	Paved road, bus	568	568	Dry zone	8	9	200mz/ 140ha	11.76mz/8.23ha	1992
Sofio Sánchez	Yucul	14	Dirt road, no bus	900 - 1100	1000	Wet zone	8	7	120mz/ 84ha	8mz/ 5.6ha	1992
Silvio Mayorga	Santa Lucía	20	Dirt road, no bus	650 - 900	775	Wet zone	5	9	205mz/ 143.5ha	14.64mz/10.25ha	Founder (1991)
Simon Bolivar	Siares	12	Dirt road, no bus	950 - 1000	975	Wet zone	5	23	107mz/ 74.9ha	3.82mz/ 2.67ha	Founder (1991)
Sixto Sánchez	Yucul	11	Dirt road, no bus	950 - 1250	1100	Wet zone	5	11	171mz/ 119.7ha	10.69mz/7.48ha	1992
Total							37	111	1890		

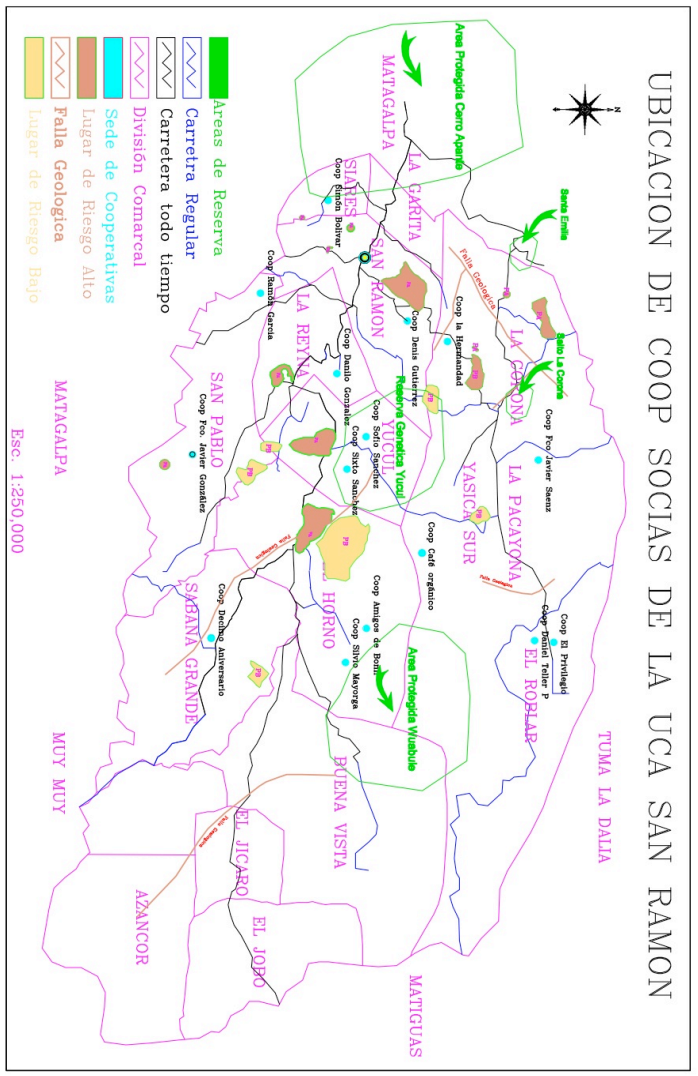


Figure 8: Location of Member Cooperatives of the UCA San Ramón with Roads (scale 1:250,000)

(Legend translation: Green=Natural Reserves; Blue line=Regular road; Black line=Road full year; Pink line=subdivision boundary; Light blue dot=cooperative location; Brown line=fault; Light brown areas=dry zones)

5B. Social Profiles of Households Surveyed

Table 13 shows a breakdown by cooperative of the number of households surveyed, the number of families within each household, gender and age group distribution, and the average number of people living in each household. The size of each household ranges from 4.43 individuals to 6.5 per household, the average size being 5.31 people.

Table 13: Households Surveyed, Gender and Age Distribution, and Average Number of People per Household

Cooperative	# households surveyed	# families	Age Group	Male	Female	Total age grp/cooperative	Total # people in households surveyed	Average # people/household
Amigos de Bonn	8	9	0-5	2	6	8	39	4.88
			6-16	3	2	5		
			17-35	11	7	18		
			36-65	4	3	7		
			65+	0	1	1		
Danilo González	7	7	0-5	1	0	1	36	5.14
			6-16	8	6	14		
			17-35	6	7	13		
			36-65	3	5	8		
			65+	0	0	0		
Denis Gutiérrez	6	8	0-5	1	2	3	30	5
			6-16	4	0	4		
			17-35	6	9	15		
			36-65	3	5	8		
			65+	0	0	0		
Ramón García	7	16	0-5	1	2	3	36	5.14
			6-16	4	1	5		
			17-35	10	8	18		
			36-65	4	6	10		
			65+	0	0	0		
Silvio Mayorga	8	8	0-5	1	3	4	41	5.13
			6-16	6	16	22		
			17-35	2	6	8		

			36-65	4	3	7		
			65+	0	0	0		
Simón Bolívar	7	8	0-5	0	1	1	31	4.43
			6-16	4	4	8		
			17-35	6	3	9		
			36-65	3	6	9		
			65+	3	1	4		
Sixto Sánchez	8	10	0-5	4	3	7	52	6.5
			6-16	13	4	17		
			17-35	9	5	14		
			36-65	6	7	13		
			65+	1	0	1		
Sofío Sánchez	8	10	0-5	0	3	3	48	6
			6-16	8	9	17		
			17-35	12	5	17		
			36-65	4	6	10		
			65+	1	0	1		
Total	59 households	76 families	0-5	10	20	30	313	5.31
			6-16	50	42	92		
			17-35	62	50	112		
			36-65	31	41	72		
			65+	5	2	7		
				158 males	155 females	313 total individuals in study		

Characterization of Farmer Households

Households generally own their own land, and parcel sizes are classed as small landholdings (1-10 Ha) in local terms. Income sources are mixed, coming from both sales of produced goods or crops, and from wage labor (I will show income sources in more detail later in this chapter). In the language of peasant studies that describes a trajectory of class from landless worker, to serf, to sharecropper, and beyond to peasant proprietors, these farmers can be considered to be peasant proprietors who own and farm their own land but participate actively in the market economy when coffee prices fall or when the basic grains harvest fails, making their livelihoods flexible by necessity as Kay notes (2000, 132).

Length of Cooperative Membership

The differences among the cooperatives in terms of length of membership has to do with when the cooperatives were founded: Simón Bolívar and Danilo González cooperatives were founded in the mid-1980s during the Sandinista Agrarian Reform, so the average length of membership is over 25 years. On the other hand, the Amigos de Bonn Cooperative was founded in 2004, and so the average length of membership is shorter at 6.8 years. The five other cooperatives are distributed between these two extremes. Many of these cooperatives were founded with the assistance of the UCA San Ramón in the mid- to late-1990s and early 2000s as the result of the revitalization of cooperative culture related to the exploding fair trade coffee market and resulting increased demand for certified smallholder coffee during that period. The Amigos de Bonn Cooperative is an interesting case as well, having been supported in its formation in 1996 by a sister-city organization from Bonn, Germany (also, coincidentally, the site of the Fairtrade Labeling Organization's offices); it is the newest cooperative but the continuous aid in the form of funded projects, scholarships, and other support this cooperative has received from the organization has resulted in higher standards of living within this cooperative, which contrasts with its neighboring cooperative located in the same community, the Silvio Mayorga Cooperative.

Table 14: Average Cooperative Membership by Cooperative

Cooperative	Community	Years of membership in cooperative (average)
Amigos de Bónn	Santa Lucia	6.8
Danilo González	La Reina	25.0
Denis Gutiérrez	La Pita	12.5
Ramón García	El Trentino	15.5
Silvio Mayorga	Santa Lucia	16.1
Simón Bolívar	Ciares	25.7
Sixto Sánchez	Yucul	20.0
Sofío Sánchez	El Canton	21.0

Gender Distribution

The 59 surveyed households included 76 families, meaning that many of the households have multiple families residing together, often a child with spouse and children living with the parents, who are usually the cooperative members. As Table 14 shows, the households surveyed included 158 men and 155 women including children. This is an overall equal distribution of gender among individuals in the households surveyed; given that the sample of families surveyed make up a significant percentage of the overall population of each cooperative, this can be said to represent the gender distribution overall at the cooperative level. The exceptions are Silvio Mayorga Cooperative, which has nearly twice as many women as men, and Sixto Sánchez Cooperative, which has many more men (39) than women (19).

The number of women in the Silvio Mayorga Cooperative seems high, but this is only because there are not many men: as we see in Figure 8, this cooperative has a substantially higher proportion of households headed by women than the other cooperatives. This contrasts with the Amigos de Bonn cooperative situated in the very same community, in which men head all of the households studied. In conversations and interviews with the members of the Silvio Mayorga Cooperative it emerged that they

attributed the high number of women-headed households to high levels of domestic violence within the families participating in the study, in which men abandoned the women and children in their households. Later we will see that the data show that the level of food resilience is lower in this particular cooperative (and thus food insecurity is higher), and it will be argued that higher vulnerability of women is positively correlated with lower economic and productive capacity and thus higher tendency towards seasonal hunger and food insecurity.

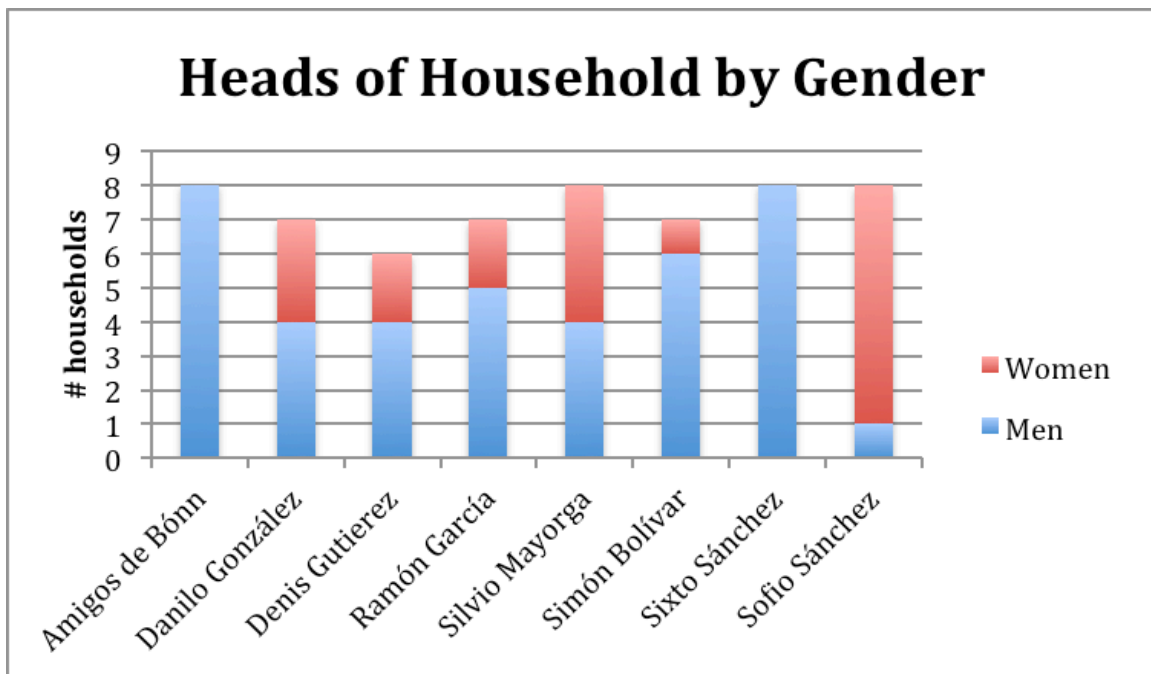


Figure 7: Heads of Household by Gender

Age Distribution

Individuals in the households surveyed were classified into five age groups, as shown in Figure 9. The number of men and women in each age group across the surveyed sample is also shown.

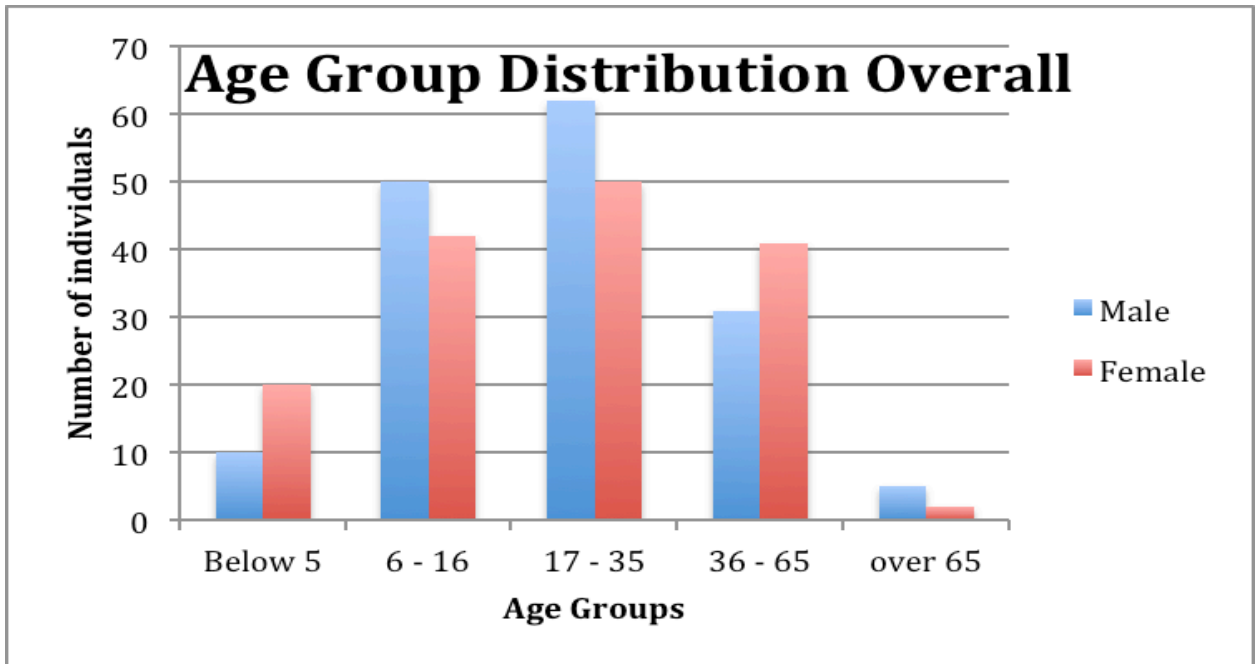


Figure 8: Age Group Distribution among Surveyed Families

Most of the surveyed population belongs to the 6-16 and 17-35 age groups (204 individuals in total), making it a relatively young population. It is important to mention that the distribution between males and females is reversed for the first group (children under the age of five) and the second group (6-16 years old); this is to say that there are twice as many females in the youngest age group, but less females than males in the second group. This major shift in gender distribution between the two age groups may point to a higher mortality rate among female children after age 5 that may be attributable to lower nutritional status in favor of male children, though this is unverifiable.

Levels of Education

As shown in Figure 10, more than a third of the surveyed population (111 individuals, or 35.5%), have not completed primary school, 83 (26.5%) have no formal education, 19 (6.1%) finished secondary education (high school), 12 (3.8%) are studying at a university or technical school, and .98% have graduated from a university or

technical school. This distribution indicates a low level of education among the population surveyed, as almost a third are not able to complete primary education, and almost another third have no formal education, and not even 10% finish high school.

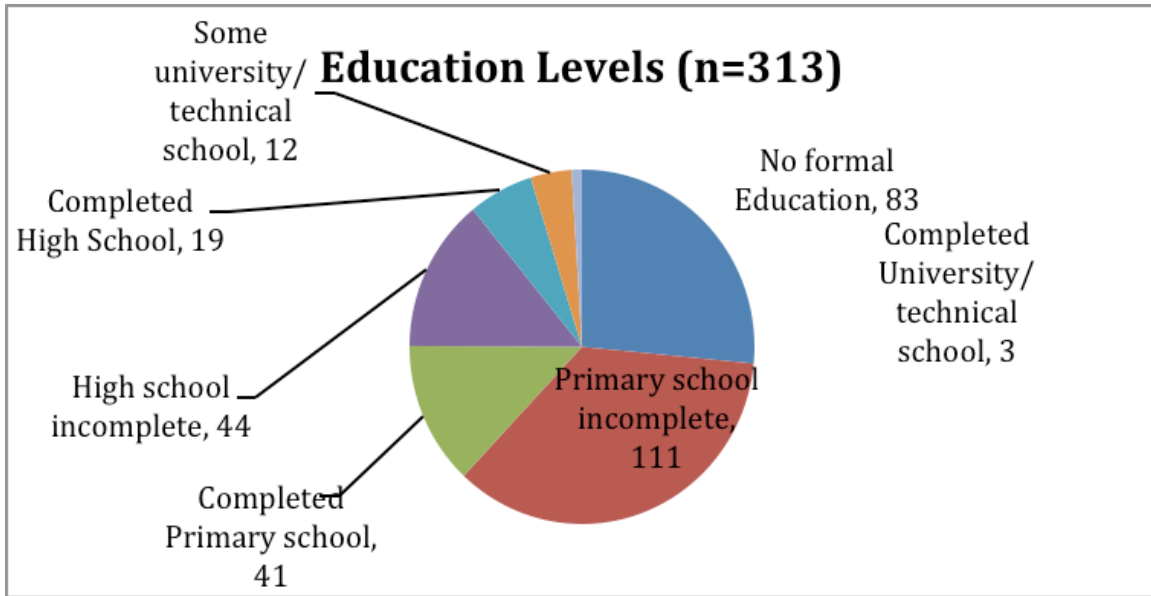


Figure 9: Education Levels (n=313)

Figure 11 further breaks down education levels by cooperative. It is important to note in the Denis Gutiérrez, Danilo Gonzales, and Ramón García cooperatives, substantially more people have completed some secondary school or graduated from high school; these are also the cooperatives that more most easily accessible, lying closer to the municipal seat where there is a high school, possessing roads that are passable in all weather conditions, as well as public transportation that provides access to and from the communities multiple times per day. Available access and transport can be positively correlated to higher levels of education, given that students can more easily attend educational school in the municipal seat. The four cooperatives on the right side of the graph (Silvio Mayorga, Simón Bolívar, Sixto Sánchez and Sofío Sánchez, as well as

Amigos de Bonn Cooperative on the far left side of the graph) have extremely low levels of formal education and some primary school. These are also the cooperatives with less access to public transportation; in all five of these cooperatives, until recently main roads do not reach the communities, and residents had to walk between 2-5 kilometers in order to reach the community. Given this lack of access, these cooperatives have had little historical involvement in, and benefits from, the social programs of the UCA San Ramón. This data further supports the positive correlation between levels of education and access to roads and public transportation.

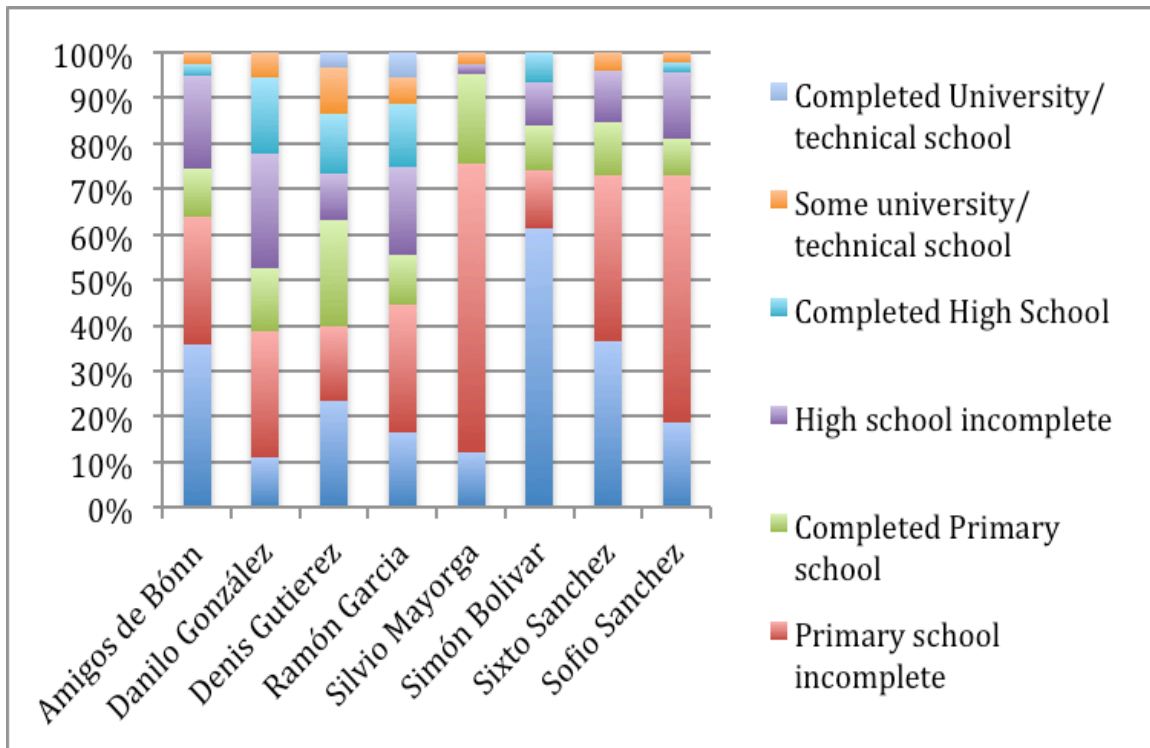


Figure 10: Education Levels by Cooperative

The cooperative with the overall lowest levels of education, Silvio Mayorga, is also the cooperative lying the farthest from the municipal seat, where the closest high school is, as shown in Figure 12. Amigos de Bonn Cooperative, which lies in the same

community as Silvio Mayorga, has a similar proportion of the total surveyed population with unfinished primary school or no formal education. This indicates that distance from the municipal seat is correlated with low levels of education, and perhaps with lower economic power.

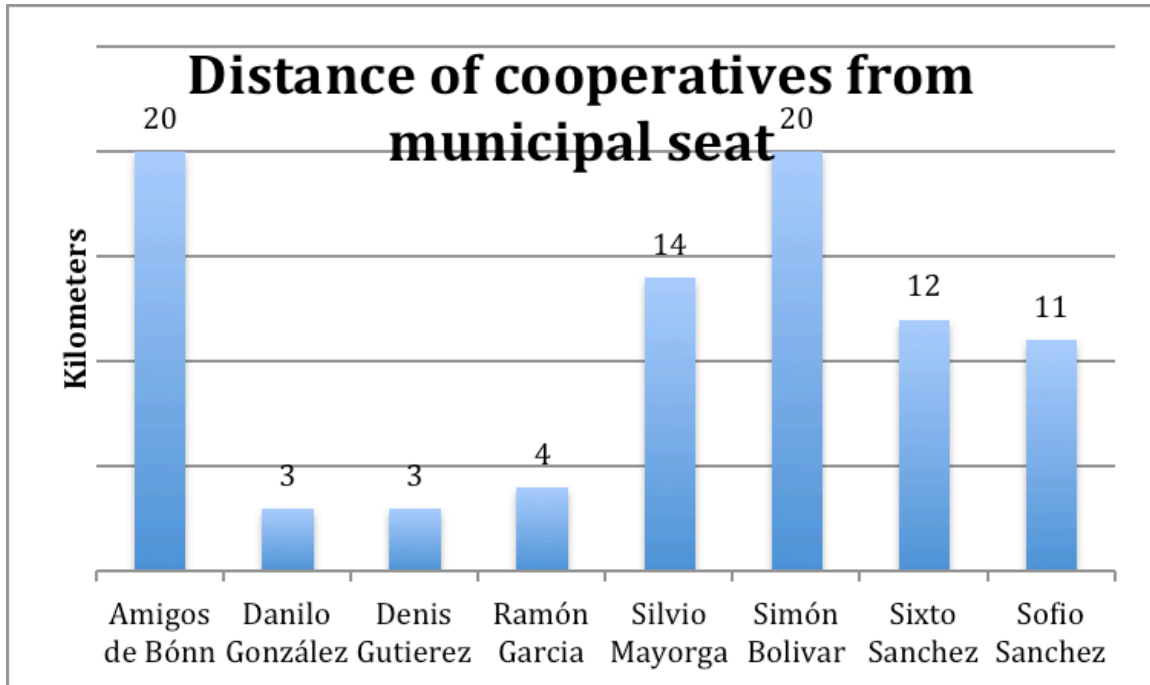


Figure 11: Distance of Cooperatives from Municipal Seat in San Ramón

Household Access to Water

Access to clean water for drinking and cooking is critical to food security – if food is prepared with contaminated water, or if potable water is unavailable or scarce, the result can have negative effects on human health, including bacterial and parasitic infections, dehydration, as well as a resulting lack of efficient absorption of nutrients and vitamins in foods, leading to nutrient deficiencies. Equally important to food security and especially food sovereignty is access to water for irrigating crops and watering

livestock. Without it, families cannot produce food, nor assure access to it in times of scarcity. Thus water is critical to not only the availability of, and access to, food, but also to its healthy use and consumption.

Overall, access to running water in the home among the households surveyed is widespread, with 91% of households possessing it, as shown in Table 15. Breaking down the data by cooperative, however, shows that only a little more than half the households in Silvio Mayorga and Ramón García Cooperatives have running water at home. The source of running water in the home is just as important as having it, as it can determine the cleanliness of the water. 51% of households have potable water sources, while the other half of the households surveyed obtain household water from private wells, public wells, or the local river, shown in Figure 13. This last source is worrisome, even though it only makes up 13.5% of the total, because river water in coffeelands is often contaminated with the waste of coffee wet-milling processing during the harvest season, which involves high amounts of decomposing organic matter and heightened levels of harmful microorganisms in the water during that time, which can negatively affect the health of the families dependent on that water for consumption and irrigation, as they can be exposed to intestinal parasites and bacteria (including amoebas, giardia, and others) that cause infection and affect the ability to digest and benefit from nutrients in food.

Table 15: Household Access to Running Water by Cooperative

Cooperative	Running water in home	
	No	Yes
Amigos de Bónn	0	8
Danilo González	0	7
Denis Gutiérrez	0	6
Ramón García	3	4
Silvio Mayorga	3	5
Simón Bolívar	0	7
Sixto Sánchez	0	8
Sofío Sánchez	0	8
TOTAL	6	53 (91%)

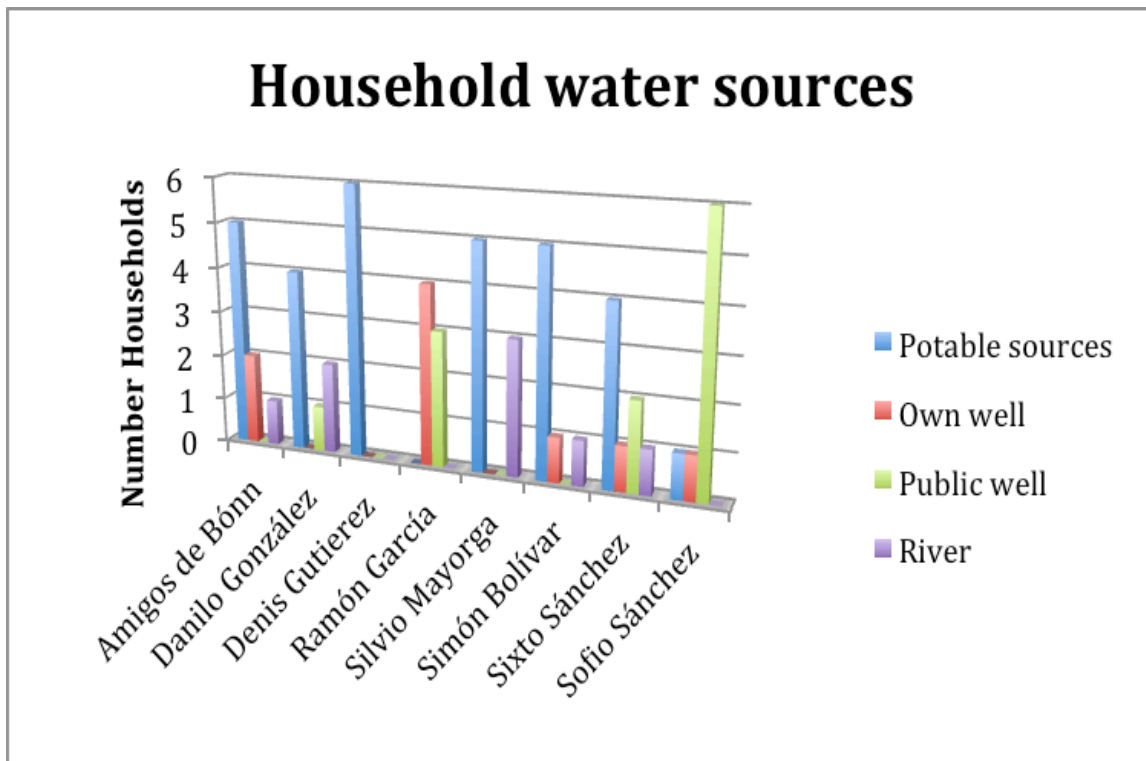


Figure 12: Household Water Sources by Cooperative

Household Access to Basic Services

Figure 14 shows access to household basic services. 58% of households surveyed have electricity. However, three of the cooperatives (Amigos de Bonn, Silvio Mayorga, and Sofío Sánchez) do not have electricity; these three cooperatives are among the five

that until recently were isolated by lack of vehicle-accessible roads to the communities in which they are located. In the three most accessible cooperatives (Danilo González, Denis Gutiérrez, and Ramón García), the vast majority of households surveyed have electricity. Only seven of the 59 households have access to indoor flush toilets, the majority using outdoor latrines; again, it is the most accessible cooperatives that have indoor-flush toilets. The wastewater from flushing toilets is released into local rivers and streams, as there are no septic services in rural areas. The households surveyed overwhelmingly (86%) use wood-burning cooking stoves, with only five using propane stoves in Danilo González and Ramón García Cooperatives. This has implications for the long-term sustainability of wood reserves and shade trees in the coffee plots and the forests surrounding the cooperatives, as the demand for wood fuel will either remain constant or grow. Conservation of these wood reserves is and will continue to be crucial for food security in these cooperatives as it is critical to the use and preparation of food.

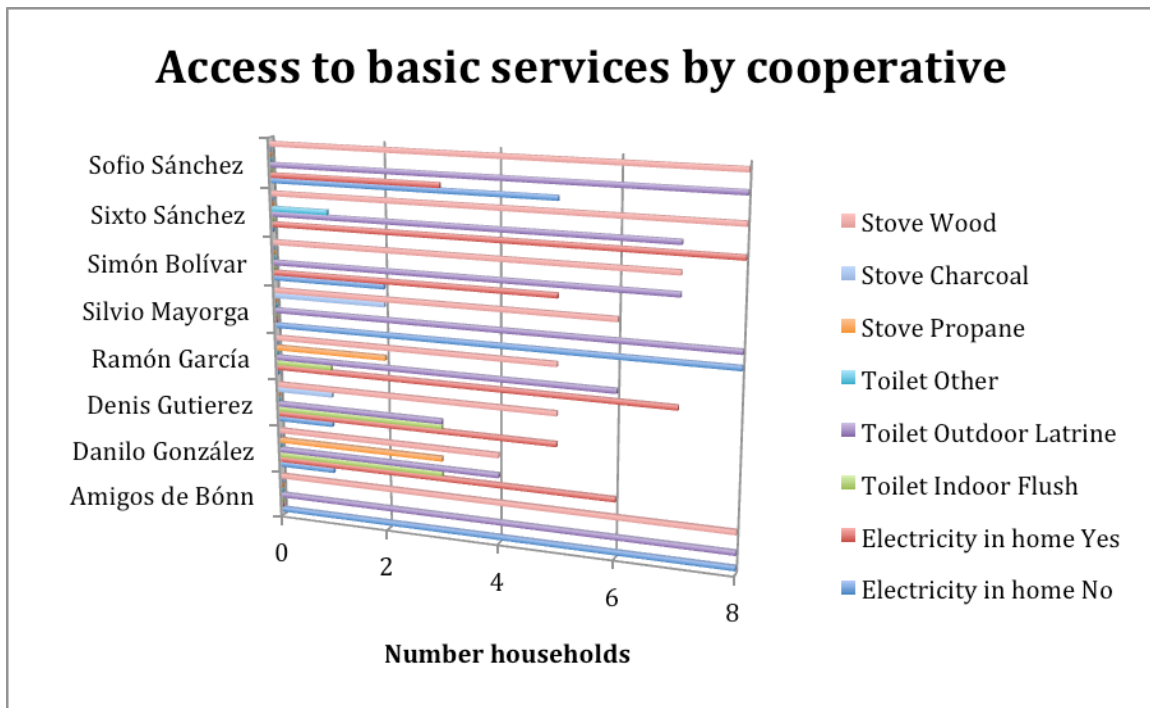


Figure 13: Household Basic Services by Cooperative

5C. Length and Severity of Seasonal Hunger in the Eight Cooperatives

Length of the Thin Months

Families within the eight cooperatives experience seasonal hunger, also known as “difficult months” or the “thin months”. The thin months correspond with both the start of the rainy season and with the production calendar: the rainy season generally begins in late April or early May, and this is also the period when planting of basic grains and gardens occurs, and families wait for the grain harvest that occurs in late August and September. The average length of the thin months among all of the households surveyed is 4.63 months. As shown in Table 16, the range of seasonal hunger extends from March through August; the tendency is consistent among the eight cooperatives, with a higher proportion of the families in the top four cooperatives in the chart noting May and August as difficult months. This indicates that the period of scarcity lasts longer than in the bottom four cooperatives, in all of which the difficult months begin in May. The darker highlighted months are those that were cited as difficult by over 50% of surveyed families, indicating that these are the more severe months.

Severity of the Thin Months: Variation and Common Patterns

For all eight cooperatives, June and July are cited as difficult by almost all households; this corresponds to the height of the rainy season, after basic grains have been planted and families are waiting for the new corn harvest in September.

Table 16: Months of Food Scarcity, or the Thin Months

Cooperative	# households	Months of Scarcity					
		March	April	May	June	July	August
Amigos de Bonn	8	2	3	3	7	6	3
Danilo González	7	1	1	2	5	7	4
Denis Gutiérrez	6	0	1	3	5	6	4
Ramón García	7	4	4	4	4	4	1
Silvio Mayorga	8	0	0	1	8	8	1
Simon Bolivar	7	0	0	0	7	7	4
Sixto Sánchez	8	0	0	4	8	8	6
Sofío Sánchez	8	0	0	3	8	8	5
AVG 4.63mo	59						

The consistency of June and July among all of the cooperatives as the most severe months can be positively correlated with two other factors: shocks in the form of extreme weather events and seasonal spikes in the prices of basic grains like corn and beans, which make up the bulk of calories in the daily diet of the families surveyed, as we will see later in this chapter. In both 2010 and 2011, Nicaragua experienced either hurricanes (in 2010) or unusually heavy rains (in 2011) during the peak rainy months of June and July. Although the impact of these two weather events was heavier in other regions of Northern Nicaragua (like Las Segovias), it did have a significant impact on farmers in the municipality of San Ramón, due to damage accrued to corn and bean fields that significantly affected subsequent harvests in September. Over the last two years (2011-2012), large losses have been reported due to these unusual rain patterns.

This is further supported by the data in Figure 15, which shows the average number of months that the basic grains harvested (corn and beans combined) provision a household, per cooperative and overall. On average, families harvested enough corn and

beans to last 7.87 months in 2010. In 2011, the average length of time was reduced to 7.11 months, due to severe rainy season weather in that region that year. The average family anticipated that the next basic grain harvest in 2012 would provision them even less time – about 7.04 months average. Thus there is a positive relationship between environmental hazards such as extreme weather events, and the ability of a family to provision basic foods throughout the entire year. It can be argued that risk management strategies that increase resiliency and the ability to respond to such conditions, are as important to creating food security at the family and community level as is increasing or diversifying production to increase availability of foods at the local level.

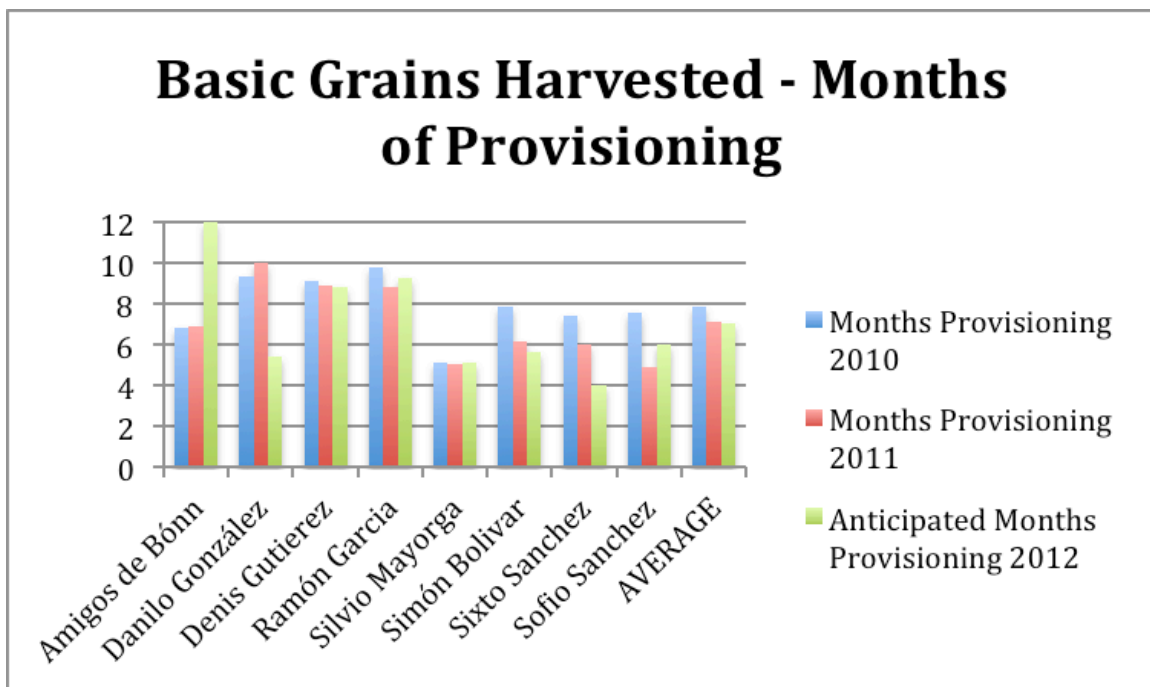


Figure 14: Months of Provisioning from Basic Grains Harvested, by Cooperative

It is interesting to note that there does not seem to be a direct correlation between the length of the difficult months and the duration of basic grains harvested: the first four cooperatives in the table – the ones reporting longer periods of scarcity (with the thin

months starting in March or April, rather than in May) have varying amounts of time of duration of their basic grains provisioning. On the other hand, the four cooperatives that reported shorter periods of scarcity, also report a lower period of duration of basic grains harvested; given that a higher proportion of the households surveyed in those cooperatives reported June and July as severe months, it can be said that they are experiencing shorter, but also more severe, scarcity, and that they are depending on purchased grains to supplement their household provisioning. In the next section I examine the relationship between months of provisioning, household size, parcel size, and land use.

Various other factors and relationships stand out. First, the five cooperatives that have had less access to roads and cooperative assistance (as shown in the section on cooperative profiles) contrast greatly with the three that are closer to the municipal seat, their basic grains harvests provisioning the household consistently for under 8 months. Second, these cooperatives (with the exception of Amigos de Bonn) anticipate their harvests lasting much less time (under six months) in 2012. It was mentioned by some farmers in interviews that this is because they will plant fewer basic grains due to having less money available as a result of the heavy rains of the year before, in which they had to consume some of the seed they had put aside for planting, or buy grains for consumption, money that would have gone to purchasing seed for planting.

Third, there is also a relationship between the price of food and the period of scarcity, especially its more severe months of June and July. As Figure 16 shows, there is always variation in corn prices around July. July, 2009 saw especially high prices, with corn being sold locally at just under \$500 per metric tonne; the spike was less

extreme in 2010, but prices shot up the following year from just under \$400 in January 2011 to about \$650 per tonne in July, making it essentially inaccessible to the average smallholder coffee farmer who is generally cash-poor in July. It means that basic foods like corn are doubly inaccessible due to the lack of cash and the high price, and households must resort to other coping mechanisms, including eating less or taking out credit to buy food (more on coping mechanisms later in this chapter).

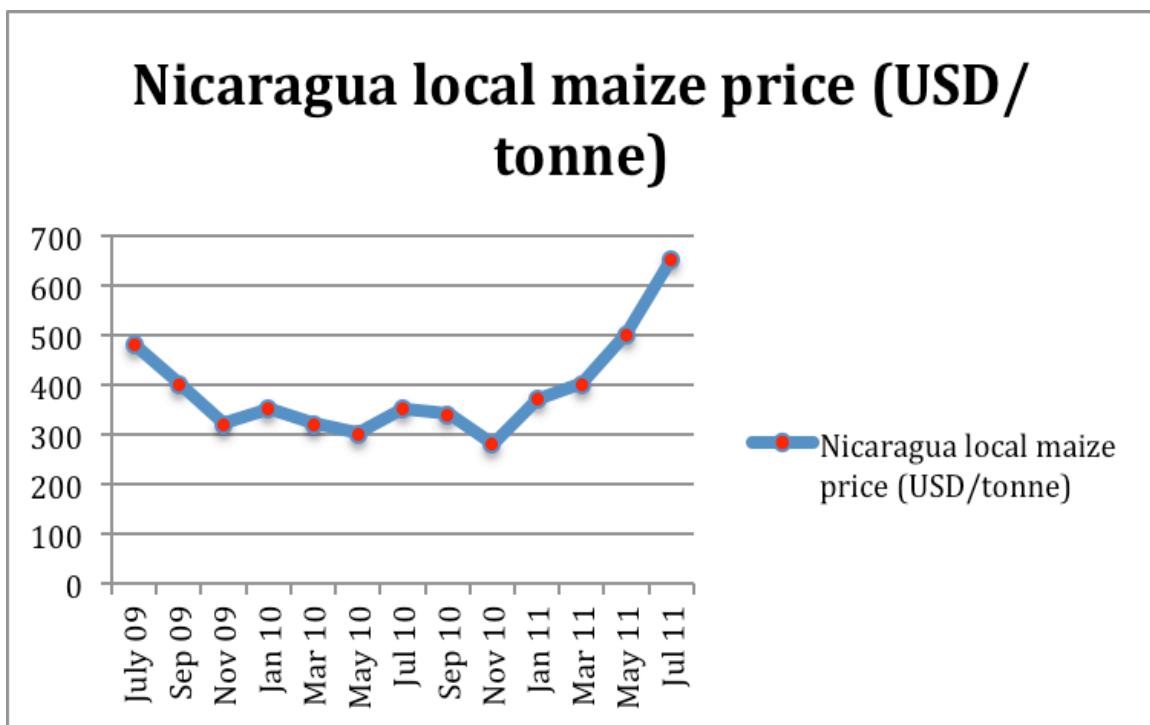


Figure 15: Nicaragua Local Maize Price (USD/tonne)

(Adapted from FAO 2011, 9, based on data from MAGA, Nicaragua)

5D. Food: Availability and Access

We have established that basic grains harvests do not provision a household for the entire year, meaning that families acquire food through other means or reduce their food intake during the scarce periods of April-August, and that this appears to be related to seasonal spikes in food prices. We will look at what these and other coping

mechanisms look like later in this chapter, but for now we will look more closely at the role of land tenure as an indicator of access to the means of production and thus to food, and then take a closer look at production levels of basic grains, and diversity of production as indicators of the availability of, and access to, food.

Access to Land

Families have access to land for production and living via different mechanisms: they can own, rent or lease land, or are given custody of cooperatively owned land without retaining legal title over it (this remains in the hands of the cooperative). As shown in Figure 17, under half of the households reported owning their own land, while 46% have access to land that is cooperatively owned.

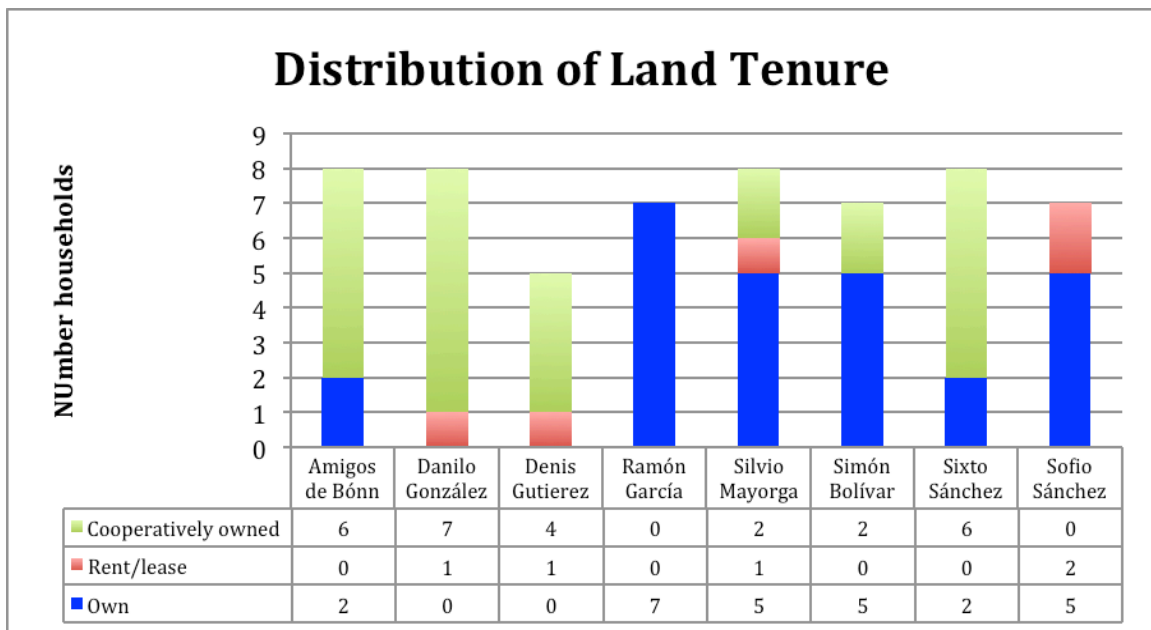


Figure 16: Land Tenure in the 8 Cooperatives

It is important to note that the cooperatives with collectively owned land are known as *colectivas*, meaning that all of the land in the cooperative is owned by the collective cooperative rather than by the individual members; most of these cooperatives

were formed during the first stage of the Sandinista Agrarian Reform in the early to mid-1980s, which focused on collectivizing state-run farms (that had previously been large privately-owned haciendas) and putting them into the hands of their former workers. Since the 1990s, many of these remaining *coletivas* have undergone a process in which the collective formally assigns rights to specific parcels to each member, while retaining legal title to the land. This system of land tenure is more stable and has been associated with higher access to land to produce, because individual farmers cannot sell the land when land markets periodically surge, a pattern that often leads to increased vulnerability in rural populations as families have decreased access to the means of production when the economy shifts downward again. In the other six cooperatives, the tendency is largely towards owning land, with only five families renting land.

Parcel Size, Land Use and Production Diversity

Parcel size

All of the households surveyed belong to the smallest class of smallholders in Nicaragua, those with .5 to 14 ha, as categorized by the National Agricultural Census of Nicaragua. According to Falguni, this class of smallholders makes up 60.9% of all farm households in Nicaragua, but due to the small size of its land holdings, this group only cultivates a total of 9.1% of all cultivated land in Nicaragua (2009, 2). Among this class of smallholders, the average parcel size nationwide is 4.67 ha.

The average parcel size of the 59 households surveyed is 4.6 ha, which is almost exactly in line with the national average of this class of producers. However, when looking at average parcel sizes by cooperative in Figure 18, there is much variety among the cooperatives: three of the cooperatives (Silvio Mayorga, Simon Bolivar, and Sofio

Sánchez) fall below the national average, while the other five are above it. This differentiated access to land among the cooperatives has implications on production volumes of basic grains and coffee, as well as production diversity, since the cooperatives with less land can produce less food and less varieties of food.

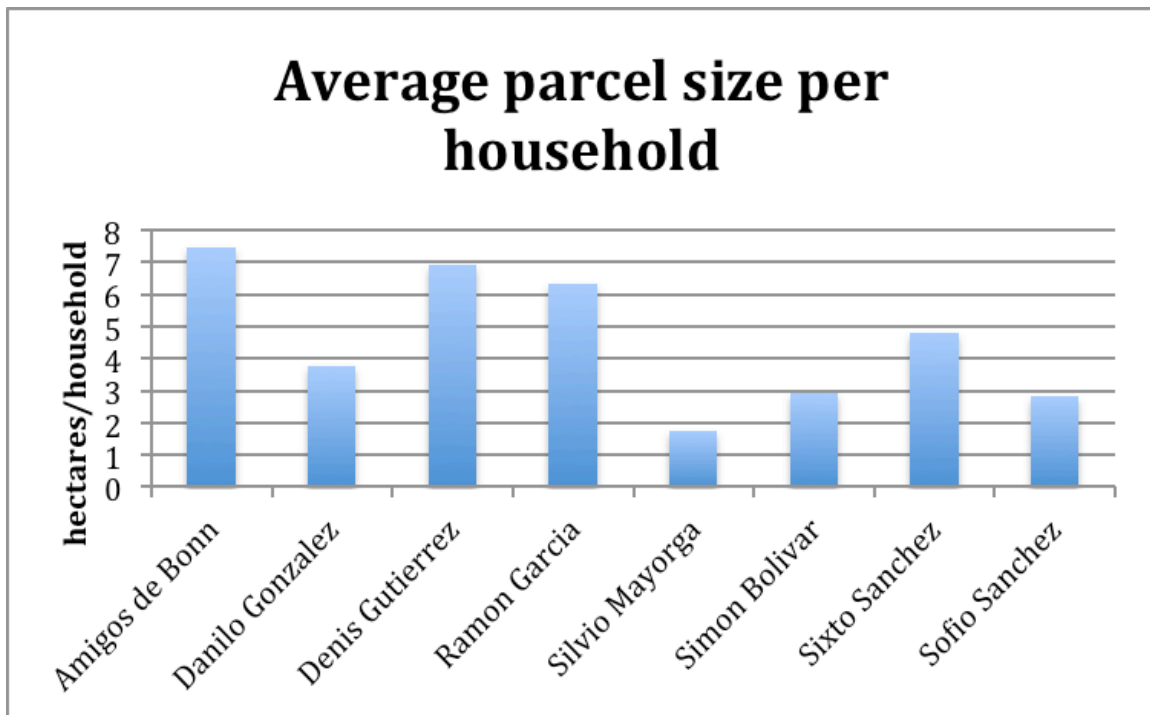


Figure 17: Average Parcel Size per Household by Cooperative

Table 17 shows average parcel size in relation to the data already presented on the length and severity of the thin months. No direct correlation of any kind can be determined when all of the cooperatives are included in the analysis. However, if we take out the two outliers (Amigos de Bonn has a substantially higher average parcel size than the others, and Silvio Mayorga has a substantially lower size), there still is no clearly definable pattern: the cooperatives with average parcel sizes below the national average have varying lengths of thin periods, and varying lengths of the most severe periods (in dark shading). Average number of people per household also appears to not have a direct

correlation to either length or severity of the thin months. In the next section we will look at land usage and will relate the average parcel size to land usage and production diversity.

Table 17: Average Parcel Size and Household Size Related to Length and Severity of Thin Months in the Eight Cooperatives

Cooperative	No. of people/ household	Avg. Parcel size	Months of Scarcity					
			March	April	May	June	July	August
Amigos de Bonn	4.88	7.45ha	2	3	3	7	6	3
Danilo González	5.14	3.77ha	1	1	2	5	7	4
Denis Gutiérrez	5	6.92ha	0	1	3	5	6	4
Ramón García	5.14	6.32ha	4	4	4	4	4	1
Silvio Mayorga	5.13	1.74ha	0	0	1	8	8	1
Simon Bolívar	4.43	2.91ha	0	0	0	7	7	4
Sixto Sánchez	6.5	4.8ha	0	0	4	8	8	6
Sofío Sánchez	6	2.85ha	0	0	3	8	8	5
	5.31							

Land Use

Food availability is linked to land usage, in that the amounts and variety of foods produced on farms generally has a positive correlation to higher availability of food. The farms of the families surveyed can be divided into seven categories:

- Coffee production (116 mz of the total land), which includes coffee and associated shade trees, which often include fruit trees like bananas and citrus among others. Thus the coffee field can also be an important source of dietary diversity as well as a source of income as some families sell their excess fruit.

- Basic grains (corn and beans, 96.5 mz). These include corn and beans, and sometimes other cereal crops like sorghum, which is used for animal feed. Corn and beans are planted in the *milpa*, a production system that involves field rotation, associated intercropping, and other practices that are designed to maintain soil fertility, control pests, and maximize yields. In Nicaragua, corn and beans can be planted in separate plots, or intercropped in alternating rows either at the same time or at different moments, depending on the seed maturation period, etc. (unlike in Mexico, where specialized varieties of corn and bean seeds are planted in the same holes at the same time).
- Forest (74.5 mz), which is an important source of firewood, and wild animals for meat during the months of scarcity.
- Pastures (61.2 mz): used for grazing livestock.
- Patio¹⁷ (14.3 mz), important for production of medicinal herbs, culinary herbs, and small vegetable production.
- Young forests/*tacotal* (10.7 mz): these are recuperating forests going through transition.
- Vegetables and garden produce (6.2 mz)

There are several insights into the relationship between land usage or production diversity, household size, the availability of food, and months of provisioning, according to Figure 19. The first insight is the relationship between coffee production area and areas dedicated to basic grains production; the relationship is inverse in all but one case. In the

¹⁷ Small, usable space near the house where women typically maintain small-scale production of herbs and medicinal plants and/or raise small livestock.

four cooperatives where coffee production is highest, that is, where a higher proportion of the household parcel is dedicated to coffee production, a proportionately less amount of land is dedicated to basic grains production. The opposite is true as well – in the three cooperatives that are less dependent on coffee production (Danilo Gonzales, Ramón García and Silvio Mayorga), land dedicated to basic grains production is proportionately larger. The only exception is the Amigos de Bonn Cooperative, which has an almost equal amount of land on average dedicated to coffee production and basic grains production; this exception could be explained by the fact that the average parcel size of the households surveyed in that cooperative is significantly larger than the other cooperatives, about double the overall average size; the cause could be that investment in coffee production did not result in a shortage of land for food production because sufficient land was available. The finding that coffee production and basic grains production is inversely related is consistent with the findings of past research on coffee smallholders and food security (Caswell et al. 2012), and supports the conclusion that overdependence on coffee as the single cash crop reduces families' ability to grow food for consumption due to lack of available land for food production.

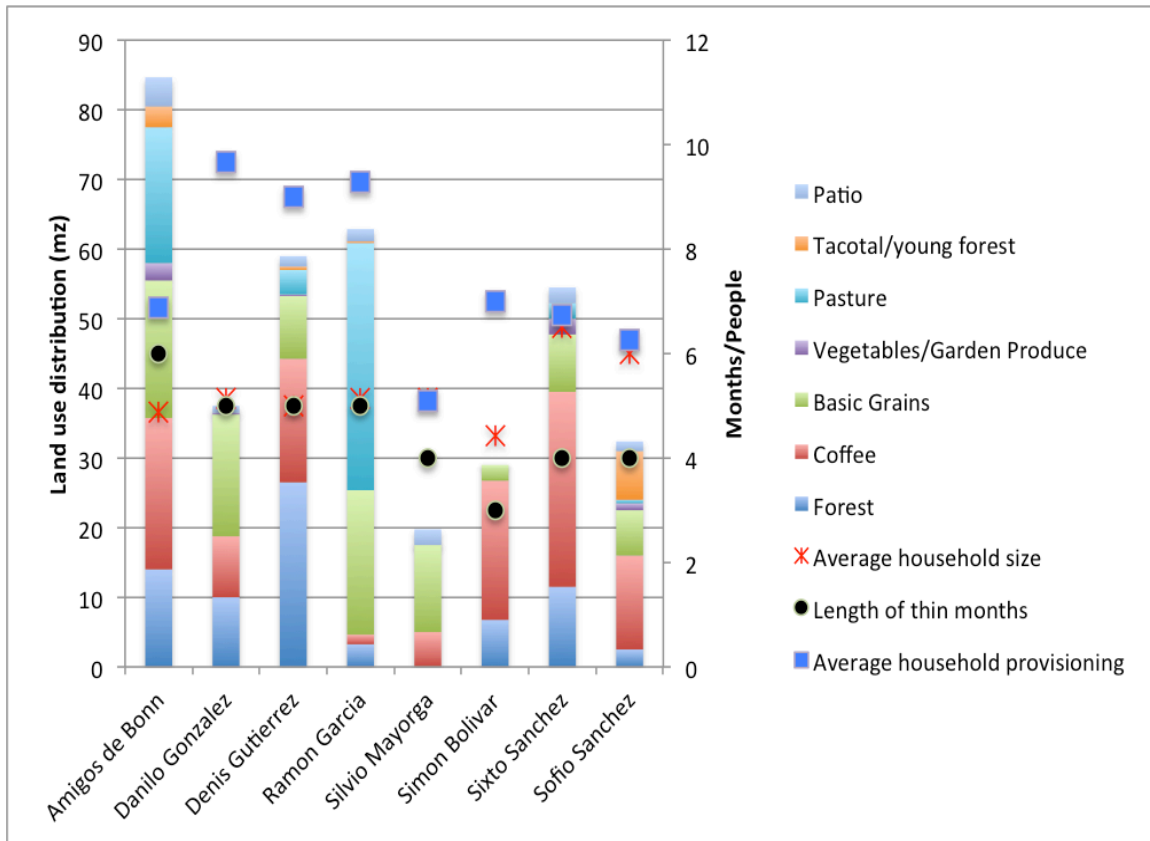


Figure 18: Land Use Related to Household Size, Length of Household Provisioning, and Length of Thin Months

However, the inverse relationship between coffee production and basic grains production, with a third indicator, the average length of the thin months as shown by the black line on the figure above, reveals a more complicated picture: three of the cooperatives with the most extreme coffee vs. basic grains relationship in favor of coffee (Simon Bolivar, Sixto Sánchez, and Sofío Sánchez, on the right side of the graph) have the shortest period of thin months, while the four out of five cooperatives that have a higher proportion of land dedicated to basic grains (the four on the right side) have the longest thin months period, all around six months. This is a surprising pattern, as it would be expected that high dependence on coffee as a once-yearly source of income to buy food, combined with less land dedicated to food production, would result in

increased periods of scarcity, but the data from these five cooperatives suggests these indicators, with others like income sources and proportion of food sold, consumed, and bought, may shed more light on this surprising result. For now, the preliminary interpretation is that higher dependence on coffee does result in lower amounts of land for food production, but does not appear to directly result in longer periods of scarcity.

The length of household provisioning seems to be tied to the mix of both the proportion of land dedicated to basic grains production and of land dedicated to coffee production, rather than to only one or the other: where the length of household provisioning is lowest is where households are overly dependent on one thing for income or food – either most of their land dedicated to basic grains or most of their land dedicated to coffee, but not a balanced mix of the two – and where the length of household provisioning is highest is where there is more proportionately balanced dedication of land to two things, either coffee and basic grains or, in the case of Ramón García cooperative, where little coffee is grown, balanced dedication of land to basic grains and pasture (i.e. milk production). The implication is that no matter the size of the average landholding, balanced dedication to two or more crops for food and/or income leads to longer periods of household provisioning. When we look at income sources below, we will explore if more varied income sources resulting from more diversified production results in higher levels of food security. This is an interpretation that would also need to be tested in other places with more advanced statistical analysis.

Next we relate household size (the purple line on the graph) and the length of thin months (the black line). With the exception of the Amigos de Bonn cooperative on the far left side of the graph, the length of the thin months is higher when the average

household size is higher. This observation suggests that higher demand for food grown for household provisioning can create shortages earlier in the year, resulting in longer thin months. The exception of the Amigos de Bonn cooperative may be explained by the overall higher availability of land in that cooperative that is used for pasture and patio production, and thus more diversified sources of income.

Another major variation to note among the cooperatives is that Amigos de Bonn and Ramón García have significantly more land dedicated to pasture than the other cooperatives; these two cooperatives produce cattle mainly for milk production for sale to the UCA San Ramón, which has a cooperatively-owned milk processing and distribution plant in the municipality. It is the main source of income for the families in Ramón García Cooperative, while farmers in Amigos de Bonn also receive a significant proportion of their income from coffee, as we will see below. An important limitation to take into account is that all households surveyed only produce basic grains during one season of the year (the rainy season – May or June to September), due to the lack of water to irrigate during a second growing season, which occurs during the dry season after the coffee harvest, planting in February or March. This greatly limits the amounts of basic grains that can be produced to meet annual needs, on top of the limitation of access to sufficient land.

Table 18: Proportion of Households Surveyed in Each Cooperative that Produce Corn and Beans

Cooperative	# households surveyed	Average Parcel Size/Household	Households that Produce Corn	Households that Produce Beans
Amigos de Bónn	8	7.45ha	8	7
Danilo González	7	3.77ha	5	5
Denis Gutiérrez	6	6.92ha	4	5
Ramón García	7	6.32ha	6	7
Silvio Mayorga	8	1.74ha	8	8
Simón Bolívar	7	2.91ha	3	1
Sixto Sánchez	8	4.8ha	2	3
Sofío Sánchez	8	2.85ha	6	4
Total	59		42	40

In the Simon Bolivar, Sixto Sánchez, and Sofío Sánchez Cooperatives, a much smaller proportion of the families surveyed produce basic grains, as shown in Table 18. Relating this to average parcel size in the table above, it is clear that whether a household produces basic grains or not is related to small parcel sizes, which limit the amount of available land for growing basic grains. This is consistent with the findings of past research (Caswell, et al. 2012). Another factor is due to the terrain – the more extreme slopes found in these communities make it hard to farm as well as difficult to maintain the quality of the soil due to erosion. It is also important to note that very little land is dedicated to growing vegetables and garden produce in all of the cooperatives. This indicates low availability of fresh and diverse foods at the household level.

Production Diversity

Corn: Availability and Access

Corn is produced by 71% of the households surveyed. Table 19 shows the breakdown of the amount of corn per cooperative that is harvested, sold, purchased, consumed, and given to animals as feed. As expected, the cooperatives that allocate more

land to basic grains production also have a higher production of corn: Ramón García with 135 harvested quintals (100 lb bags) and Amigos de Bonn with 99 quintals.

There are two important points that emerge from this data. First, we can see that the majority of the cooperatives, with the exception of Ramón García, buy a part of the corn that they consume because many families cannot produce enough for year-round consumption. The cooperatives that produce less corn and beans, Simón Bolívar and Sixto Sánchez, also have a large proportion of their available land dedicated to the production of coffee, the income from which they use to purchase the corn to meet their food needs.

Second, corn is grown primarily for household consumption and not for sale, as is shown in Table 19. Only four of the eight cooperatives sell their corn surpluses: Amigos de Bonn, Ramón García, Sixto Sánchez, and Sofío Sánchez. The two cooperatives that sell none of their corn harvest, Danilo González and Denis Gutiérrez, are also the two cooperatives that have negative corn balances. Upon looking at the data at the household level, however, it is important to note that only one household in each of these cooperatives actually has a negative balance. The positive balances may be explained as grain put aside as seed for planting the next cycle.

The take away point from this analysis is that in all but one cooperative (Ramón García), the households surveyed must purchase corn in order to meet their annual food needs. The fact that high food prices generally coincide with the most severe thin months (when families will be purchasing grains) means that families are paying high prices to meet their needs, which decreases their access to this important staple in critical moments.

Table 19: Corn Balance Sheet (Harvest, Sale, Purchase, and Consumption Amounts) by Household and Cooperative

Cooperative		Quantity Corn Harvested (100lb)	Quantity Corn Sold (100lb)	Quantity Corn Bought (100lb)	Quantity Consumed (100lb)	Quantity Corn for Animal Consumption (100lb)	Balance
Amigos de Bonn	1	5		5	5	2	3
	2	30	8	0	18	4	0
	3	10		2	7	3	2
	4	10		5	8	2	5
	5	7		0	6	1	0
	6	10		10	8	2	10
	7	20	10	0	8	2	0
	8	7		0	6	1	0
	Total	99	18	22	66	17	20
Danilo González	1			1	1	0	0
	2			1	1	0	0
	3	8		4	8	0	4
	4	10		5	14	6	-5
	5	10		2	12	0	0
	6	15	0	0	15	0	0
	7	10	0	0	10	0	0
	Total	53		13	61	6	-1
Denis Gutiérrez	1	16		3	13	6	0
	2	12		2	14	0	0
	3	12	0	3	12	3	0
	4	0	0	12	10	2	0
	5	12	0	0	12	0	0
	6	0	0	5	8	0	-3
	Total	52	0	25	69	11	-3
Ramón García	1	30	12	0	13	5	0
	2	20	6	0	13	1	0
	3	15	5	0	10	0	0
	4	10	4	0	6	2	-2
	5	30	0	0	0	0	30
	6	30	7	0	20	3	0
	7	0	0	0	0	0	0
	Total	135	34	0	62	11	28
Silvio Mayorga	1	5	0	5	5	3	2
	2	3	0	2	2	1	2

	3	8	0	2	8	2	0
	4	20	0	0	10	10	0
	5	10	0	5	10	0	5
	6	5	0	2	5	1	1
	7	10	0	10	10	2	8
	8	8	0	5	8	1	4
	Total		69	0	31	58	20
Simón Bolívar	1	0	0	15	0	0	15
	2	0	0	3	3	0	0
	3	0	0	7	7	0	0
	4	10	0	0	10	0	0
	5	15	0	0	15	0	0
	6	20	0	4	20	0	4
	7	0	0	40	40	0	0
	Total		45		69	95	
Sixto Sánchez	1	0	0	16	0	0	16
	2	0	0	25	25	0	0
	3	0	0	15	15	0	0
	4	5	0	6	11	0	0
	5	40	10	0	30	0	0
	6	0	0	15	15	0	0
	7	0	0	0	0	0	0
	8	0	0	0	0	0	0
	Total		45	10	77	96	0
Sofío Sánchez	1	8	0	0	8	0	0
	2	5	0	5	5	0	5
	3	40	25	0	0	15	0
	4	10	0	0	8	2	0
	5	9	0	8	9	0	8
	6	8	0	0	8	0	0
	7	0	0	6	6	0	0
	8	0	0	6	6	0	0
	Total		80	25	25	50	17

Beans: Availability and Access

Table 20 shows amounts of beans harvested, sold, bought, and consumed, and the balance in each cooperative. Beans are not given to animals as feed. As with corn, most of the cooperatives (with the exception of Ramón García) buy a portion of their beans in the local or regional markets as the families do not produce sufficient quantities to fulfill

their needs for the entire year. Some cooperatives, like Simón Bolívar, Sixto Sánchez, and Sofío Sánchez, do not produce a great quantity of beans and have to buy a significantly higher quantity to feed their families. This again corresponds to the fact that these three cooperatives dedicate a higher proportion of their land to coffee production and so have limited land available to dedicate to food production. Additionally, as in the case of corn, the sale of beans is not common as shown in Table 20, with Ramón García Cooperative selling the most and Amigos de Bonn selling only a small amount, and the rest of the cooperatives selling none.

The conclusion here is that, just as with corn, bean availability through production is restricted by limited access to land and overdedication of land to coffee production, and must be complemented with purchased grains, except in the case of Ramón García, which has significantly more land dedicated to basic grains production and almost none to coffee. Later in this chapter, we will explore more in depth how households meet their annual food needs through varying sources of income, assistance, and coping mechanisms.

Table 20: Bean Balance Sheet (Harvest, Sale, Purchase, and Consumption(by Cooperative

Cooperative	Beans harvested (100lb)	Beans sold (100lb)	Beans purchased (100lb)	Beans consumed (100lb)	Balance
Amigos de Bonn	43	5	5	37	6
Danilo González	41		4	45	0
Denis Gutiérrez	25		4	33	-4
Ramón García	79	44		21	14
Silvio Mayorga	28	0	7	25	10
Simón Bolivar	5		35	37	3
Sixto Sánchez	22		24	39	7
Sofío Sánchez	19		24	40	3
Total	262	49	103	277	

Animal and Animal Products Production: Availability and Access

Animals and animal products are critical sources of protein. Sufficient protein is especially important for small children to promote normal growth and health. As shown in Figure 20, chickens and eggs are the most widely produced and available; only six households out of the 59 surveyed do not produce chickens, and there are no significant differences among the cooperatives. Cows and milk are produced by much fewer households, and milk in only three cooperatives; this means that for most households, milk must be purchased and is probably inaccessible during the thin months when cash is short and being used mostly to purchase the dietary staples – corn and beans. Pigs are common among the cooperatives, but are raised by relatively few (18) households. Sheep, goats, and ducks are relatively rare.

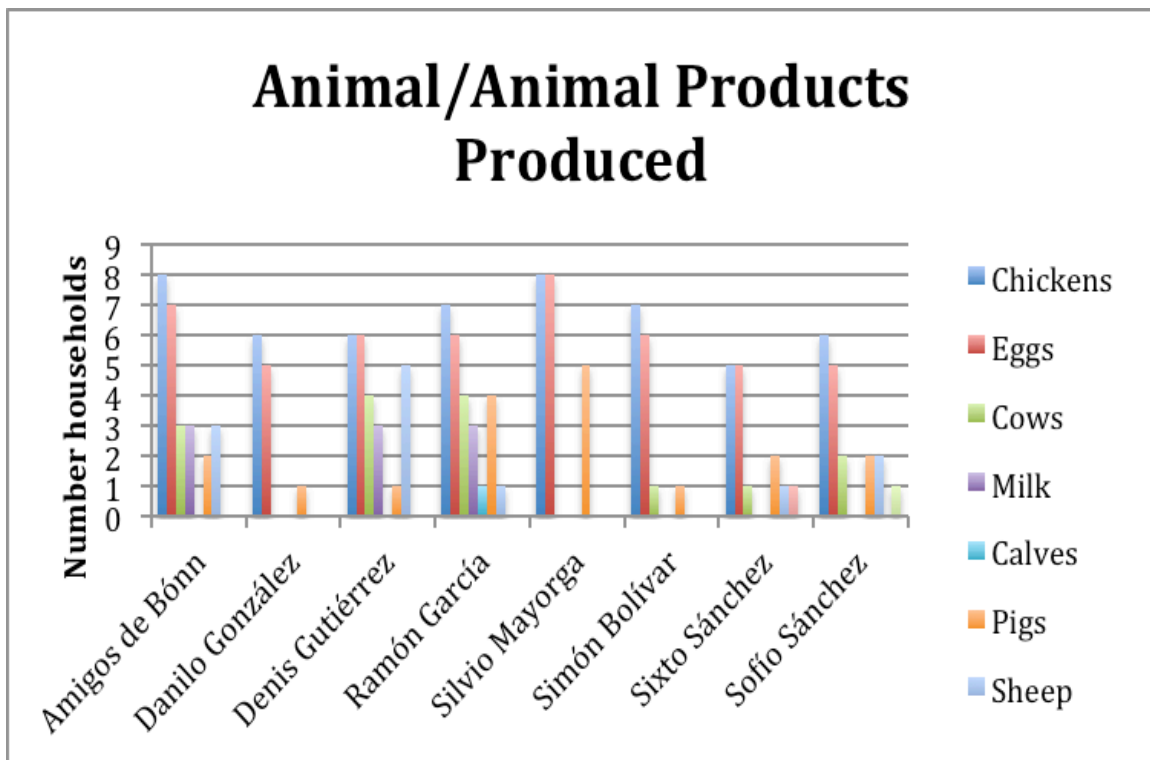


Figure 19: Animals and Animal Products Produced by Households.

Figure 21 shows the breakdown by cooperative of the amount of each product produced. It should be noted that eggs are presented as units per month and milk in liters per day. Most of these products, except a small portion of eggs, are not sold but rather consumed by the household. Some cooperatives, like Amigos de Bonn, have a significantly higher production of eggs per hen. The reason could be that the families in this cooperative are over-estimating the number produced by each hen. The conclusion is that animals and animal products are not produced at high levels, and the majority produced are chickens and eggs. This could result in low access to protein in the diet, but we will explore that in the section on dietary diversity below.

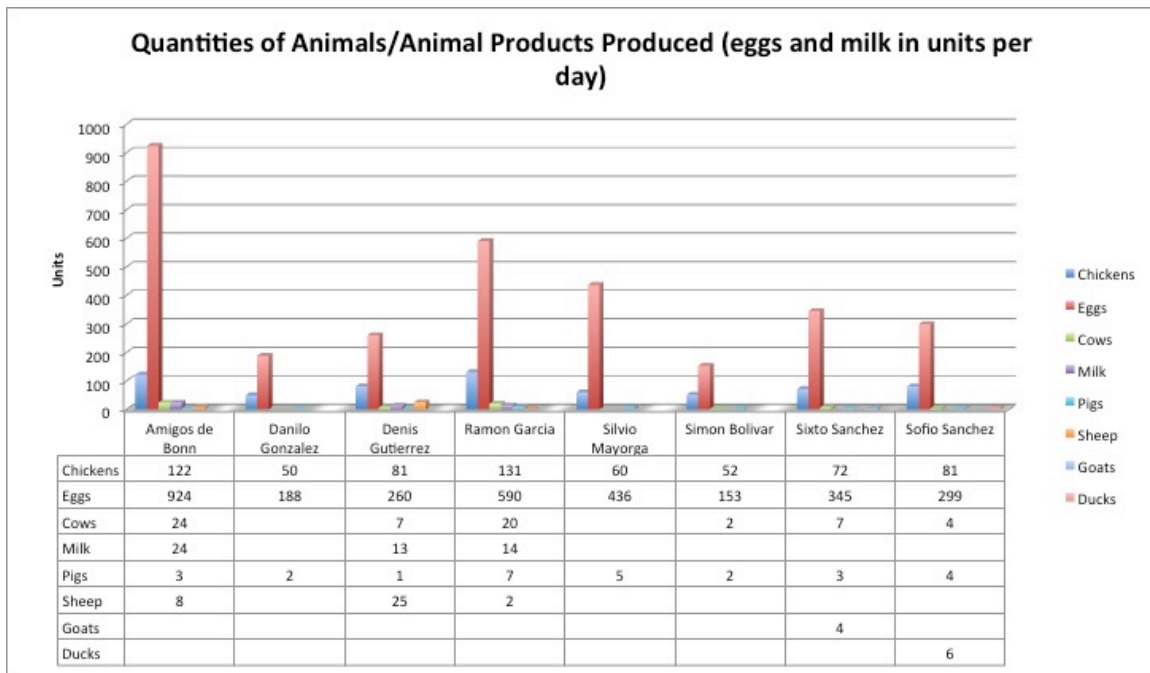


Figure 20: Quantities of Animals/Animal Products Produced (eggs and milk in units per day)

Fruit Production: Availability and Access

The next group of food products is fruit. There are a large variety of fruit trees being produced, but avocado, orange, mango, mandarin orange, and lime trees are the

most commonly grown, as is evident in Figure 22, which shows the number of households per cooperative that produce the 17 fruits mentioned by households in the surveys. Fruit trees are commonly grown as shade trees for coffee plants, and are also used as firewood when other sources are scarce, making them multifunctional and critical to the livelihood of a farming household; it is also important to recognize the importance of the coffee field, then, in making diverse fruits available on the farm. This key role of the coffee field in improving dietary diversity and food security is ironic, given that overdedication of land to coffee is also a factor limiting the availability of basic grains year round, and this must be taken into account (or taken advantage of) in any food security strategy promoted by the cooperative.

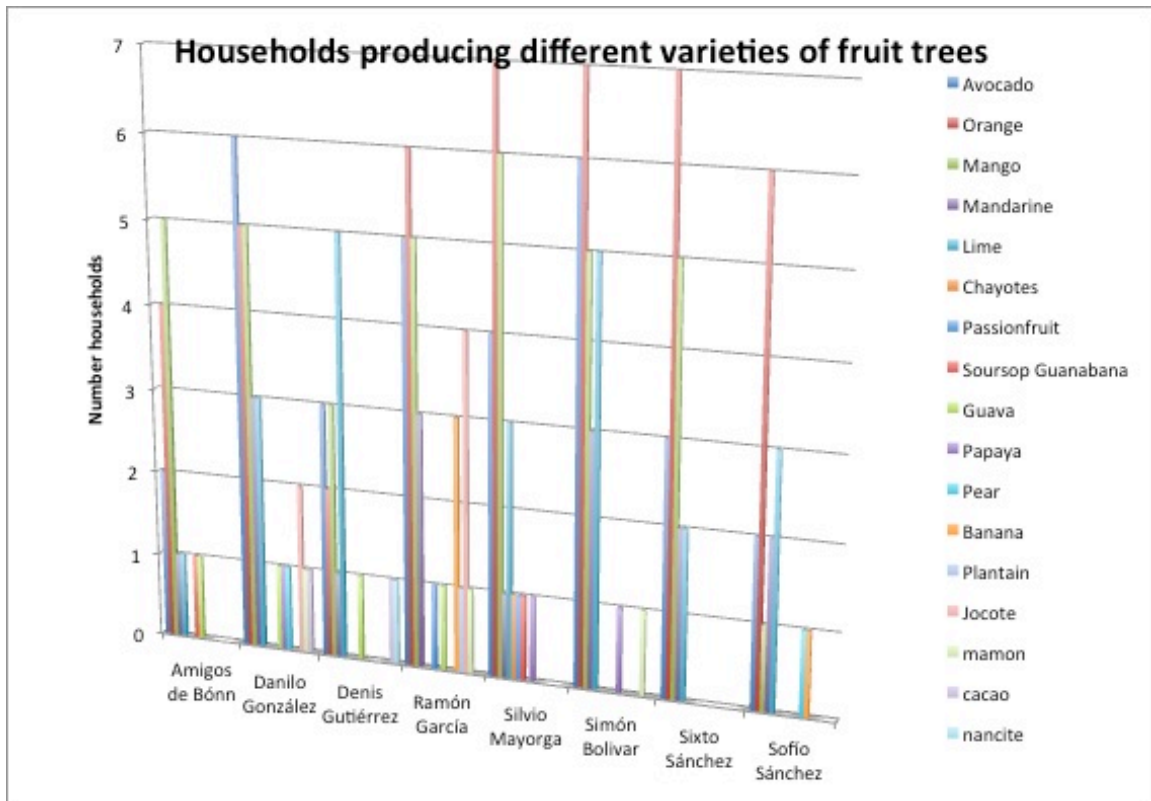


Figure 21: Households Producing Different Varieties of Fruit Trees

In terms of contributing to household and community food security, the frequency of fruit trees is more important than the number of types of fruit trees, as greater numbers of orange trees per household, for instance, can mean not only more oranges available for food, but also for income generation. Table 21 shows the breakdown of the quantity of each type of fruit tree in each cooperative among the households surveyed. Avocados, oranges, mangos, mandarin oranges, and limes are produced in the highest numbers, apart from being the most common among the households surveyed. Bananas are also produced in very high numbers in the three households that mentioned growing them. Bananas and plantains are important intermediate shade trees for seedling coffee fields, serving as shade until the larger and permanent shade trees grow above the coffee. Although there is a high diversity and high frequency of many different types of fruit trees overall, participants in focus groups did cite that they rarely collected all of the fruit they produced, often letting it rot on the ground for squirrels to eat. Participants said that they would go out and gather oranges or mangos to sell in local markets when they were short on cash. The overall result of this analysis of fruit production is that there is both high availability of, and access to, a variety of nutritious fruits at the level of the cooperative, but it is a resource not fully taken advantage of. Fruit sales are a potentially larger source of income, but access to markets would need to be improved, as we will see in the section on sources of income below.

Table 21: Number of Different Varieties of Fruit Trees Grown by Cooperative

Cooperative	Avocado	Orange	Mango	Mandarin	Lime	Chayote fruit	Guayaba	Guava	Papaya	Pear	Banana	Plantain	Jocote	mamon	Cacao	nancite	
Amigos de Bonn	18	21	12 3	20	3		3	1									
Danilo González	25	17	39	15	11			2	10	2			4	2	15		
Denis Gutiérrez	8	11	22	7	33			3							60	3	
Ramón García	25	40	31	14			20	2			70	30	19	4			
Silvio Mayorga	18	51	39	3	9	1	2	4	5								
Simón Bolívar	30	25 1	55	19	33				6					10			
Sixto Sánchez	7	33 6	52	18	12												
Sofio Sánchez	49	30	4	5	8					4	400 0						
Total	180	757	365	101	109	1	22	7	8	21	6	407 0	30	23	16	75	3

Proportion of Food Consumed that is Purchased: Dependency on Income for Food

Generally speaking, households must purchase some staples that cannot be produced on their farms or that cannot be produced in sufficient quantities or during the entire year, such as salt, sugar, rice, and sometimes meat. However, families must also purchase basic grains, as has already been shown, due to limited land to produce enough for the entire year. They must also purchase vegetables, as there is a large lack of vegetable and garden production among the households surveyed. When participants were asked in focus groups why they did not produce even small amounts of vegetables like tomatoes, onions, and others in their patios, they replied that not only was there not enough land in many cases, but more commonly that they did not know anymore how to produce vegetables; somehow the knowledge – and the habit – of vegetable production

had been lost as families have grown more used to using income to acquire foods that are no longer produced locally in significant amounts, in addition to those that cannot be produced locally.

Figure 23 reveals that approximately a third of the households surveyed buy more than half their total food (30%), more than a third buy less than half their food (36%), and the other third buy all of their food (29%). Only 5% report that they do not need to buy any food. Given this overall high dependence on purchased food, it is obvious that income from other activities is critical to households' satisfaction of their food needs year round. This raises questions of how vulnerable households are to price fluctuations of the products or services they sell; the case of coffee has already been described, in which farmers and their families are subject to wide price swings that periodically threaten their livelihoods when prices fall below the cost of production, as they did during the 1999-2003 coffee crisis. Dependence on income from coffee to purchase food and other basic needs on the one hand allows farmers to access those foods, but on the other it can be argued that it overdependence on one source of income also increases their vulnerability to price swings, coffee plagues and unusual weather events.

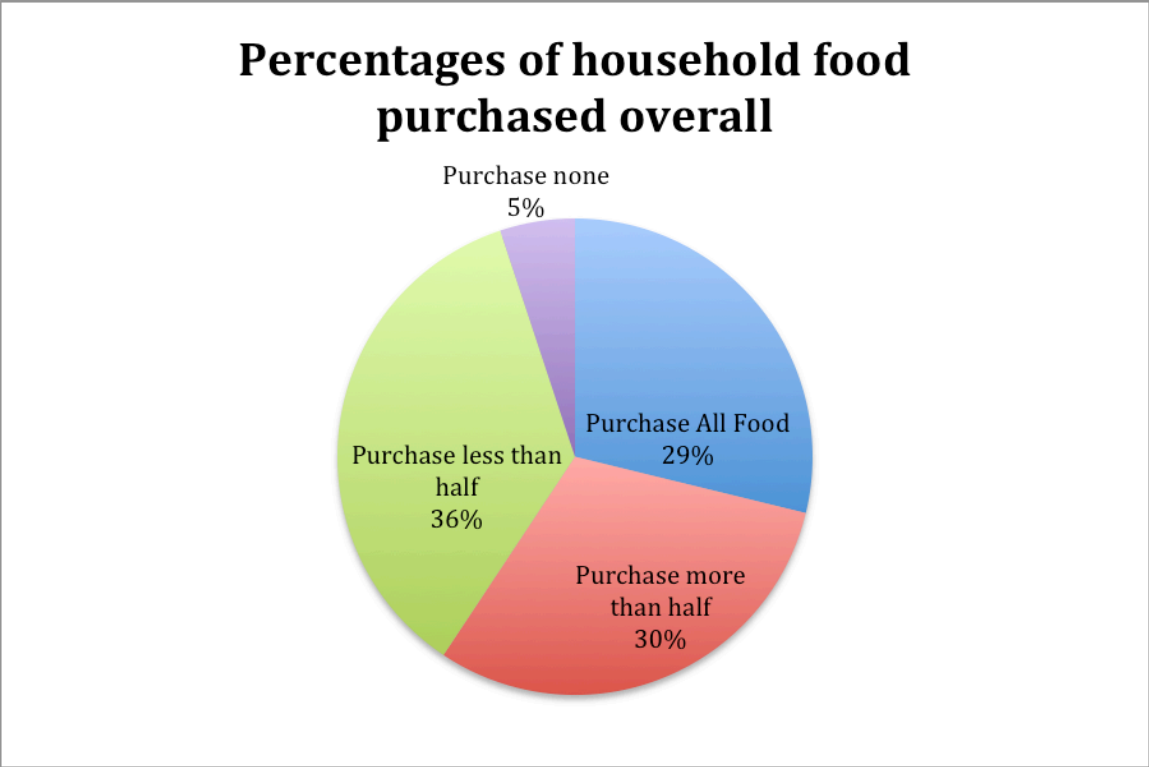


Figure 22: Percentages of Household Food Purchased Overall

Figure 24 shows that with respect to the purchase of food, most of the households surveyed purchase roughly half of their food. Some cooperatives, like Simón Bolívar, Sixto Sánchez, and Sofío Sánchez, report that they purchase most of their household food, with 71%, 63%, and 38%, respectively. This observation echoes the previous data on the purchase of corn and beans, foods that these particular cooperatives purchase rather than produce, as available land is mostly dedicated to coffee production. The overall trend is that the majority of households can only provision themselves the entire year by purchasing food. This implies that income is critical to accessing sufficient food. In the next section we will take a closer look at sources of household income within the different cooperatives.

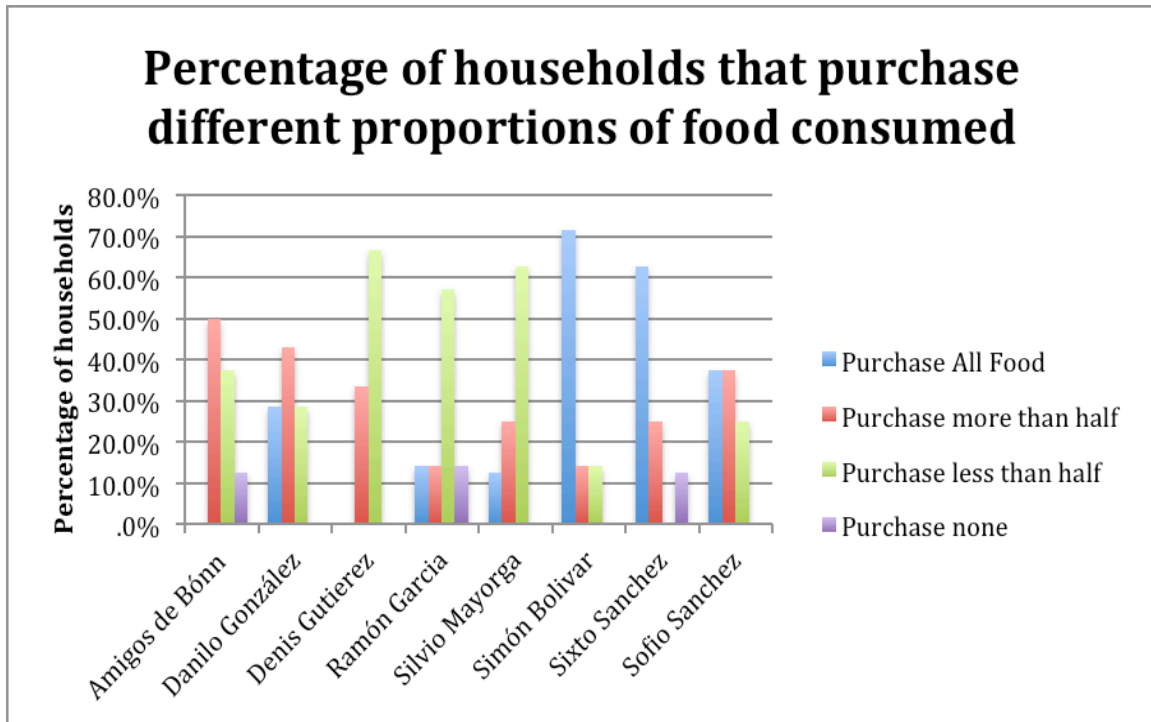


Figure 23: Percentage of Households that Purchase Different Proportions of Food Consumed

Where is Purchased Food Acquired?

The majority of purchased food is acquired at *pulperias*, or small local shops usually run out of the front of homes, as shown in Figure 25. The three cooperatives with the best access to the municipal market in San Ramón (Denís Gutiérrez, Danilo González, and Ramón García cooperatives) have a higher proportion of households acquiring food at the municipal market, which is generally less expensive. The exception is Simón Bolívar cooperative. The implication is that the most remote cooperatives depend more heavily on local shops, which can mean slightly higher prices, but also the future potential of strengthening local food distribution systems in those communities if local vegetable production is increased and marketed to the community through those local shops.

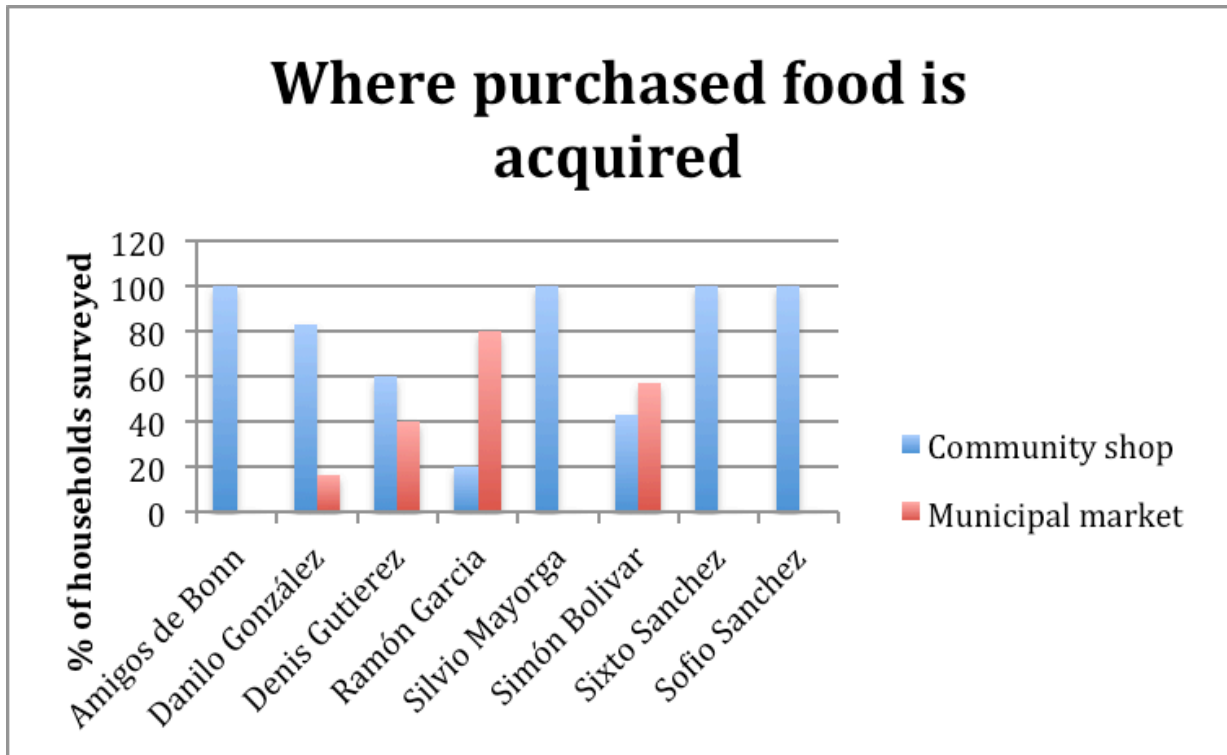


Figure 24: Percentages of Families Acquiring Purchased Food in Different Markets

Sources of Income to Increase Access to Food

Income generated from coffee sales, sale of other farm products, and wage labor is important for households as it allows access to basic foods during the thin months and to foods not produced locally throughout the year. In Figure 26 it can be seen that the households in all but one cooperative are heavily dependent on coffee sales for income generation; the exception is Ramón García, which is a dry zone cooperative where coffee does not grow well, and which is more diversified into salaried work, milk, and basic grains sales. I do not count Silvio Mayorga Cooperative in this analysis, as the respondents reported no income from coffee, which cannot be true as the farmers there do produce coffee as shown in the land use data; thus this was most likely an error in data collection and should not be included in this particular analysis.

It can be seen that Amigos de Bonn Cooperative members earn income from the sale of vegetables; this cooperative is unique in that its members have some land in production for contractors, mostly cabbage for commercial distribution and sale, not for family consumption. Simon Bolivar, Sixto Sánchez, and Sofío Sánchez Cooperatives are almost exclusively dependent on coffee sales for income. Coffee is sold once per year, and when we take into account that these three cooperatives suffered the shortest period of thin months but also the most severe, we can conclude that the income they earn from coffee only allows them to buy grain to complement what they have produced to fulfill their needs for about nine months; they are still without sufficient food for three months of the year.

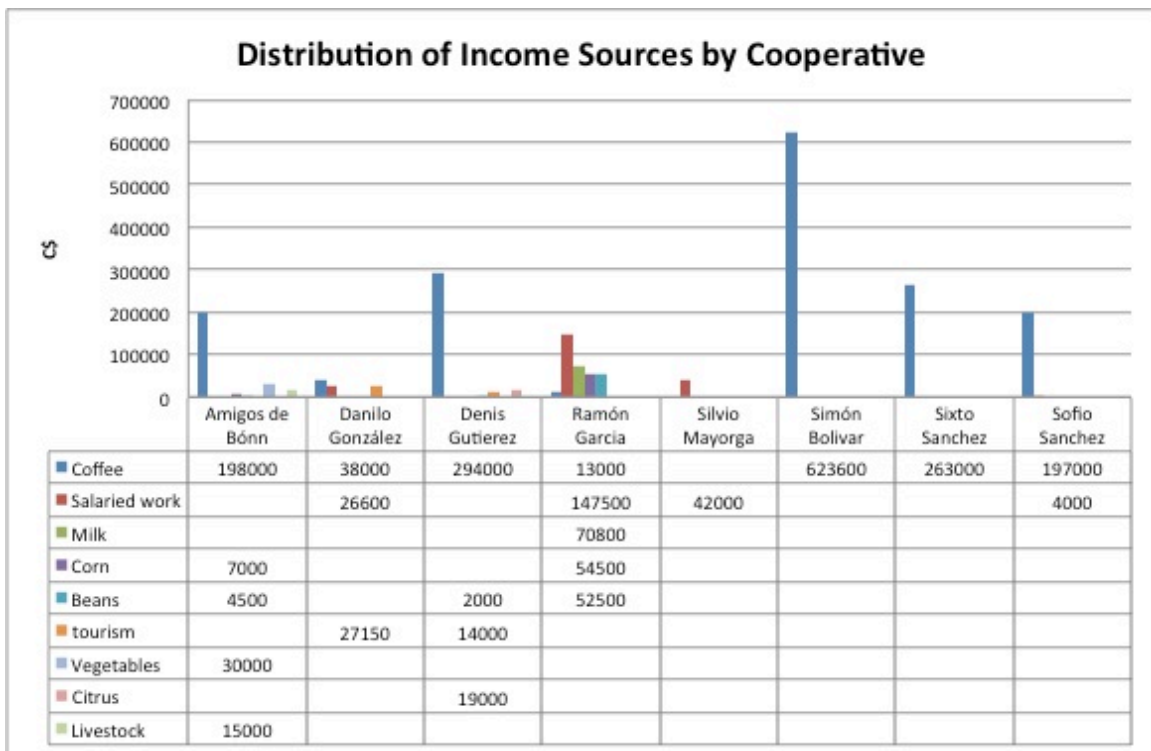


Figure 25: Distribution of Income Sources by Cooperative (in Córdoba)

Aid as a Strategy to Increase Access to Food

Besides seeking salaried work or producing food crops, families also seek different types of aid to meet their needs during the year and especially to alleviate hunger and supplement their diets during the most severe thin months of June and July. Households surveyed mentioned five main types of aid or assistance they receive: financial assistance in the form of loans from the UCA San Ramón credit program; basic grains seed given by government programs, nonprofit organizations, international development agencies, or the UCA San Ramón; food assistance obtained from neighbors as gifts or in trade; money gifted by relatives; and remittances from family members who have migrated to cities, to other countries, or to seasonal harvests to work and earn income. Loans, even from the UCA San Ramón, often require collateral in the form of property titles; this requirement makes loans unfeasible or inaccessible to many farmers since they do not want to risk losing their land if they default on the loan. Although most of the families as members of the UCA San Ramón are eligible to apply for short-term loans at an interest rate of 18%, many prefer not to take advantage of this opportunity because of this risk or a lack of collateral. For those who have collateral and are able to take out a loan, this credit is often used to purchase basic grains seed for planting in late April or early May, freeing up resources to purchase food during the most critical months of June and July.

Figure 27 shows the number of households that receive assistance by cooperative. We see that a total of 15 of the 59 families received some type of aid. The highest form of assistance utilized overall is loans, followed by money gifted by relatives. Only six families only use food assistance from neighbors or family, and only two households surveyed reported receiving remittances; this implies little reliance on outmigration and

outside salaried work for survival, which is supported by previous data presented on income sources above. The conclusion is that overall families are highly dependent on coffee income and limited basic grains production to meet their needs, and short-term loans to finance basic grains production are the most common form of assistance utilized.

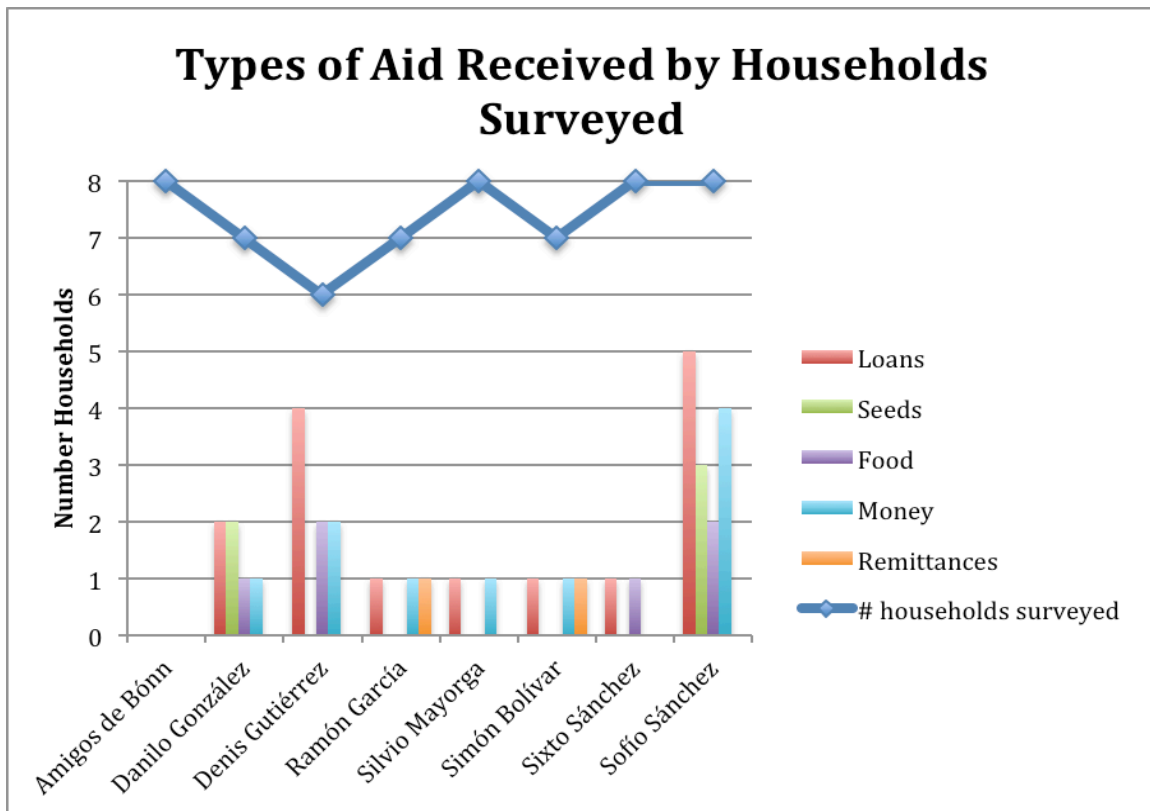


Figure 26: Types of Aid Received by Households Surveyed

Food Sources for Small Children

Good and nutritious food is critical to normal growth in children under the age of five. If children do not receive a proper diet, especially during the first two years of life, it negatively affects their growth and mental development and has consequences that affect their prosperity and well being during their entire lives. According to the data collected, there is little access to assistance from government programs to receive baby

formula and cow's milk to supplement children's diets during the first five years of life. Low access to food supplements is widespread: only one family from Amigos de Bonn and three families from Ramón García are aware of specific places (community health centers) where they can obtain food for children under the age of five.

In spite of that, many mothers interviewed opt for powdered milk over breast milk, especially in Ramón García, Simon Bolivar, Sixto Sánchez, and Sofío Sánchez cooperatives, as shown in Figure 28. Powdered milk is readily available at local shops in small envelopes that do not require large cash output and can be bought as needed. Culturally, powdered milk is seen as comparable in health terms to baby formula, which is medically incorrect. This misconception of the nutritional value of powdered milk can lead to infant malnutrition, as powdered milk is often filled with corn syrup solids and does not contain the nutritional properties of baby formula or cow's milk, and especially breast milk. Silvio Mayorga and Denis Gutiérrez cooperatives are the only cooperatives where breast milk was cited as the exclusive source of food for small children. The reasons for the large variation among the cooperatives in terms of using cow's milk or powdered milk as alternatives to breast milk may be the ages of children in the household, product availability, and the ability or willingness to pay. The conclusion is that breast milk is underutilized, and that baby formula is not widely available, while many mothers use cow's or powdered milk to supplement their children's diets; we do not have biometric data to support this, but it may be that children under five years old suffer the consequences of undernutrition.

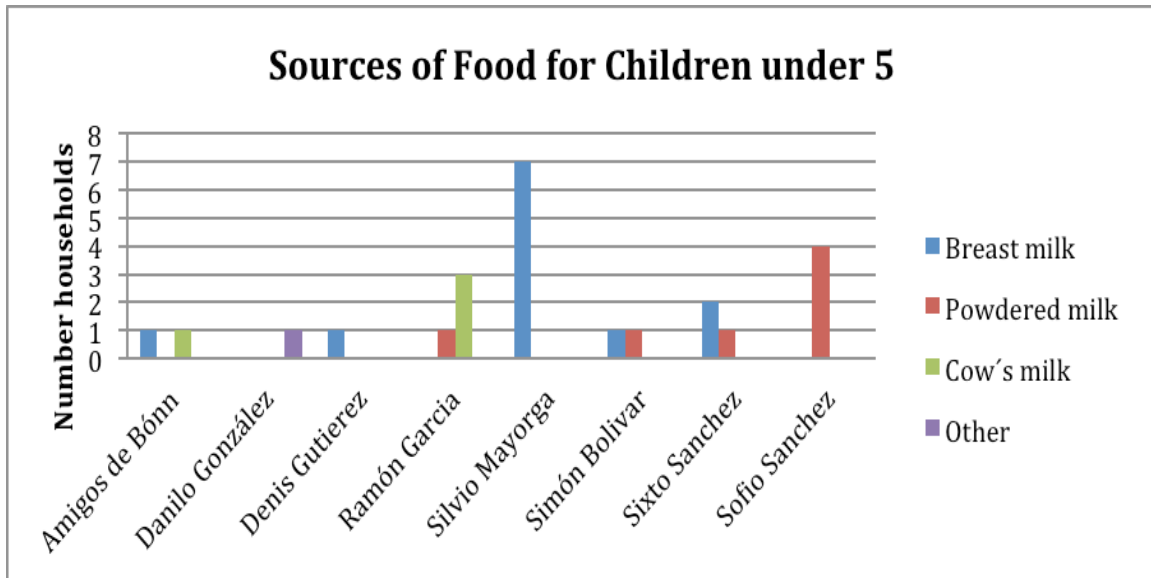


Figure 27: Sources of Food for Children under Age Five.

5E. Food Use and Consumption

Food is “used” in a variety of ways: it is eaten, sold, given to animals as feed, traded for other products, as well as stored for future use.

Of the Foods that are Produced on Farms, What is Sold, Where, and Why?

We have already seen that of the basic grains that are produced, the majority of the eight cooperatives do not produce enough to meet their annual needs with stored grains. Figure 29 shows that overall among the 59 households surveyed, 82% sell none of the food crops that they produce. Most of what is produced is for household consumption with a small amount of eggs and chickens being sold (as we saw in the section on Income Sources), and in Ramón García cooperative, some basic grains are sold.

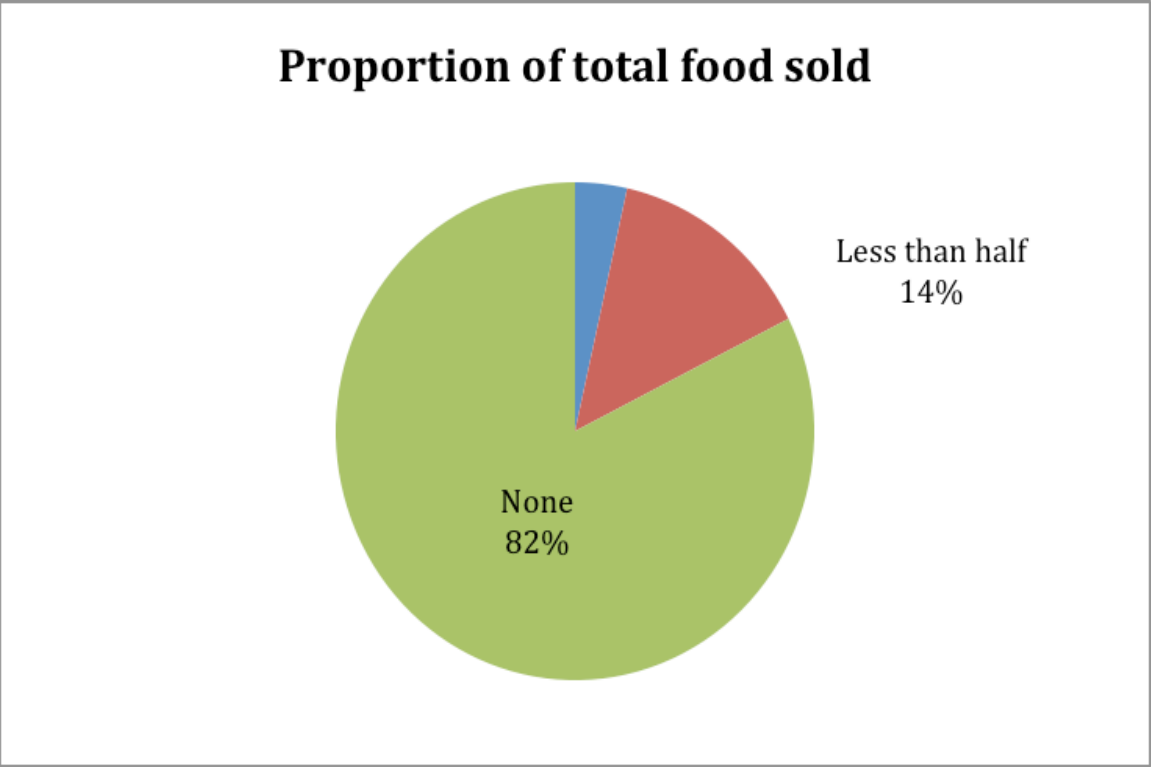


Figure 28: Proportion of Total Food Sold

In Figure 30 it is evident that most of the households surveyed do not sell any of the food that they produce. Only two cooperatives have a significant percentage of families that sell less than half of what they produce: Amigos de Bonn, in which 38% sell less than half of what they produce, and Ramón García, in which 57% sell less than half and over 20% sell more than half. These cooperatives mainly sell corn and beans, as mentioned above.

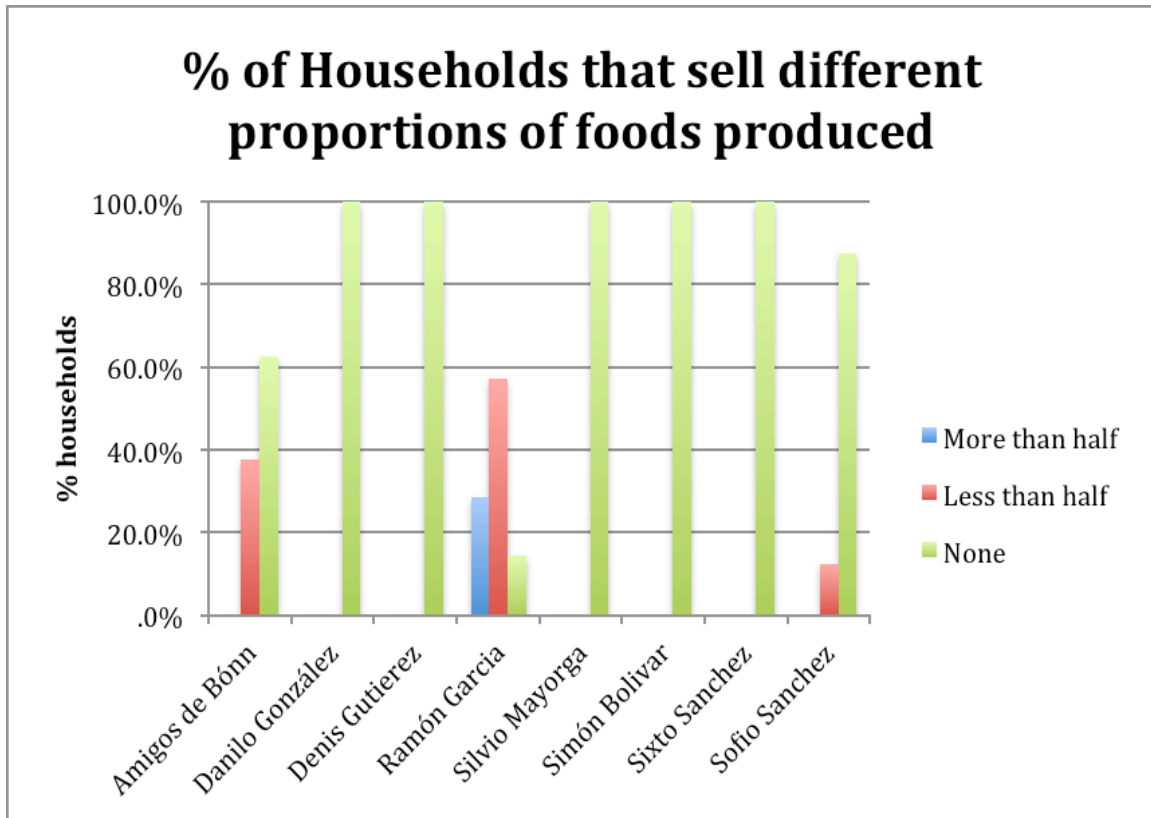


Figure 29: Percentage of Households that Sell Different Proportions of Foods Produced

Figure 31 shows the points of sale where households sell what they produce. There are only three main points of sale: local markets (in Matagalpa, the closest major city), local community shops, and the UCA San Ramón (which buys, besides coffee, basic grains and milk). More than 50% of the families in each cooperative, with the exception of Silvio Mayorga and Danilo González, sell part of their produce in the local market in Matagalpa. All the cooperatives, apart from Amigos de Bonn, also sell to the UCA, which buys most of the coffee produced by the cooperatives. Only two of the cooperatives, Danilo González and Sofio Sánchez, sell to local shops in the community, which buy corn, beans, and eggs to re-sell to the community.

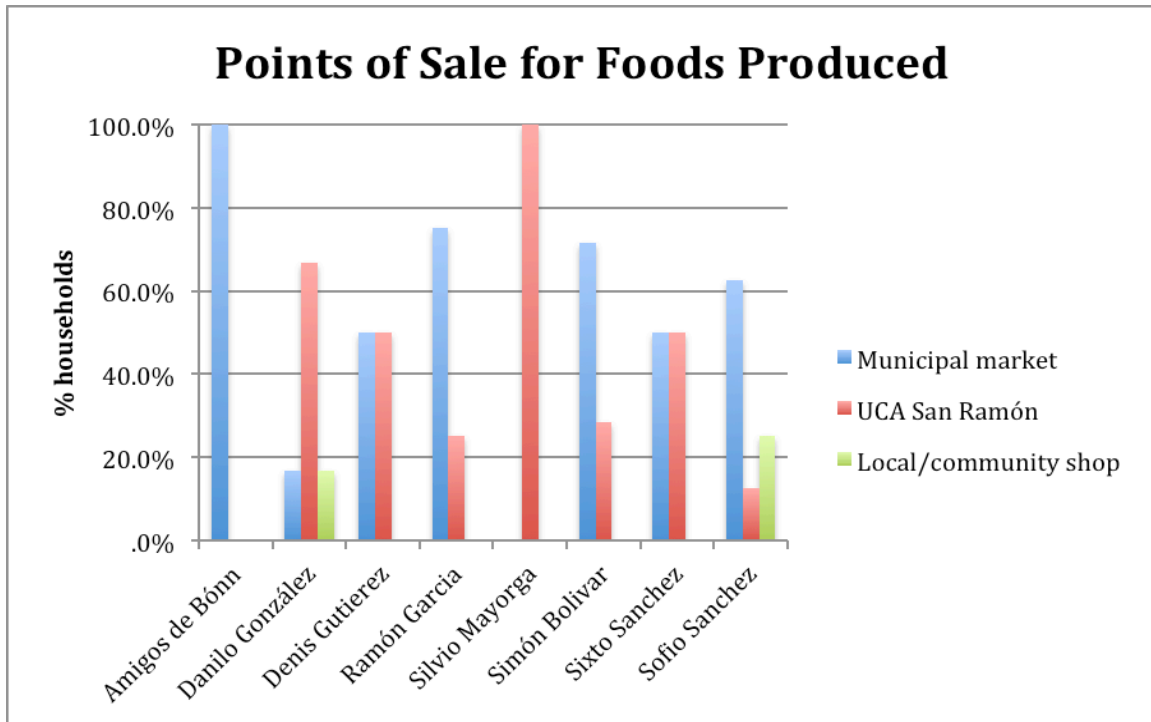


Figure 30: Points of Sale for Foods Produced

Farmers do not have many options in terms of where to sell what they produce. Due to the low volume of production, many families do not have the power to negotiate prices and have to adjust to market prices. Local markets are not well developed and are often dominated by *coyotes*, or middlemen, who control prices via their monopolies. Coffee may be the exception as most of the cooperatives sell to the UCA San Ramón, which exports to the United States and pays higher prices than local *coyotes*. It is worth mentioning that the percentage of families that sell to the UCA may be underrepresented in the previous figure, as cooperative members must sell an agreed-upon portion of their coffee harvest to the UCA as part of their membership.

Food Consumption: Dietary Diversity and Use of Available Foods

To measure dietary diversity, 24-hour dietary recalls were performed with 59 individual survey respondents. The limitation of this data is that it was collected at one moment during the year – in the month of September. For the 24-hour dietary recall methodology to be useful in painting a full and realistic picture of what diets are like and how they vary throughout the year, the recalls should be taken four times per year so that comparative data exists of diets during the different stages of the abundant and scarce seasons. However, we were only able to perform the recalls once for this study, and we must limit any conclusions we draw from this data given the fact that it reflects what food was available – and the access that households had to it – during that particular season: it was during the grain harvest, which means that in some cases grains for consumption may not have been available yet; it was three months before the coffee harvest, when families receive cash income for harvested coffee delivered to the UCA San Ramón; September is also after the time when fruits like avocados and mangos are ripe, limiting their availability, and it is not a major period for banana harvesting either.

I do believe, however, that even given this limitation, the dietary recalls can provide a glimpse of the basic spread of dietary diversity among individuals surveyed. Further information collected during focus groups with women project beneficiaries, which is presented after the discussion of the dietary recalls, support the conclusion that diets are very limited to basic staples that provide calories but are deficient of critical nutrients, and that basic knowledge of different varieties of food preparation that would make a more diverse diet more accessible and interesting has been lost over the last generation.

Overall, it was reported that on average:

- Rice is eaten twice per day
- Beans are eaten twice per day
- Tortillas are eaten once per day
- Eggs or cheese is consumed on average six times per week.
- Seven households eat fruit daily, while fruit is consumed on average less than once per day.
- Only eight households eat vegetables daily, and on average vegetables such as tomatoes and peppers are eaten about fifteen times per week.

Table 22: Average Weekly Frequency of Foods Eaten by Cooperative

Food Group	Food	Amigos de Bonn	Danilo González	Denis Gutiérrez	Ramón García	Silvio Mayoraga	Simon Bolívar	Sixto Sánchez	Sofío Sánchez
Basic Grains	Rice	14.00	18.00	17.50	9.00	11.38	9.00	14.00	19.25
	Beans	14.88	18.00	19.83	12.00	13.13	12.00	16.63	14.88
	Tortilla	8.75	10.00	5.83	6.00	11.38	3.00	14.88	12.25
Vegetables	Onion	3.50	6.00	11.67	5.00	0.88	4.00	4.38	7.88
	Tomato	1.75	0.00	2.33	1.00	0.88	1.00	3.50	2.63
	Peppers	0.00	1.00	8.17	3.00	0.00	1.00	2.63	6.13
	Garlic	0.00	0.00	2.33	0.00	0.00	0.00	0.00	0.00
	Avocado	0.00	2.00	0.00	0.00	0.00	0.00	0.00	1.75
	Squashes	0.88	0.00	0.00	0.00	0.00	0.00	0.88	0.00
	Chayote	0.00	0.00	1.17	0.00	0.00	0.00	0.00	0.00
Starchy Roots	Cabbage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
	Potato	0.00	0.00	0.00	0.00	0.00	0.00	1.75	0.88
	Malanga/Taro	2.63	0.00	0.00	0.00	0.00	0.00	0.00	2.63
Fruit	Yuca/Cassava	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88
	Bananas	0.00	6.00	3.50	0.00	1.75	1.00	0.00	5.25
	Other fruit	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Dairy and Eggs	Fresh fruit drinks	0.00	1.00	3.50	0.00	0.88	1.00	0.88	0.00
	Milk	0.00	0.00	1.17	1.00	0.00	0.00	0.88	0.88
	Cream	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
	Eggs	2.63	0.00	4.67	3.00	1.75	1.00	0.88	1.75
Meat	Fresh cheese	0.88	7.00	1.17	6.00	1.75	1.00	1.75	3.50
	Chicken	0.00	0.00	1.17	0.00	0.88	0.00	2.63	0.88
	Pork	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Processed foods	Beef	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sopa Maggi	1.75	0.00	1.17	0.00	0.88	0.00	0.00	0.00
	Pasta	0.88	2.00	1.17	0.00	0.00	0.00	0.00	0.88
	Processed fruit drinks	0.00	0.00	1.17	0.00	1.75	0.00	0.00	0.88
Other	Cookies/chips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.75
Other	Coffee	0.00	2.00	2.33	2.00	3.50	1.00	6.13	5.25

A further observation is that there is a contrast between what is produced (what is available) and what is consumed. One thing is consistent – the majority of productive land (outside of coffee) is dedicated to basic grains, and this is what makes up the bulk of the diet overall as well. But one interesting inconsistency between what is produced and what is consumed is that rice is consumed more frequently than corn tortillas; however,

given that this data was taken during the beginning of the corn harvesting season, it does make sense that purchased rice would make up for the lack of availability of dried corn for making *masa* for tortillas.

Another inconsistency between what is produced and consumed is that there are at least six types of fruit being produced on farms, and very little of that is consumed, according to the recalls. Again, this pattern has to do with the season, which is not a season of available ripe fruit, and it could have to do with people's perceptions of snacking on fruit – it emerged in focus groups that they did not mention much of the fruit they eat because they do not perceive it as something to be counted as eaten, since it is often munched on while walking down the road or in pauses during work. So, there is likely some substantial underreporting of fruit eaten.

In terms of vegetables, the cooperatives have between 0–2.5 Mz of land dedicated to vegetables, and in three of the cooperatives, vegetables (mostly cabbage, malanga (taro), and some tomatoes) are produced in monoculture fields for sale to local middlemen. Very little vegetables are being consumed according to the dietary recalls, even in those cooperatives that have higher amounts of land dedicated to vegetable production, indicating that there is a culture preference of not eating vegetables, which further aggravates a lack of availability of locally-produced vegetables in some cooperatives. One exception is the Danilo González cooperative, which has a higher than average consumption of vegetables; this could be due to this cooperative's close proximity to the town of San Ramón, where fresh vegetables are easily and cheaply accessible in the municipal market. Overall, the take away point here is that compared with the amount of different foods available, very few foods are being consumed.

“El Plato del Buen Comer”: Consumption of Food Groups According to Regional Guidelines

Dietary diversity is important for all people, but especially children, as sufficient amounts of vitamins and nutrients found in fruits and vegetables, and protein found in legumes and animal-based products, are essential to child’s normal and healthy physical, mental, and emotional development, especially during the first five years of life.

According to the “El Plato del Buen Comer” (“The Plate of Good Food”, see Figure 32) (mundonutricion.portalmundos.com) used throughout Latin America as a guide for educating people about constructing a healthy mixture of foods in their diets, basic grains, tubers, and legumes should make up 50% of the diet, fruits and vegetables should make up about 35%, and animal products including dairy, meat, and eggs should comprise about 15% of the diet.

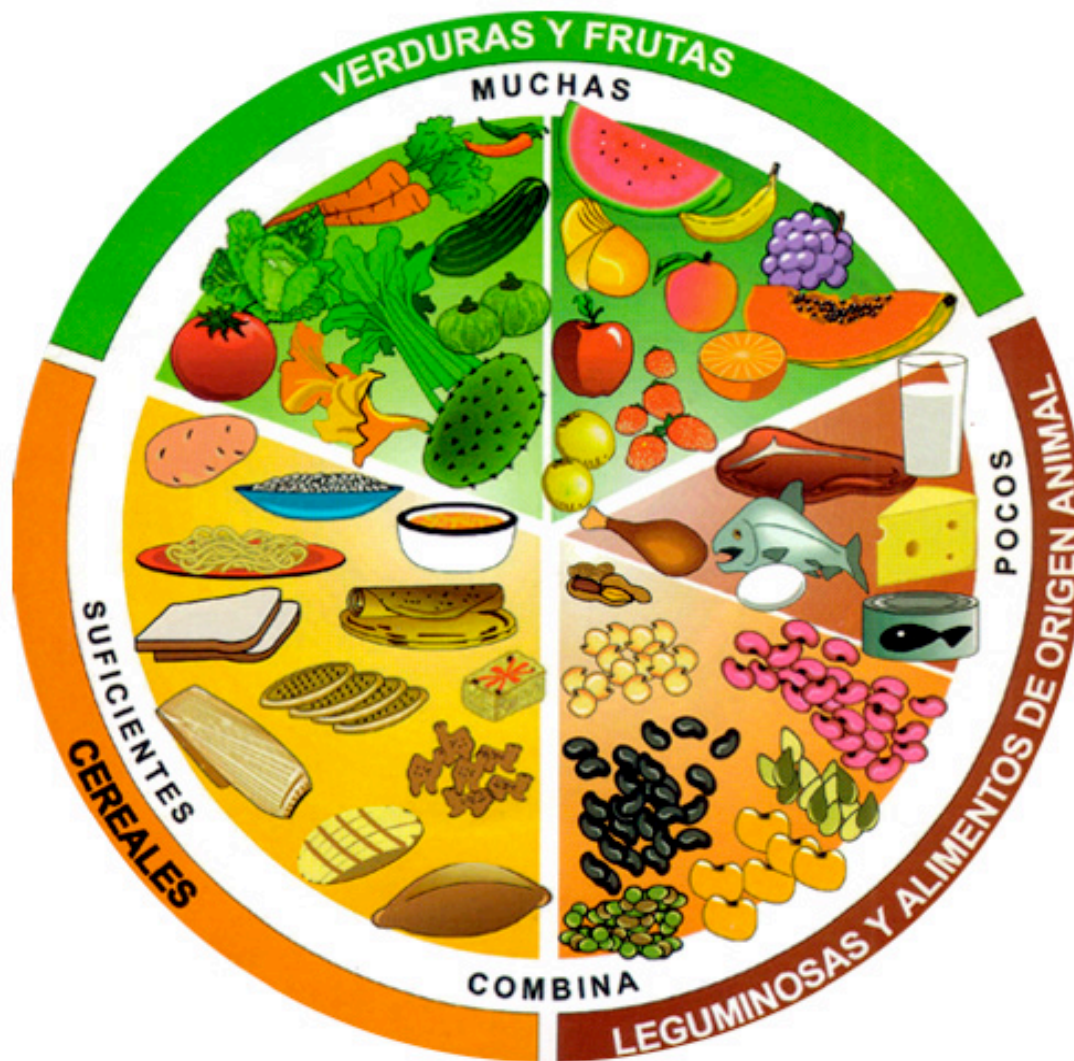


Figure 31: El Plato del Buen Comer (mundonutricion.portalmundos.com)

Working from the complete list of foods mentioned in the sample of dietary recalls, we categorized the foods mentioned into categories similar to those in the *Plato del Buen Comer*, with some alterations: we separated tubers from basic grains in order to have a more refined understanding of the types of carbohydrates being consumed; we also separated processed foods since they are such a concern given their high caloric content and low nutrient value; finally, we separated coffee as it made up such a significant portion of the daily diet, according to the recalls.

The recalls show that basic grains and tubers make up 63% of the daily diet (12% over the recommended amount); vegetables and fruit make up 21% of the diet (14% below the recommended proportion); proteins in the form of meat and animal products make up 11% (4% below), and processed junk foods and coffee make up 7% of the diet, as shown in Figure 33.

Looking at this data outside the context of the thin months, it appears that there is low dietary diversity overall, with insufficient amounts of fruits and vegetables, and protein in the diet. Disaggregating the data by cooperative, however, shows some significant differences. Ramón García Cooperative, which has the highest amount of basic grains and also milk production, has the highest proportions of dairy and eggs in the diet, but falls just above average in vegetable consumption. In contrast, Silvio Mayorga Cooperative has the highest proportion of basic grains consumed, and is among the lowest of protein consumption, along with Simon bolivar, Sixto Sánchez, and Sofio Sánchez Cooperatives. Silvio Mayorga has critically low levels of vegetables as part of the diet, and all but Denis Gutiérrez Cooperative fall well below the guidelines for vegetables and fruits in the diet. All but Ramón García fall well below the recommendations for protein intake. Overall, Silvio Mayorga Cooperative has the lowest dietary diversity.

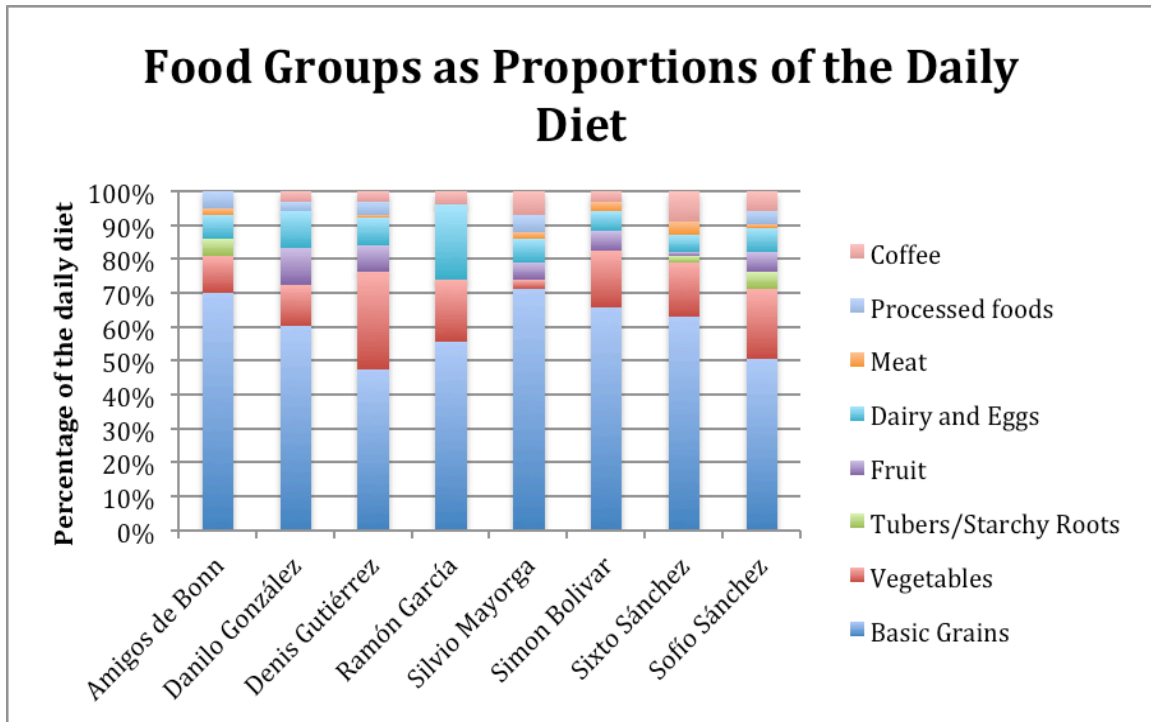


Figure 32: Food Groups as Proportions of the Daily Diet

Food Usage: Traditional Recipes

In focus groups, women shared that in the past, their mothers and grandmothers had prepared many recipes that are no longer used, and that they used a variety of locally-available plants, fruits, and vegetables that often grew in the forests, but that they had lost much of this knowledge. Some of these dishes are still prepared, but are generally eaten on special occasions like birthdays, Christmas, and Holy Week (Easter holidays). Only 10 or more households consume just three of these traditional dishes during the year. 28 households eat *nacatamal* (a *tamal* with chicken or pork, rice and seasoned with *achiote*, a red paste extracted from a seed pod), with most (25 households) eating it only annually. *Pollo caldillo* (chicken soup) follows with 17 households, most of which eat this dish

annually and, finally, *tamal pisque*, with 10 households at least once per year. Frequency of consumption for each dish is shown in the tables below by cooperative.

Table 23: Frequency of Consumption of Traditional Dishes - Nacatamal

Cooperative	Nacatamal			Total
	bi-weekly	annually	other	
Amigos de Bónn	1	4	0	5
Danilo González	0	2	1	3
Denis Gutiérrez	0	3	0	3
Ramón García	0	2	0	2
Silvio Mayorga	0	5	0	5
Simón Bolívar	0	4	0	4
Sixto Sánchez	0	4	0	4
Sofío Sánchez	0	1	1	2
	1	25	2	28

Table 24: Frequency of Consumption of Traditional Dishes - Pollo Caldillo

Cooperative	Pollo Caldillo				Total
	daily	bi-weekly	annually	other	
Amigos de Bónn	0	0	2	0	2
Danilo González	0	1	0	0	1
Denis Gutiérrez	0	1	0	0	1
Ramón García	0	0	3	0	3
Silvio Mayorga	1	1	1	0	3
Simón Bolívar	1	0	3	0	4
Sixto Sánchez	0	0	2	0	2
Sofío Sánchez	0	0	0	1	1
	2	3	11	1	17

Table 25: Frequency of Consumption of Traditional Dishes - Tamal Pisque

Cooperative	Tamal pisque	Total
	Annually	
Denis Gutiérrez	2	2
Ramón García	1	1
Silvio Mayorga	2	2
Simón Bolívar	1	1
Sixto Sánchez	4	4
	10	10

Apart from these traditional dishes, there are various others that were mentioned in the focus groups but that are consumed by less than 10 families during the year: *sopa de gallina y res* (chicken and beef soup), *arroz valenciano* (valencian rice, similar to chicken paella), *pollo y carne frito* (fried chicken and beef), fish, stew, *pollo al vino* (chicken with wine), *gallina rellena* (stuffed chicken), *gallina horneada* (baked chicken), *indio viejo* (dish of *masa* cooked with chicken broth, shredded pork, and spices commonly eaten during Holy Week), and others. These are consumed by so few families and so rarely that they are not considered common.

The conclusion from the analysis of dietary diversity and the consumption of traditional dishes is that the daily diet is highly dependent on rice, beans, and tortilla, with little consumption of vitamin-rich plants, vegetables, and fruits and insufficient intake of protein-rich foods. This can be attributed to a mixture of loss of knowledge of food preparation, and lack of access and availability of those foods; as seen in the analysis of production diversity, vegetables are produced in very small amounts in most of the cooperatives, and as we saw in the analysis of income generation, most of the annual income occurs when coffee is sold, and any credit that is taken out is used to buy seed and basic grains. Thus there is very little money to purchase vegetables that come from outside the community. The lack of fruit consumption is credited to the high amount of work that is required to gather and prepare it (the cultural preference is to consume fruit in the form of fruit drinks or *frescos* made from juice combined with water and sugar), according to statements in focus groups.

5F. Agroecological Practices

Agroecological production practices are critical to family and community food security for a number of reasons. Often they include knowledges and practices tried and proven over various generations to be appropriate to the local environment and culture. These local practices often result in higher productivity for longer periods of time than conventional or Western practices that depend on chemical inputs to add nutrients to the soil while removing organic waste that can naturally enrich soils. They also include knowledges and practices learned and adapted from outside sources. I prefer to use the term “local” rather than “traditional” agroecological practices to acknowledge the fact that all of the farmers involved in this study use a combination of what might be considered “traditional” older practices passed down from one generation to the next, and newer practices acquired via cooperative technical assistance and adapted by the farmers to their own production cultures. In this study we limited our survey to soil management and fertilizing practices; we left out pest management practices as well as a deeper study of associated cropping methods used by farmers, due to the limited amount of time and resources that were allotted to the study, as well as the limited focus of the food security project itself. Thus the agroecological practices we are studying are limited to those that have a direct and easily measureable impact on crop yields and health.

Soil Conservation Practices

There are six principal soil conservation practices that are practiced among the 59 households surveyed:

- Contoured terraces: these are built-up terraces that follow lines of equal elevation, creating flat planting platforms that help prevent soil erosion down hillsides.
- Living fences or hedgerows: these can be built on terraces to prevent soil migration downward, or on the edges of field to block wind, further preventing soil loss from blow-away.
- Nonliving fences (“*barrera muerta*”, literally “dead fence”), constructed of wood, wire, or a combination of the two, meant to block soil migration due to wind and soil erosion from water when used on hillsides.
- Green manures and legume green manures (*frijol de abono*)¹⁸: both use nitrogen-fixing groundcover plants, either leguminous or non-leguminous, while fields lay fallow, to increase fertility for the next planting seasons.
- Strategically placed drainage ditches that prevent erosion from runoff water during heavy rains.

Figure 34 shows the number of households in each cooperative that utilize the six soil conservation practices. Four of the six cooperatives employ at least one of the above six practices. However, even in these four cooperatives, the use of these practices is limited to only one or two families in each of the cooperatives, except Ramón García and Simón Bolívar Cooperatives. We can see that Ramón García implements four of these practices and reports the highest number of households that utilize them, with living fences used by six families, legume green manures used by five families, and dead fences used by three families. The other cooperative that has more than two families that apply at least one practice is Simón Bolívar, with three households using dead fences.

¹⁸ A type of field bean used as a green manure fertilizer which, like other legumes, fixes nitrogen into the soil.

It is significant that contour terraces are hardly used in any of the cooperatives, given that seven out of the eight cooperatives (Ramón García Cooperative is the exception) are situated in very mountainous terrain; basic grains are often planted on hills with a 45 degree incline, creating situations where soil loss from erosion resulting from the loosening of the soil during planting, is a certainty. Thus we can assume that there are high amounts of soil erosion in these seven cooperatives. No soil conservation practices are being utilized by the households surveyed in Silvio Mayorga and Sixto Sánchez; these are two of the five cooperatives that until recently had little support or technical assistance from the UCA San Ramón due to lack of road infrastructure; Amigos de Bonn Cooperative is the exception as its continuous support from its sister city organization resulted in higher access to education and health services, and also resulted in its members being less isolated from the UCA San Ramón over time. Overall, levels of implementation of soil conservation practices are very low, especially in the four cooperatives most isolated from the UCA San Ramón.

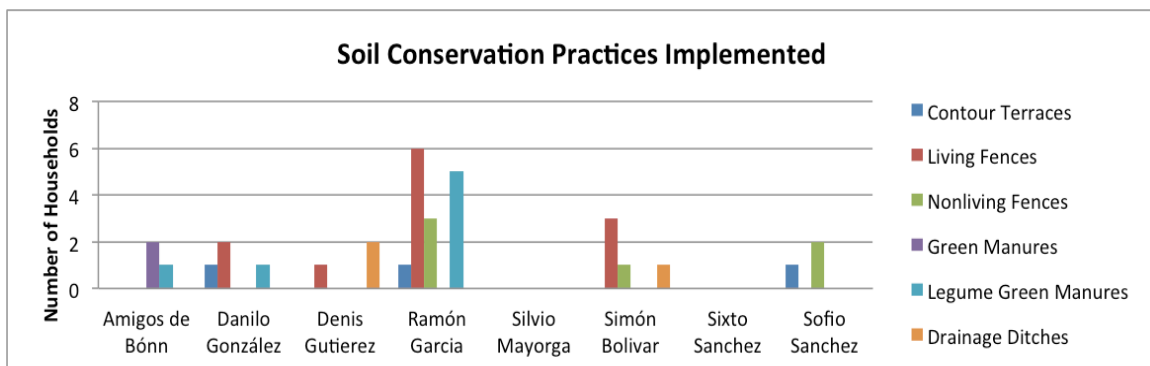


Figure 33: Soil Conservation Practices Implemented

Fertilizing Practices

Farmers use fertilizing practices ranging from organic fertilizers produced on-farm to purchase chemical fertilizers (generally NPK in different proportions). Figure 35

shows each of the practices cited that are used by at least two households, and the total quantities used, by cooperative. We can see in the following figure that most of the cooperatives use two to six different types of fertilizers, including compost, coffee pulp, foliar spray (organic), leaf and cut-grass litter, and chemical fertilizers including 15-15-15, 20-20-0, 18-6-12 (these three are all different mixes of NPK), and urea (these last four are prohibited on organic-certified farms). The most utilized fertilizing practices are the following:

- Coffee pulp, an organic fertilizer made from the waste coffee pulp resulting from the first milling process; it is mostly applied to the coffee plants themselves, and sometimes composted to then be applied to gardens.
- 15-15-15 (NPK), applied primarily to coffee fields and basic grains.
- Urea, a chemical product applied to coffee fields and basic grains.

Amigos de Bonn uses the largest quantity of pulp, 20-20-20, and urea than any other cooperative, and this is probably due to the larger quantity of basic grains and coffee produced by this cooperative. The rest of the cooperatives use two to four different types. 15-15-15 is very commonly used, probably since the UCA San Ramón itself distributes it at a subsidized price. Only one household, in Ramón García cooperative, produces worm compost (vermiculture). The main lesson learned here is that there are very low levels of implementation of organic fertilizers among all of the cooperatives. In focus groups, participants noted as the main barriers to using organic fertilizers the high amount of labor involved, and a lack of specific knowledge on how to produce compost and organic foliar sprays (biofertilizer liquid).

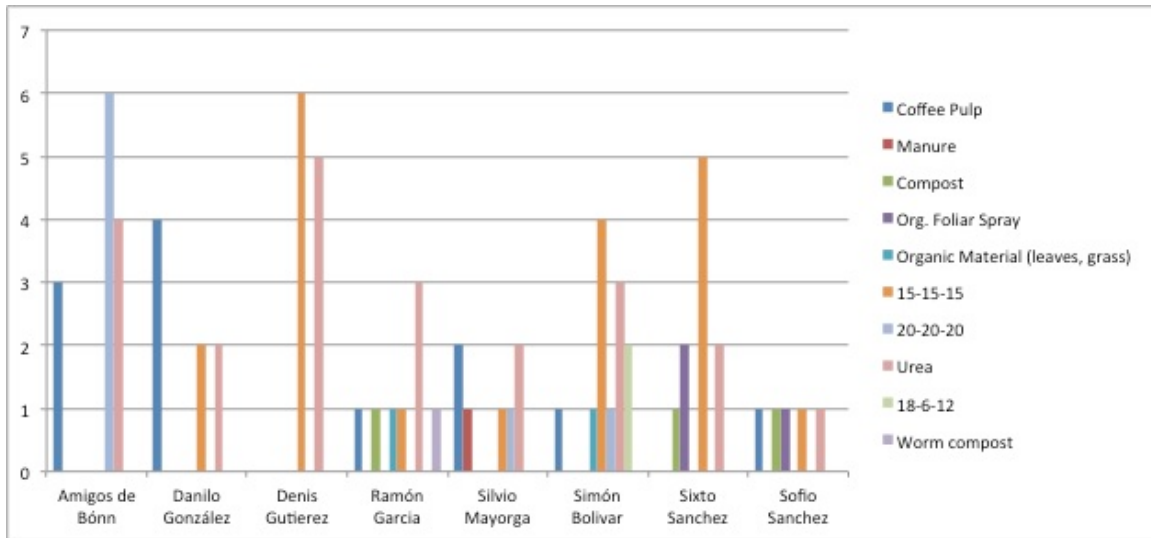


Figure 34: Types of Fertilizers Applied

5G. Food Security Strategies and Coping Mechanisms

Best Practices for Mitigating Scarcity: Strategies and Coping Mechanisms

It has been established that the households surveyed experience a period of scarcity that lasts on average 4.63 months. In the surveys, participants mentioned both long-term strategies for mitigating the effects of seasonal scarcity and reducing hunger, as well as short-term or emergency coping mechanisms, in the context of the strategies being implemented and the strategies identified as desirable, to improve food security for their households.

As shown in Table 26, it is telling that most of the actions currently implemented are emergency coping mechanisms that provide some immediate relief during the thin months. The most severe mechanism to which households resort is to reduce their daily food intake. It is also impressive to note that the households surveyed have an extensive list of long-term strategies, some of which they are currently implementing, and others of which they would like to implement in the future, to reduce the impact of the thin months

on their families. Participants expressed that a lack of money was the main reason for not implementing some of these long-term solutions. However, it must also be noted that there is a lack of access to timely and affordable long term financing from the UCA San Ramón and other lending agencies; financing typically is short term at 6 months, has an 18% interest rate and, on top of that, families generally need to take out financing right when basic grain seed prices shoot up. This increases the amount of money they need to borrow to buy grain and seed, while the price they receive when they harvest the grain four or five months later is lower, sending families into a never-ending cycle of debt and loss. This is a problem that can be addressed through access to timely long-term financing as is noted in the chart under strategies that should be implemented, or through other strategies. One such strategy would be to improve local access to seed for planting through local seedbanks, a strategy that was not actually mentioned by the survey participants, although it was later mentioned by participants in focus groups as a possibility to explore.

Participants identified other strategies that they should or would like to implement, including improvement of soil fertility and water management, installing irrigation systems to be able to produce during more than one season of the year (currently, most farmers only produce during one season), and increasing the diversity of crops produced; all three of these desired strategies resonate with the needs revealed in the data from the surveys as well.

Table 26: Food Security Strategies and Coping Mechanisms

	Currently Implemented	Should be implemented
Immediate/ Emergency Coping Mechanisms	<ul style="list-style-type: none"> • Outmigration for Wage labor • Short-term credit from UCS SR or local shops • Sell chickens and eggs • Butcher animals to sell meat • Barter and trade with neighbors and local shops • Sell basic grains harvest in advance for cash • Food or money from family members • Eat less 	
Long-term Food Security Strategies	<ul style="list-style-type: none"> • Grain storage • Outmigration for Wage labor • Plant produce • Save during the year • Barter and trade with neighbors and local shops • Plant bananas and fast-growing vegetables • Seed from assistance organizations 	<ul style="list-style-type: none"> • Long-term financing • Increase production areas (basic grains and vegetables) • Increase variety of crops produced • Save more money during the year • Find more wage employment • Access credit before grain prices increase • Install irrigation systems • Increase livestock production • Improve soil fertility and water management • Save vegetable seeds for replanting

Grain Storage Strategies

The storage of harvested basic grains (corn and beans) during the year is one strategy generally used by almost all of the households surveyed to ensure the availability of this staple food during as much of the year as possible. Figure 36 shows the quantity of corn and beans that households in each cooperative store, and the percentage of the total amount of grains harvested that is stored for consumption during the year. 47 out of the

59 households surveyed store grain; These 47 families store a total of 536 *quintales* (53600 lb) of corn. This means that 93% of the corn produced is stored, but by only 47 of the 59 households (80%). With respect to beans, 46 (78%) households store 251 *quintales* or 96% of the beans produced.

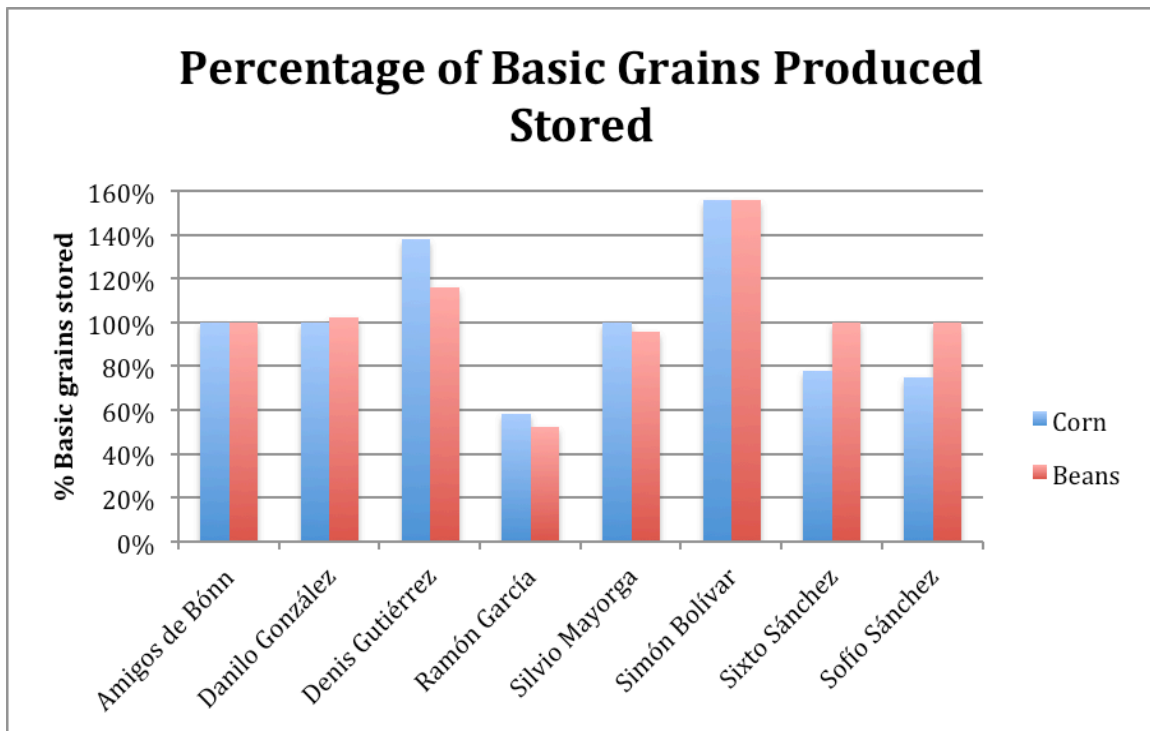


Figure 35: Percentage of Basic Grains Produced Stored

We see that some cooperatives store all of what they produce, or almost 100% (Amigos de Bonn, Danilo González, and Silvio Mayorga), and others only a portion. Denis Gutiérrez and Simón Bolívar store more than what they produce, more than 100%, due to the purchase of basic grains to meet their annual needs. Simón Bolívar stored more than it harvested, 156%, implying that households purchased grain to store; this indicates that households in this cooperative could benefit from higher levels of basic grains production. Ramón García lies on the other side of the spectrum, storing only a little

more than half of their corn (58%) and bean (52%) harvests; this is attributed to the high levels of production in this cooperative, where families live primarily from the sale of basic grains.

It is also important to take into account that overall, more than 86% of the households store basic grains for consumption during the year. The only exceptions to this trend are Danilo González, with 71% of the families storing corn; Sixto Sánchez, with only 25% storing corn and 38% beans; and Sofio Sánchez, with 75% storing corn and 50% beans. Sixto Sánchez and Sofio Sánchez, while storing all of their beans, only stored 78% and 75% of their corn, respectively, indicating the need to sell a portion to pay debts or other costs, even when the total harvest would not meet their annual needs. The conclusion is that although households utilize the strategy of storing basic grains, overall they are not meeting their basic food needs, as evidenced by the fact that they are all experiencing varying lengths and severity of thin months, which are attributed directly to low production levels (due to lack of access to land), short-term financing that necessitates the sale of grain to pay back loans taken out to purchase seed to plant, and the need to sell grains when prices are low in order to pay back loans and other costs of living. The purchase of basic grains is another strategy used when needed to offset this cycle. Another strategy that would improve the situation of stored grains would be to improve household grain storage infrastructure.¹⁹

¹⁹ I did not collect sufficient data on the methods of household storage of basic grains; it is common knowledge, however, that jute and plastic sacks are the most common (and cheapest) method of household storage; this leaves stored grains vulnerable to damage from mold and rodents, further reducing the quality and quantity of available grain suitable for human consumption during the year.

Seed Saving Strategies

The strategy of selecting and saving corn and bean seeds for replanting is utilized by most of the households that produce basic grains; however, in most cases, insufficient seed is put aside to plant and harvest enough basic grains to more closely cover a household's needs. In other cases, farmers said they put enough aside to plant all of their available land, but that they had to resort to consuming their seed stock as food during the thin months when their stored grains ran out. It is clear that even if families were able to save more seed stock for basic grains and not consume it in times of need, they would come closer to covering their families' needs, but would in most cases still not meet it, given that the major problem at the foundation is lack of land to produce sufficient volumes, and lack of water to irrigate it if a second harvest is produced during the dry season.

In the case of vegetable seeds, all of the households surveyed mentioned that they did not select nor save vegetable seeds, but rather purchased seeds every year for the few vegetables they cultivate. In focus groups and interviews the women stated that they had lost the knowledge about how to select, save, and store vegetable seeds, overwhelmingly expressing the desire to learn these techniques that their grandmothers had utilized.

Perceptions on Climate Change: Assessing and Adapting to Future Risk

Farmers in San Ramón perceive climate change as very real, and as a critical threat to their livelihoods. They perceive that it affects what they can produce and the quality of what they produce because of changing temperature, growing seasons, the frequency of extreme weather events, and the availability of water for irrigation. This perception of climate change also impacts what kinds of strategies they use when

negative conditions do occur; in focus groups farmers expressed that adaptation to climate change and improving resilience through different practices are critical food security strategies. In this study, two different measures were used to study perceived changes in the climate: the level of fog and the duration of the rainy season over time. To farmers, the level of fog is an indicator of humidity levels and of temperature overall: to them, less fog can mean a longer dry season and a warming climate. The length of the rainy season is related to the growing season, the availability of water, and is also related to the prevalence of certain pests that affect crops.

With respect to the level of fog, Figure 37 shows the percentage of households surveyed in each cooperative that report that the level of fog is less, more, or equal to that of 10 years ago. More than 74% of the overall respondents perceive that the level of fog is lower than 10 years ago. Only in two cooperatives, Silvio Mayorga and Simón Bolívar, are the families divided as to whether the level is less or equal, or more or less the same, respectively. The importance of this decrease in the level of fog in the communities is that it indicates that in at least six of the cooperatives, farmers perceive that they are experiencing warmer weather and a longer dry season or less rain, which places stress on their crops and on their livelihoods overall.

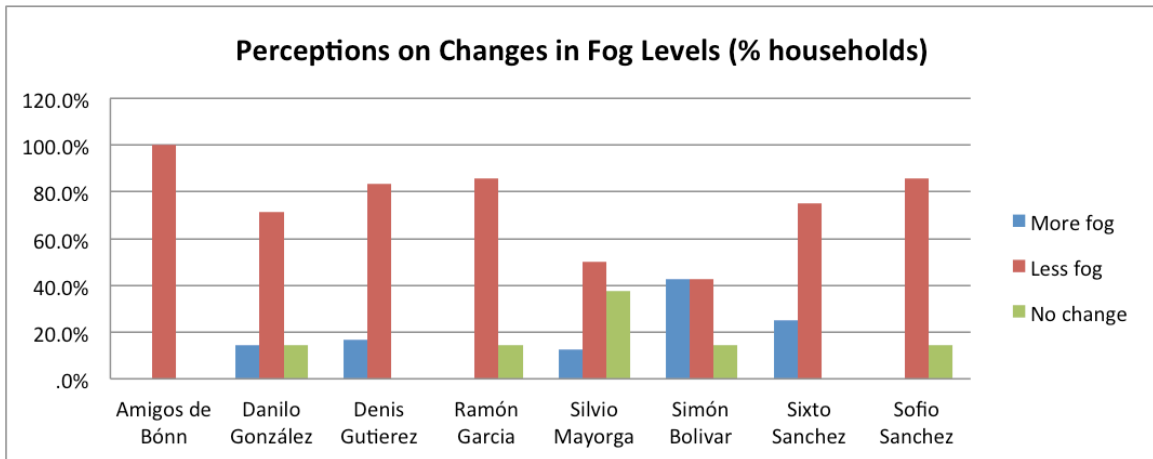


Figure 36: Perceptions of Changes in Fog Levels (% Households)

The second measure used of perceptions of climate change is the duration of the rainy season. Table 27 shows the responses of the surveyed families (by percentage) with regard to when the rainy season began 10 years ago. 96% (52) of the total sample report that 10 years ago the rainy season started in May and only 2% report that it began in June. Further, 75% report that the rainy season began in May, which is 21% less when compared to perceptions of ten years ago; more people believe that the rainy season started one month later five years ago than it did ten years ago. The perceptions of the rainy season when this survey was completed are the same as those for five years ago – 75% believe it started in May and the rest in June. The conclusion is that overall the rainy season is perceived to start one month later than it did ten years ago.

Table 27: Perceptions of Changes in the Start and End of the Rainy Season over Time

		January	February	May	June	October	November	December
10 years ago	Rainy season begins			52	1			
5 years ago				41	12			
2011				41	13			
10 years ago	Rainy season ends	9	7			12	15	11
5 years ago		12	1			6	25	10
2011		11	4			12	16	11

In terms of when the rainy season began ten years ago, a small majority, 28%, report that the rainy season ended in November, followed by 22% who believe that it ended in October, and 20% who believed it ended in December. 46% report that 5 years ago the rainy season ended in November. This percentage represents a large increase from that of 10 years ago, which suggests that more people believe that the rainy season ended later five years ago than it did 10 years ago. Most respondents believe that the rainy season of 2011 would end in November (30%) and 20% believe that it will end in January, later than five years ago, although there is not a significant difference from 10 years ago. The conclusion is that people believe that winter is beginning one month earlier compared to 10 years ago, but there is not much change in perceptions of when the rainy season ends; this means a shorter rainy season is perceived by the respondents.

I was able to find data on seasonal average precipitation only up to 2000, and thus was unable to verify if the farmers' perceptions of shorter rainy seasons correspond with physically measured rainfall. In addition, the closest weather station with this data available online was 309 kilometers away from San Ramón, and would not have reflected the reality there in any case. If perceptions indeed reflect actual changes in precipitation

patterns, then further research would be needed on what the real effects are on water availability for irrigation. For the purpose of this study, the take-away point is that the perception of a shorter rainy season may affect farmers' decision making in terms of what they produce and when, and the amount of risk they are willing to assume.

Strategies to cope with drought and environmental degradation

Perceiving that the rainy season begins later, people now feel more vulnerable to drought and lack of access to water. The strategies used by the families to cope with the perceived drought are focused on measures to protect the environment and guard against drought. This has implications for how families irrigate crops, especially if they decide to pursue a food security strategy like crop diversification into vegetables, which requires increased availability of water for irrigation.

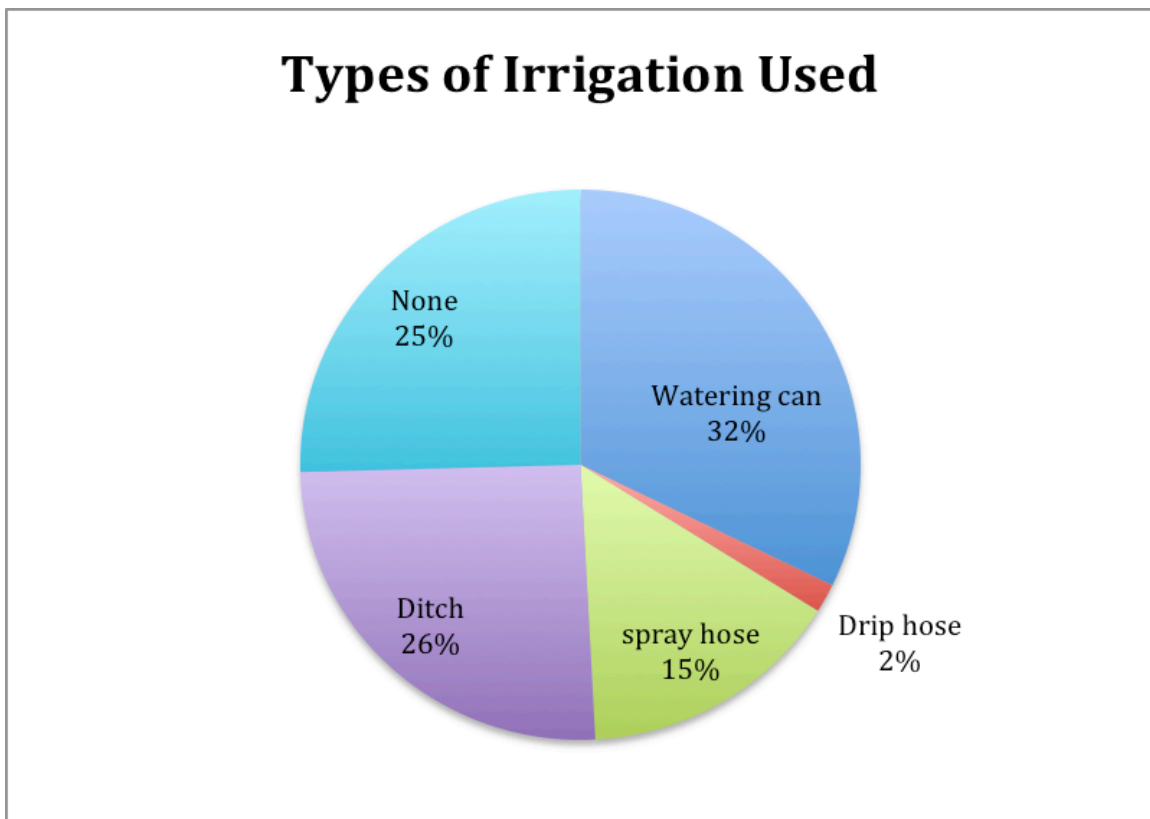


Figure 37: Types of Irrigation Used

Most households do not irrigate corn and bean fields, but those that have vegetables must irrigate them during the dry season, and some resort to irrigating their corn and beans only when there are extreme dry periods. Distances from homes to fields range from 10 to 2000 meters, with the Ramón García cooperative having the highest distances, and the main water source for irrigation there is the river. The fields of Silvio Mayorga Cooperative lie an average of 250 meters from homes, and most families surveyed in this cooperative use hand watering cans to irrigate plants when needed; the main water source for irrigation in this cooperative is also the river. Given this fact, and the fact that river water levels are likely to decrease with shorter rainy seasons, it is imperative that other strategies be sought to restrict water use even as production levels increase or diversify; strategies such as increasing the usage of drip irrigation (only one household surveyed utilizes it, according to Figure 37), as cited by participants as a desired food security strategy, can increase food availability as well as not have a heavy impact on burgeoning water supplies. Participants also cited other strategies that they would like to implement more widely to mitigate drought in their communities, as shown in Figure 39. It is important to note that the desired strategies mentioned by participants are long-term mitigation strategies, which demonstrates a clear understanding on their part of the relationship between trees, shade, and groundcover with preserving water sources.

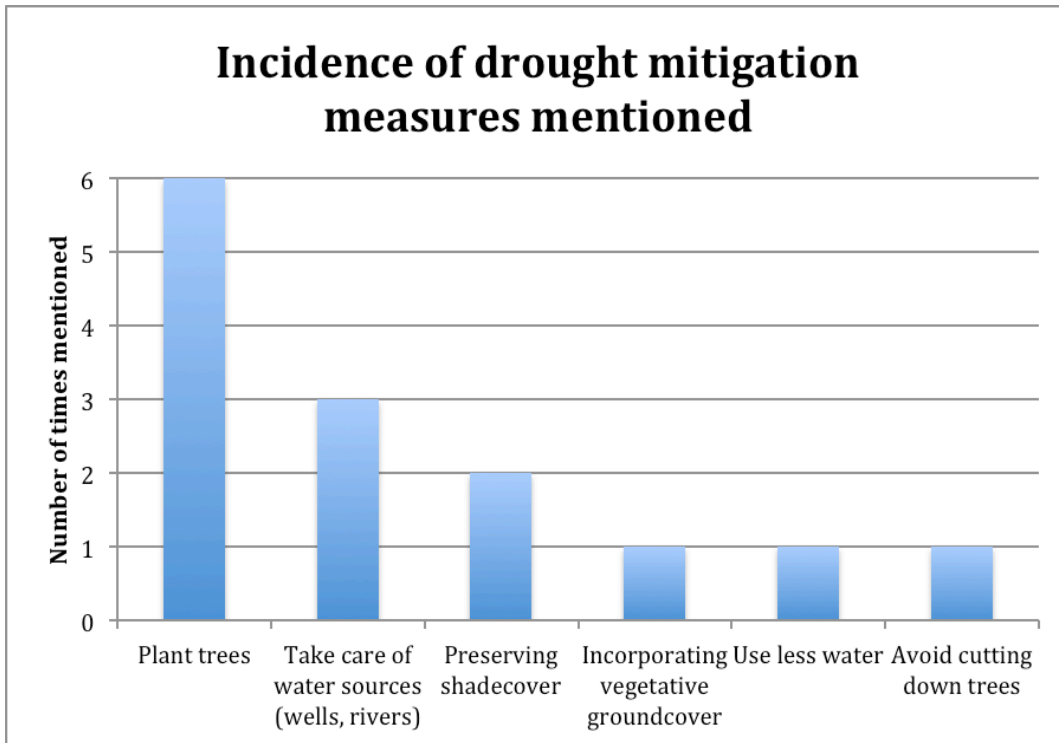


Figure 38: Incidence of Drought Mitigation Measures Mentioned by Respondents

The perceived intensification over time of the dry season also makes efforts at mitigating environmental degradation in the cooperatives and surrounding areas more critical; even farmers perceive this to be true, and the UCA San Ramón has had an ongoing campaign at the community level to promote reforestation and discourage the clearing of forests and other destructive environmental practices in an effort at preserving clean and accessible water sources for the communities. Figure 40 shows the environmentally protective measures like reforestation, not burning, community clean up, cultivating without chemicals and others that workshop respondents mentioned were important. Stopping of the burning of plastic was another measure that was mentioned. Although families understand that burning plastic is environmentally harmful, the only other option for removing this plastic waste is to bury it, which is more harmful and can

contaminate water sources as it degrades over time. The data show the wealth of knowledge that exists within the community.

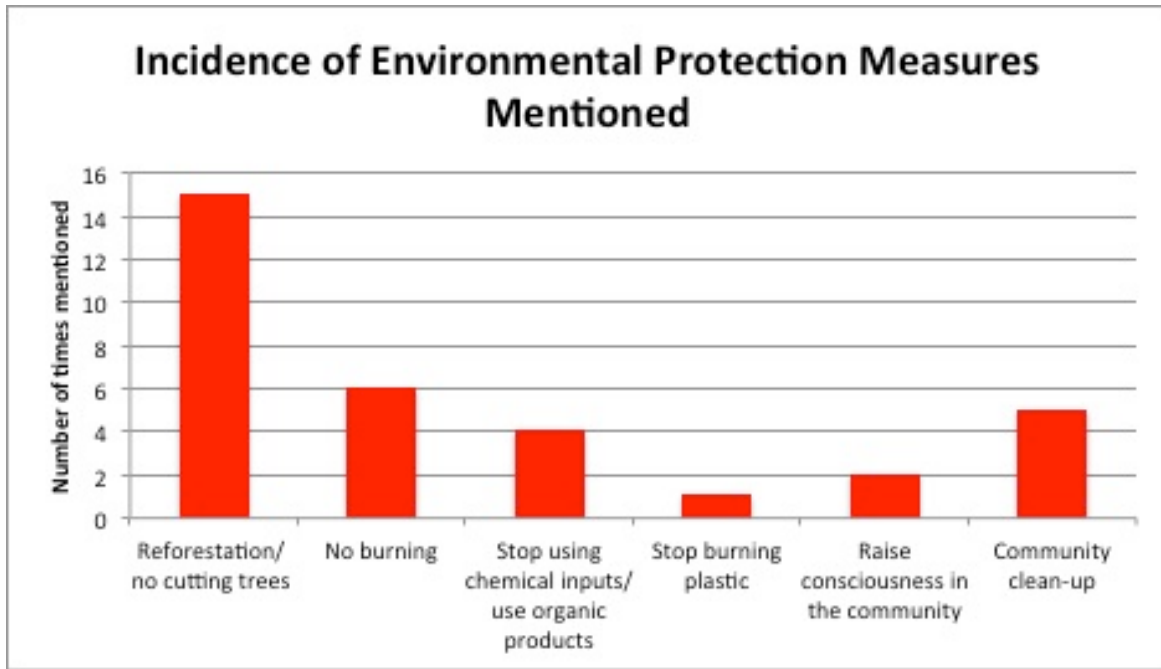


Figure 39: Incidence of Environmental Protection Measures Mentioned

5H. Youth Leadership in the Cooperatives

Youth leadership is critical to long-term food security. Youth will carry forward the cultures of farming and healthy eating, and they will be the social and economic actors in their families and communities in the years to come. Creating pride in being *campesinos*, but at the same time creating opportunities for youth to have comfortable and fulfilling lives in which their needs and desires are met, is the two-fold strategy that CAN and the UCA San Ramón’s Youth Leadership and Food Sovereignty Project aims to promote. This does not involve creating a romantic dream of being a farmer, which the youth in these cooperatives very clearly understand has not brought their families out

of poverty and need; instead it involves the youth looking at how to join farming with other skills they can learn in the project as well as in other engagements in their communities.

Leadership begins with engagement and ownership in local organizations. Youth participation in their communities and organizations has been extensive. From the focus groups and interviews carried out with young people of the cooperatives, the participation rate is around 53%, depending on how many young people participate in an activity. The most common ways that young people participate include being promoters at the UCA San Ramón, in its community health campaigns, environmental education campaigns, and also with the present food security project, in which they act not only as community researchers, but also as farmer-educators. One important activity that began in May 2011 parallel to the implementation of this diagnostic study was working with families in the planning and planting of family gardens as part of CAN and the UCA San Ramón's Youth Leadership and Food Sovereignty Project. This project is dedicated to planting fruit tree nurseries and vegetable gardens to ensure long term supply of diverse fruits, and a higher diversity of food available for consumption, especially vegetables. Youth leaders are key actors in the project, acting as the direct links with their cooperatives. They promote gardens and support the beneficiary families in their garden management and the implementation of agroecological technologies such as compost and fertilizer production. They also work with the families to put on the new Mercado Campesino (farmers' market) in the municipal seat of San Ramón, where families can now bring their excess produce twice per month to sell and earn extra income. Learning outcomes and personal

changes among the Youth Leaders have been positive, as evidenced by these quotes from participants:

- “I have learned through practice how to manage gardens and nurseries, pest management, knowledge that I did not have before,” promoter from Simón Bolívar Cooperative.
- “I learned how to make organic fertilizers and how to make compost, the importance of grafting fruit trees, to have confidence in the people in my cooperative, and to meet promoters in other cooperatives,” promoter from Sofio Sánchez Cooperative.
- “All of this knowledge has helped me with work at school and in garden plots as well as work with women, men, and children in my cooperative,” promoter from Amigos de Bonn Cooperative.

Learning agroecological techniques is a highly valued set of skills for the youth promoters interviewed because they give the youth the skills and knowledge to solve problems such as the diversification of production and soil conservation and pest management techniques. Most of the young people say that a lack of time is an important factor for not participating more. Most of their time is spent doing farm work, housework, and studying.

Other opportunities with the UCA San Ramón include volunteering at training workshops in the communities and taking formal leadership positions in their cooperatives. Community leadership opportunities cited include belonging to a community youth group, and belonging to the youth group of the organization DESAFIOS. Furthermore, as they are the children of members of the cooperatives, young

people are involved in meetings and activities of the cooperatives to which their parents belong.

However, looking at the education statistics, only 41% of individuals under the age of 36 are currently studying. This alarmingly low percentage is due to a lack of economic resources necessary to pay for transportation and university tuition. Due to this, most of the young people leave high school and do not feel motivated to go back. Furthermore, the economic needs of family require young people to work more on the farm, as young people represent the cheapest and most efficient source of labor for families. It also necessitates in some cases that youth leave their communities to find wage labor in nearby cities, other parts of the country, or outside Nicaragua. This can become a vicious cycle promoting persistent poverty.

Outmigration and its Impacts

Outmigration from the communities of the cooperatives has been low. Of the 59 surveyed households, only eight families reported that some of their family members have emigrated, as shown in Table 28. Only three of the eight cooperatives reported that someone from one of the families of the cooperative emigrated. We can see that most of those who leave migrate to other departments, like Estelí or Jinotega to find employment. Half emigrate temporarily, half emigrate permanently, and half of those who leave send remittances.

Table 28: Incidence of Outmigration in the Eight Cooperatives

Cooperative	Who migrated	Where	When	Reason	Type	Send Remittances
Sofío Sánchez	2 children	Jinotega	2010	Work	Temporary	Yes
Simón Bolívar	2 children	Locally	2009	Work	Temporary	Yes
Ramón García	1 child	Esteli	2002	Work	Permanent	No
Ramón García	2 children	La Dalia	2000, 2003	Work	Permanent	No
Ramón García	4 children	Local	2010	Work	Temporary	No
Ramón García	2 brothers	EEUU, Costa Rica	2009, 1992	Better life	Permanent	Yes
Ramón García	1 child	Local	2002	Work/study	Permanent	No
Ramón García	1 cousin	Costa Rica	2009	Work	Temporary	No

It is also important to note that most of the young people do not want to emigrate. Their family and the farm give them enough to do. “My work always keeps me at home and I do not want to migrate. I have three friends who left to work because there were no other alternatives in the community,” said one young person from Amigos de Bonn.

Although most of the young people do not want to leave their homes for a long period of time, many understand the need to leave to find other opportunities to earn more income. “I migrated to Managua to find work to buy clothes, food, and to help my family,” said one young person from Ramón García. “I think it is better to migrate for a better life,” said another from Danilo González. About 54% of the young people interviewed or who participated in the focus groups have a positive view of migration, or are willing to emigrate. A factor that could increase the need to emigrate for them is the lack of available land in the communities for production. In fact, this means that it will be very hard for them to be farmers and continue living in their communities, and also be members of the same cooperatives.

Perspectives of Young People about Rural Life

According to the interviews with youth, we can say that almost all of them prefer rural life to urban life. The main reasons for this are: they prefer to work on the farms and produce the food that they eat; they do not need to buy water or firewood; they can sell what they produce; they like the fresh air and the ambiance created by the people in the communities. Some also say that life is beautiful because they can work when they want. One young person from Sofío Sánchez said “Rural life is as beautiful as can be. It is quite flexible because one can work when they want. We are very much used to what there is. Not everything is easy – sometimes there are gains and losses, but it is more comfortable.” Other youth also say that life is difficult because when there is no work or harvest on the farm, they have to work for other people.

5I. Summary of Findings: Dynamics of Food Insecurity in the Eight Cooperatives

The households surveyed in the eight cooperatives have equal gender distributions among the age groups. However, the gender distribution shifts from favoring females to males from the first age group to the second. Three of the cooperatives (Amigos de Bonn, Silvio Mayorga, and Sofío Sánchez) do not have electricity; these three cooperatives are among the five that until recently were isolated by lack of vehicle-accessible road to the communities in which they are located. In the three most accessible cooperatives (Danilo González, Denis Gutiérrez, and Ramón García), the vast majority of households surveyed have electricity. 51% of households have potable water sources, while the other half of the households surveyed obtain household water from private wells, public wells, or the local river.

Average education levels are low, with most of the population not completing primary school. There is a correlation between education levels and access to transportation to the municipal seat in San Ramón where the high school is located; those four cooperatives (Silvio Mayorga, Simon Bolivar, Sixto Sánchez, and Sofío Sánchez) with historically less access to roads and transport services have the lowest overall levels of education among the population surveyed. Amigos de Bonn Cooperative was also physically isolated by the lack of a good road, but through its relationship with its sponsoring sister-city organization, received regular assistance and experienced more development and engagement with the UCA San Ramón as well. The four cooperatives' relative isolation has resulted in little assistance, which is correlated not only to low levels of education, but also low levels of production, and low levels of implementation of best practices in agroecology, food usage, and dietary diversity.

Seven of the eight cooperatives are located in the wet zone and dependent on coffee production for income at varying degrees; Ramón García cooperative is the only cooperative situated in the dry zone and that is almost exclusively dependent on basic grains production and some milk production. This difference in environment and production means there are different sets of problems that create situations of seasonal hunger and food insecurity in Ramón García than in the other seven cooperatives. What they all have in common is that they are all experiencing seasonal hunger, lack of dietary diversity, and challenges related to achieving year-long household provisioning and food security in the face of weather and economic shocks and environmental degradation.

Length and Severity of the Thin Months

The average length of the thin months among all of the households surveyed is 4.63 months. In all cooperatives, the most severe months are June and July, which correspond with the height of the rainy season and the period when the previous year's basic grains harvest has been consumed and the current crop is waiting to be harvested in August-September. There does not seem to be a direct correlation between the length of the difficult months and the duration of basic grains harvested, indicating the influence of other factors causing scarcity and the inability to provision the household with these basic foodstuffs during the entire year. However, the cooperatives with smaller periods of household provisioning from basic grains harvests also experience more severe thin months. There is a correlation, however, between the price of food and the period of scarcity, especially its more severe months of June and July; food prices rise markedly in July of each year, corresponding to the height of the thin months. This corresponds with the results of a food security study performed in 2010 by CAN in Las Segovias, Nicaragua (unpublished).

Availability and Access to Food

Overall, parcel sizes, overdedication of land to coffee production, and the type of land available to farm limit availability of basic grains. Income from coffee, wage labor, or the sale of other products (in the case of Ramón García Cooperative, basic grains and milk) is used to purchase basic grains and other foodstuffs (including vegetables and protein). The differentiated access to land among the cooperatives affects production volumes of basic grains and coffee, as well as production diversity, since the cooperatives with less land can produce less food and less varieties of food. Furthermore, some

households (particularly those of Simón Bolívar, Sixto Sánchez, and Sofío Sánchez) do not grow basic grains and instead focus on coffee production. The result is low food resilience among these households as they are almost completely dependent on income from coffee to buy basic foods and eat. The fact that high food prices generally coincide with the most severe thin months (when families will be purchasing grains), means that families are paying high prices to meet their needs, which lessens their access to this important staple in critical moments.

Coffee production and basic grains production are inversely related, which is consistent with the findings of past research on coffee smallholders and food security (Caswell et al. 2012). Higher dependence on coffee does result in lower amounts of land for food production, but does not appear to directly result in longer periods of scarcity. Whether a household produces basic grains or not is related to small parcel sizes, which limit the amount of available land for growing basic grains. However, regardless of the size of the landholding, balanced dedication to two or more crops for food and/or income leads to longer periods of household provisioning, whereas shorter periods of household provisioning is linked to overdependence on a single cash crop, be it coffee or basic grains. In addition, household size matters, and higher household demand for food grown for household provisioning can create shortages earlier in the year, resulting in longer periods of scarcity. The amount of basic grains produced is also limited by the dry season and the lack of access to irrigation to be able to produce during two seasons of the year. Households in most of the cooperatives (except for two) have to buy basic grains to supplement what they produce and reduce their dietary intake to adjust to shortages.

Another factor is the terrain: the more extreme slopes present in these communities make it hard to farm as well as difficult to maintain the quality of the soil due to erosion. Simon Bolivar, Sixto Sánchez, and Sofio Sánchez Cooperatives are also almost exclusively dependent on coffee sales for income. Coffee is sold once per year, and when we take into account that these three cooperatives suffered the shortest period of thin months but also the most severe, we can conclude that the income they earn from coffee only allows them to buy grain to complement what they have produced, to fulfill their needs for about nine months; they are still without sufficient food for three months of the year. Financial cycles aggravate the situation as well; households must often take out high interest short term financing to fund the planting of basic grains, and they pay back the loans when grain prices are the lowest (when they are selling them); the perceived loss as well as high interest rates may influence how much they plant and harvest.

Most households store basic grains in plastic or jute sacks and, in very few cases, in small metal silos. The lack of hygienic infrastructure contributes to the loss of precious stored grains to molds and rodents. Very few households possess the knowledge of how to select, store, and use vegetable seeds. With respect to basic grains, people save these seeds, but in many cases they do not save enough seeds to cover what they want to plant due to the need to consume it during the thin months, or the need to sell it for income.

In terms of access to a wider variety of foods, only 11 of the 59 surveyed households have a garden or plot where produce is grown, and protein production is limited to eggs from hens. This indicates low availability of fresh and diverse foods at

the level of the home, and the need to use cash to purchase those foods. It is also true that fruit sales are a potentially larger source of income.

Food Use and Consumption

Most food produced is for household consumption; very little of it is sold for income. Apart from coffee, 82% of households do not sell any of what they produce and those that sell some foods sell them mostly at the municipal market, and this indicates that those food products that are sold do not stay in the same communities where they are produced, reducing access to those foods locally. Only two cooperatives have a significant percentage of families that sell what they produce: Amigos de Bonn, in which 38% sell less than half of what they produce, and Ramón García, in which 57% sell less than half and over 20% sell more than half. These cooperatives mainly sell corn and beans. Farmers do not have many options in terms of where to sell what they produce. Due to the low volume of production, many families do not have the power to negotiate prices and have to adjust to market prices. Local markets are not well developed and are often dominated by *coyotes* who control prices via their monopolies.

Diets are limited to basic staples that provide calories but are deficient of critical nutrients. Moreover, basic knowledge has been lost over the last generation of different varieties of food preparation that would make a more diverse diet more accessible and interesting. The general conclusion from the analysis of dietary diversity and the consumption of traditional dishes is that the daily diet is highly dependent on rice, beans, and tortillas, with little consumption of vitamin-rich plants, vegetables, and fruits, and insufficient intake of protein-rich foods. This can be attributed to a mixture of loss of knowledge of food preparation, and lack of access and availability of those foods, as seen

in the analysis of production diversity, vegetables are produced in very small amounts in most of the cooperatives, and as seen in the analysis on income generation, most income comes once per year when coffee is sold, and any credit that is taken out is used to buy seed and basic grains. Thus there is very little money to purchase vegetables that come from outside the community. There is also a cultural preference of not eating vegetables that further aggravates a lack of availability of locally produced vegetables in some cooperatives. The lack of consumption of fruit is credited to the high amount of work that is required to gather and prepare it, as the preferred preparation is as prepared fruit drinks, according to statements in focus groups. Overall, compared with the amount of different foods available, very few foods are being consumed.

Disaggregating the dietary data by cooperative shows significant differences. Ramón García Cooperative, which has the highest amount of basic grains and milk production, has the highest proportions of dairy and eggs in the diet, but falls just above average in vegetable consumption. In contrast, Silvio Mayorga Cooperative has the highest proportion of basic grains consumed, and is among the lowest of protein consumption, along with Simon bolivar, Sixto Sánchez, and Sofío Sánchez Cooperatives. Silvio Mayorga has critically low levels of vegetables as part of its diet, and all but Denis Gutiérrez Cooperative fall well below the guidelines for vegetables and fruits in the diet. All but Ramón García fall well below the recommendations for protein intake. Overall, Silvio Mayorga Cooperative has the lowest dietary diversity.

Food Self Sufficiency

Given the overall high dependence on purchased food, it is obvious that income from other activities is critical to households' ability to meet their food needs year round.

This raises questions of how vulnerable households are to price fluctuations of the products or services they sell. However, there is both high availability of, and access to, a variety of nutritious fruits at the level of the cooperative, but it is clear people do not take full advantage of this resource.

Biological Advantage

To reap the maximum benefits of the food that is available and accessible, a healthy physical environment is necessary that includes access to clean water and basic sanitation. If these conditions are compromised, then people are subject to intestinal parasites and other infections that can compromise their ability to benefit from food. We saw in the first section of this chapter that only half the households surveyed have access to potable water. Those that depend on river water for household water are subject to contamination that can affect their health. Very few households have indoor flush toilets, the majority depending on outdoor latrines. Finally, the majority depends on wood-burning stoves, which are known to cause heightened levels of lung problems especially among women, since they are the primary preparers of food.

Agroecological Production Systems and Practices

Limited use of appropriate technology, including agroecological practices, prevents an increase in the quantity and quality necessary for the diversification and intensification of food production first for consumption and secondly to sell for income. Overall, levels of implementation of soil conservation practices are very low, especially in the four cooperatives most isolated from the UCA San Ramón. There are very low levels of implementation of organic fertilizers among all of the cooperatives. The most commonly used fertilizers are 15-15-15 and urea, which are applied on most coffee

plantations. Around one-third of them apply these chemicals to their crops, but according to the surveys, 43 households report using an additional chemical for a combined cost of C\$293,054 each year. Few families make organic fertilizer on their land, as coffee pulp is more common. This may indicate a lack of knowledge about how to make organic fertilizers. In focus groups, participants noted as the main barriers to using organic fertilizers the high amount of labor involved, and a lack of specific knowledge of how to produce compost and organic foliar sprays (biofertilizer liquid). A large majority of the farms do not have irrigation systems and are only able to harvest basic grains and produce during one season of the year.

Extreme weather shocks have an impact on household livelihoods, as sometimes there is sufficient rain for a good harvest and at other times too much rain and this damages the harvest. Families believe that levels of fog have declined over the last ten years, which they perceive as indicators of warmer temperatures, prolongation of the dry season, and higher likelihood of damage to the harvest. Furthermore, most believe that the rainy season is beginning and ending later than it did 10 years ago, a change that is perceived to be the result of global warming. Farmers understand that adapting to climate change can positively impact their ability to survive and thrive, and this affects the kinds of risks they are willing to take in terms of what to plant and what not to plant.

Food Security Strategies and Coping Mechanisms

Currently families employ a combination of short term coping mechanisms during the thin months and long-term strategies to ensure food security during the year. Most of the actions currently implemented are emergency coping mechanisms that provide some immediate relief during the thin months. Almost all households have to buy food to meet

their needs. But the need among the families varies considerably: one third buy more than half of their food, one third buy less than half, and one third buy all their food. The measures most employed by the families to cope with shortages are wage labor, bartering or trade of products, short-term loans, and eating less food. The most severe mechanism that households resort to is to reduce their daily food intake.

The households surveyed have an extensive list of long-term strategies, some of which they are currently implementing, and others that they would like to in the future, to reduce the impact of the thin months on their families. Strategies that participants found to be best practices that they would like to implement in the future were improvement of soil fertility and water management, installing irrigation systems to be able to produce during more than one season of the year (currently, most farmers only produce during one season), and increasing the diversity of crops produced; all three of these desired strategies resonate with the needs revealed in the data from the surveys as well. Although households are utilizing the strategy of storing basic grains, overall they are not meeting their basic food needs, as evidenced by the fact that they are all experiencing varying lengths and severity of thin months, which are attributed directly to low production levels (due to lack of access to land), short-term financing that necessitates the sale of grain to pay back loans taken out to purchase seed to plant, and the need to sell grains when prices are low in order to pay back loans and other costs of living. The purchase of basic grains is another strategy used when needed to offset this cycle.

But the families express a need and desire to implement long-term measures, like long-term loans, increasing the amount of land that is cultivated, and implementing new technologies to increase production. Participants expressed that a lack of money was the

main reason for not implementing some of these long-term solutions; however, it must also be noted that there is a lack of access to timely and affordable long term financing from the UCA San Ramón and other lending agencies. Financing typically is short term, has an 18% interest rate, and on top of that, families generally need to take out financing right when basic grain seed prices shoot up. This increases the amount of money they borrow to buy grain and seed, while the price they receive when they harvest the grain four or five months later is lower, sending families into a never-ending cycle of debt and loss. This is a problem that can be addressed through access to timely long-term financing as noted in the chart under strategies that should be implemented, or through other strategies, like improving local access to seed for planting through local seedbanks, a strategy that was not actually mentioned by the survey participants, although it was later mentioned by participants in focus groups as a possibility to explore.

The compromised infrastructure of community markets, dependence on intermediaries in regional markets, and the lack of development of local markets and alternatives for selling products locally also prevent the sale of products produced by the families, which largely do not have access to markets or the means of transporting their products. It also limits the availability of locally produced vegetables and fruits in local markets.

The Role of Gender in Agricultural Production and Food Preparation

Women are primarily responsible for household provisioning and food preparation. In some cooperatives, they carry the double burden of food production and preparation, which greatly limits their ability to dedicate time to other endeavors to diversify family income or diet. Furthermore, they are often subject to domestic violence

that breaks up their families, and leaves them as the primary provider for their families, and they overall have less access to education. Women are, given these factors, the most important actors at the household level in terms of promoting food security, and they should be directly engaged with when any solutions are considered or implemented.

Youth Perspectives on Rural Life and Leadership

Young people are involved in activities sponsored by the UCA San Ramón, but very few are involved in their community cooperatives; this, combined with the lack of land available for young people, threatens the potential for them to become active members in their cooperatives. Also, there is a limited presence and involvement of young people in government institutions at the municipal level as well as other scales of governance, which may indicate that the interests of young people of the cooperatives are not being represented in municipal or national policy. The participation of young people in UCA activities and programs is considerable, with more than half of the young people in the focus groups participating as promoters in some activity; however, this number could be misleading because the young people that were interviewed have positions as promoters in UCA San Ramón projects. Youth participation in their local cooperatives is low. Furthermore, the sustainability of youth participation must be taken into account. Most youth who participate in activities do so under the supervision of other organizations and it is not clear if they continue participating in these activities on their own time, nor is the impact of the activities in which they are involved clear. Finally, youth participation in municipal and government level activities is almost nonexistent.

Perceptions of rural life are very positive among youth and contribute to the low level of outward migration from the communities. But it has to be taken into account that

most of the young people do not know what it is like to live in cities, and only can imagine. Furthermore, there is a lack of available land for these young people to acquire for the purposes of production and for the pursuit of a livelihood as productive members of the cooperatives, and, although they have positive perceptions of rural life, the young people have little future as farmers unless they can create livelihoods that allow them to live in their communities while still earning enough money to acquire those things they want.

Preservation of Indigenous Knowledge

In discussions of both production/agroecology and food preparation, traditional knowledge has been lost in the last two generations, and this has limited the strategies people can choose from to improve production, preparation, and consumption of food. On the other hand, local knowledge has become a hybrid of traditional knowledges and knowledges brought from the outside, and that men and women adapt and combine the different knowledges to create hybrids appropriate to their realities. Any strategies proposed to improve food security in these cooperatives can consider appropriate technologies wherever they originate from, instead of being limited to either romanticized “traditional” technologies or pure “Western” technologies.

...

In the next chapter, I analyze the scalar interactions and articulations of all of the data considered in this chapter, and examine the proximate and structural causes of food insecurity in the eight cooperatives.

Chapter 6

Discussion and Conclusions

The Relationship between Food Insecurity and Coffee: Proximate and Structural Causes and their Implications

Previous research established that food insecurity and reduced food resilience among smallholder coffee farming families are related to overdedication of available land to coffee production, resulting in economic overdependence on a single source of income as well as low food production at the farm level. This was argued by Caswell et al. (2012) in their review of the existing literature on food insecurity in coffee lands. Some of my findings agree with this conclusion, and others add complexity and scalar dimensions to this explanation. In this chapter I lay out my results and contributions to existing knowledge in two major arguments: first, the “chain of explanation” (Robbins 2012, 8) of why food insecurity and seasonal hunger exists among smallholder coffee communities is more complex than a simple inverse relationship between coffee production and food production; second, this chain of explanation cannot be reduced to the scale of the farm, community, or cooperative but must include structural factors in any strategy proposed to alleviate food insecurity or seasonal hunger in coffeelands.

My findings confirm that coffee production and basic grains production are inversely related, which is consistent with the conclusion that overdependence on coffee as the single cash crop reduces families’ ability to grow food for consumption and increases their vulnerability. The specific relationship among the factors of access to land (especially for young people who were children during the Nicaraguan Agrarian Reform in the early to mid-1980s and have since come of age and formed families),

production of basic grains only during one season, and lack of production diversity (almost no vegetables and little protein production) require special attention.

It was expected that high dependence on coffee as a once-yearly source of income to buy food, combined with less land dedicated to food production, would result in increased periods of scarcity. Higher dependence on coffee is related to lower amounts of land available for food production, but does not appear to directly result in longer periods of scarcity. Whether a household produces basic grains or not is indeed related to small parcel sizes, which limit the amount of available land for growing basic grains. The counter example that suggests that other factors are important elements in food security is that even Ramon Garcia Cooperative, which produces almost no coffee, still experiences severe periods of scarcity. Even selling about 50% of the grain it produces, it is not able to meet its needs, indicating that the problem for this cooperative may lie with finance cycles and the dependence on a grain market where prices are very low when the moment to sell comes, and families must sell a higher proportion of their grains to earn the cash they need. This cooperative also still has low dietary diversity, even though its consumption of protein is higher.

However, regardless of the size of the landholding, balanced dedication to two or more crops for food and/or income leads to longer periods of household provisioning, whereas shorter periods of household provisioning are linked to overdependence on a single cash crop, be it coffee or basic grains. The implication of this finding in particular is that production diversification is critical to increasing local availability and access to enough basic foods.

Other proximate factors identified as contributing to household food insecurity are:

- Loss of local knowledge of seed selection and saving
- Lack of hygienic seed storage infrastructure
- Loss of knowledge of how to prepare and consume local vegetables and fruits
- Lack of access to markets for diverse products
- Low levels of education that inhibit innovation that would increase productivity or other economic opportunities
- Lack of access to road and transport infrastructure
- Lack of water to irrigate during the dry season (limiting production to one season and limiting vegetable production)
- In some cases, gender inequity that limits women's ability to provision their families (since they are assuming multiple roles as head of household)
- Short term finance cycles that are high cost and high risk for farmers.

A complicating fact is that even in the households where a diversity of fresh fruits is available, very little fruit is consumed. This implies that attention must be paid to revitalizing consumption cultures especially in relation to fruits. Vegetables are also rarely consumed, and this is related in part to the fact that they are hardly produced within the cooperatives. The implication is that any strategy must include not only promotion of production at the household level but also education about how to consume vegetables and create new cultures of consumption.

The findings also support the argument that any solution must move away from the moment of time when coffee income is received (as is the focus of Fair Trade), and

refocus on what happens during the entire year. The calendar of when households must manage these different factors is critical as well, as shown in Table 29 and which further demonstrates the complexity of household food insecurity. Addressing all or some of these proximate causes in combination can arguably increase households' food security in the short and long term.

Table 29: Calendar of Production, Finance, and Coping Mechanisms

	Event	January	February	March	April	March	April	May	June	July	August	September	October	November	December
	Avg. Coffee harvest duration														
	Rainy season														
	Avg. thin months (4.63mo)														
	Highest food prices														
	Lowest food prices														
	Plant grains and gardens														
	Harvest grains and gardens														
	Average duration of food harvest														
Coping mechanisms	Limit diet to basic foods														
	Skip meals														
	Borrow money from relatives to buy food														
	Take out credit from local store or coop. to buy seed or food														
	Sell grain to pay back credit														
	Take out credit to fund coffee harvest														
	Pay back coffee credi														

I would argue that we need to move beyond this and shift our perceptions of smallholder coffee farmers (and their perceptions of themselves) as simply coffee farmers, to actually reflect the fact that their household economic activities are numerous and also involve much more than agricultural production: these families are coffee farmers, but also producers of basic grains, fruits, and milk, as well as providers of tourism services, and wage labor off-farm. Taking into account the reality of these households' diverse livelihoods in the process of developing strategies will arguably be more effective at relieving the problem of seasonal hunger, but that remains to be verified over time.

Another factor to consider is the variability of the dynamics of food insecurity among the cooperatives, and that the severity of insecurity is also variable among them. There are key critical distinctions among the eight cooperatives that differentiate how they experience food insecurity and how their food resilience is affected. Given the data and the differences among them, I divided the cooperatives into two groups: most food insecure and least food insecure, shown in Table 30.

Table 30: Most and Least Food Insecure Cooperatives

Groups	Cooperatives	Some Key Characteristics
Most food insecure/least resilient	Silvio Mayorga, Sixto Sanchez, Sofio Sanchez, Amigos de Bonn,	Highly dependent on coffee production, low levels of GB production, low production diversity, most isolated, lack of access to irrigation, low education levels.
Least food insecure/most resilient	Ramon Garcia, Denis Gutierrez, Danilo Gonzalez	More diversified production, closer proximity to municipal seat services, and UCA San Ramon, higher levels of education, less intense thin months.

Out of the eight cooperatives, Silvio Mayorga has the least food security and the lowest level of resilience when faced with extreme shocks. The households in this cooperative have a substantially higher proportion headed by women than the other cooperatives, due to high levels of domestic violence within the families, in which the men have subsequently abandoned the women and children in their households, leaving the women to assume multiple overlapping roles in their families and communities. Silvio Mayorga also has the lowest number of months provisioned by the basic grains harvest, the lowest levels of education, the lowest levels of production, the least production diversity, the most intense thin months, the longest distance (and worse road) from the municipal seat where all services are located, and the lowest occurrence of basic services in the home, including running water. I as a researcher would recommend differentiated strategies to these two groups of cooperatives that integrate the local dynamics as well as local knowledges and practices of each cooperative.

Even given the complex story of the interrelatedness of coffee and these other factors in contributing to food insecurity, the role of coffee cannot simply be dismissed or underemphasized: farmers and their families are subject to wide price swings that periodically threaten their livelihoods when prices fall below the cost of production, as they did during the 1999-2003 coffee crisis. Dependence on income from coffee to purchase food and other basic needs on the one hand allows farmers to access those foods, but on the other it can be argued that it also increases their vulnerability to price swings, coffee plagues and unusual weather events. Any solutions that are promoted must be combinations that address coffee production and income, basic grains production, production diversification, access to water for irrigation, the creation of good food

preparation and consumption habits and cultures, and agroecological practices that will preserve the means of production (quality of land) over time for both food and coffee production.

Structural Causes and the Chain of Explanation

The proximate causes discussed above can be more readily addressed than the structural causes that affect these families. Households and cooperatives are vulnerable to four major structural factors that influence their behavior at the local scale and their ability to respond to their own needs: cyclical food prices, extreme weather events, volatile coffee prices, and the persistence of the culture of Green Revolution technologies.

Smallholder coffee farmers are buffeted by volatile global coffee markets that swing periodically between high and extremely low prices and that threaten family stability, the ability to fully provision a family during the year, and community wellbeing, as established by Caswell et al. (2012) and discussed in Chapter 1. They are doubly hit by speculation on the grain markets at the national and international levels that send prices spiraling downward at the moment of sale, then shooting upward when farmers must purchase grain for food or planting, or take out credit for these activities. Farmers are restricted by their inability to fully engage with these markets as aware participants due to the lack of information or awareness of where to get market information. Instead they must rely on intermediaries (including the UCA San Ramón) to purchase their crops or the grains they must buy. Communication infrastructure that would allow farmers to make themselves aware in real time as to basic grains and coffee prices would permit them to sell or buy at the most optimum moment. The UCA San Ramon, as a second-

level cooperative, has worked to provide a more just and transparent bridge to markets for basic grains and coffee (and most recently, milk), but the cooperative still is restricted to paying farmers local market prices for these products as they fluctuate, as a risk management strategy. However, this is still a great improvement over the prices that middlemen pay or charge for buying or selling these products.

Extreme weather events are perceived by farmers to be related to climate change, and these events are considered the single greatest factor affecting their ability to be resilient. The main reasons are that there is little physical or organizational infrastructure to prepare communities or cooperatives for the loss of their crops due to rain, and no risk management strategies at those levels either. Examples of such strategies would be local grain and food distribution centers that maintain a secure local food supply, local seed banks that can serve the function of allowing farmers to easily replant their basic grains if their crops are destroyed by weather events, and emergency evacuation plans. I argue that risk management strategies such as these that increase resilience and the ability of families and cooperatives to respond to such conditions are as important to creating food security at the family and community level as is increasing or diversifying production to increase availability of foods at the local level. The basic grains harvests of 2010 and 2011 were so negatively affected by torrential rains that it is imperative that any strategies to alleviate seasonal hunger in these eight cooperatives include weather risk management strategies. Risk management strategies to deal with price swings in basic foods, coffee, and other commodities on which cooperatives, including Ramon Garcia, depend, are also critical.

Finally, it is clear that the long-term impacts of the Green Revolution persist among these cooperatives and within the UCA San Ramón. This was manifested in a number of different ways. At the farm level, widespread usage of agrochemicals has been accompanied by the abandonment of traditional soil conservation and water conservation practices, as well as on-farm fertilizer production. This has resulted in polluted water sources, soil loss over time, loss of soil fertility, and overall environmental degradation. Many farmers have been so inculcated over time into the culture of “progress” (that the chemical companies represent Green Revolution technologies to be), that they believe that traditional or artisanal agroecological technologies are inferior or irrelevant. This is not true across the board, but the belief persists especially among the older generation.

Among youth who have been active in the UCA San Ramón’s environmental education campaigns or youth groups, there is less buy-in to the belief that “modern” technologies are the way to go. However, this story has an irony to it: although the UCA San Ramón has invested personnel and capital in environmental education and capacity building in organic production techniques among its members, it also continues selling NPK fertilizers to its members out of its offices, and its field technicians continue to prescribe the use of these chemical fertilizers to farmers. I noticed over the years a stout resistance among the field technicians to organic techniques and to agroecology; it is clear that the technicians themselves have been trained and inculcated as well into the culture of the Green Revolution, and it is difficult for them to reject all of the training they received in agronomy school. However, this is the contradiction and challenge for the present, and one that the staff and managers of the UCA San Ramón well knew. In

pursuing food security among its member cooperatives, the UCA San Ramon will need to confront its own role in promoting continuing environmental degradation even as it promotes health programs, education projects, and environmental campaigns among its members.

These are the four major structural factors affecting food insecurity that must serve as an umbrella for any way we think about dealing with the proximate causes of food insecurity. Beyond the major structural and proximate causes discussed above, there exist other relationships, politics, and ideas that may contribute to mitigating or worsening the ability of the 59 households studied to be food secure throughout the year, consume a nutritious diet, and be sufficiently resilient in the face of weather and economic shocks. All of these causes and factors are presented in the Chain of Explanation diagram (Figure 40).

First there is the increasingly powerful cultural imposition of transnational food companies who push processed foods, especially on children. The effects of this are evident in children's preferences towards processed snacks often sold in local schools themselves in the communities in question.

Another factor, arguably a positive one, is the Nicaraguan state's increasing interventions in the area of rural food security, often in partnership with international social movements like Campesino a Campesino that are dedicated to strengthening local control over food systems and promoting food sovereignty at the community level (described in Chapter 4). The state's fostering of this movement along with the establishment of government structures dedicated to food security at the national, departmental and municipal scales is promising, though its impacts are uneven; only

three of the Food Security Law-mandated 153 municipal committees – COMUSSAN – are currently active and functioning (San Ramón municipality is among the three), but in those three, citizen participation has been active in the last two years. On the other hand, the state has been woefully unresponsive during the extreme weather events of the last two rainy seasons, and it has done nothing to organize infrastructure to deal with what is perceived by most people I have spoken to in Nicaragua to be increased frequency of weather disasters. However, there are contradictions. The persistence of Green Revolution culture is also evident in the contradictory interventions of the Nicaraguan state in rural areas: on the one hand the Nicaraguan Food Security Law places agroecology in the center of its approach to promote food security, but on the other hand other Nicaraguan state programs deliver chemical production packages to farmers.

A final factor affecting food security is the contradictory nature of the specialty coffee industry. On the one hand, the industry has stepped up to investigate the causes of, and find solutions to the problem of persistent food insecurity in the communities it sources coffee from, and should be congratulated for this step. The coffee industry partnered with the international development industry to focus primarily on production diversification and increased market opportunities at the local level, however, and, as Colleen Bramhall of the Corporate Social Responsibility area of GMCR mentioned to me, the industry needs to be engaging more with the governments of the countries where they work. I would argue that the industry needs to also pay closer attention to the structural causes of food insecurity and engage with its own relationship with these factors. Nonprofit development organizations like CAN also need to engage honestly and openly about their relationships with the factors that contribute or impact rural food

security in Latin America; my salary as a food security researcher and project manager is paid through projects funded by GMCR and the W.K. Kellogg Foundation (the foundation arm of the company that produces the famous Kellogg’s cereal. Kellogg has been criticized for its role in pushing processed foods to children around the world).

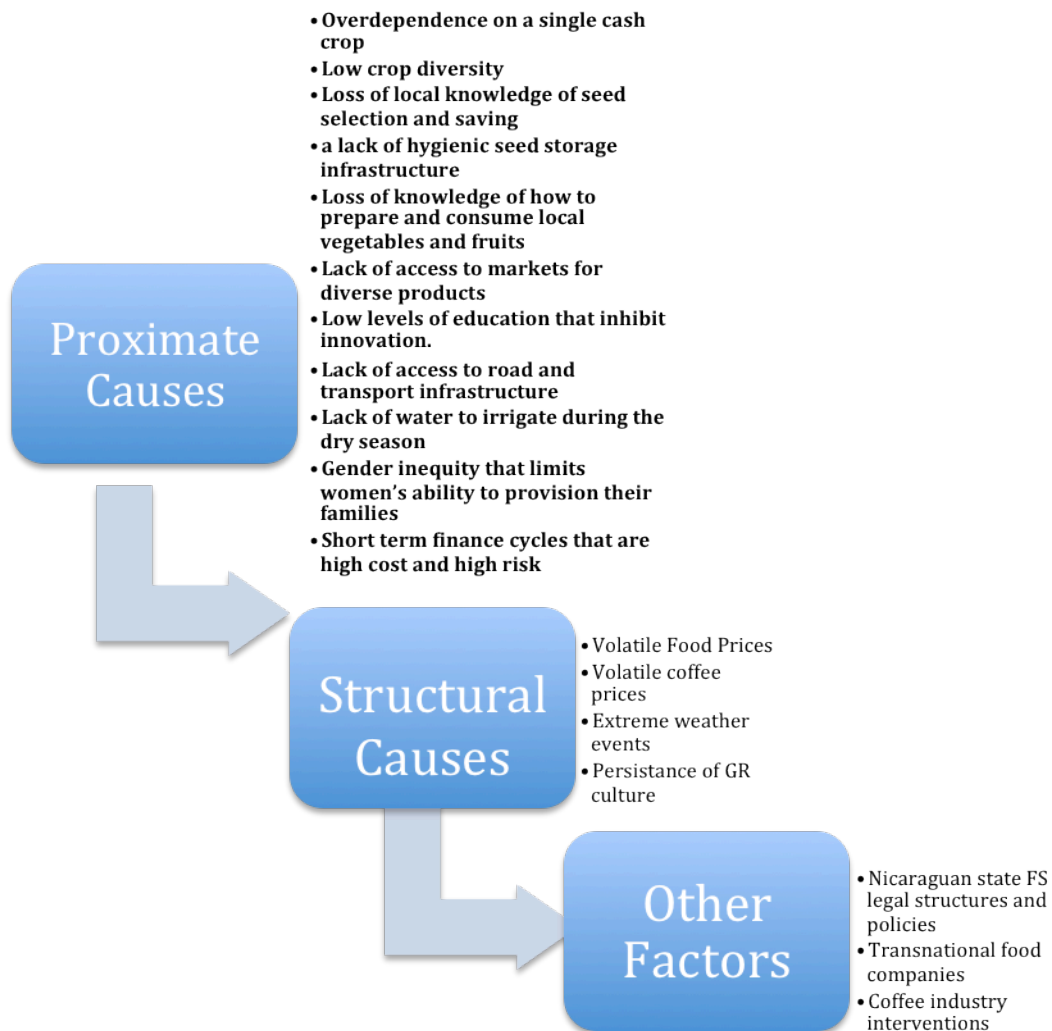


Figure 40: The Chain of Explanation of Food Insecurity in Eight Smallholder Coffee Cooperatives

The Results of the PAR Process and the Chain of Possibility

Results of the PAR Process

The PAR process of this diagnostic study (described in Chapter 3) culminated in sharing back the preliminary analyses performed by Yadira Montenegro and me (the project coordinator at the UCA San Ramón) with the various stakeholders at the UCA San Ramón. We performed five workshops with the Board of Directors and staff of the organization, with the youth leaders as a group, and with the project beneficiaries of the eight cooperatives. In these workshops, participants gave input into interpretations of the data that we offered, sometimes agreeing and sometimes offering alternative interpretations. All of their input was integrated into the final interpretation of the data, the identification of problems and of actions to address the problems.

The original idea was to produce an individual cooperative action plan for each of the eight cooperatives, taking into account their individual dynamics of access, availability, use and consumption of food, but the PAR process in the end resulted not in individualized action plans or strategies, but in a global plan. I believe that this was the result of institutional limitations, meaning that the UCA staff and managers decided after much consideration that managing what would essentially be a separate project for each cooperative would be unfeasible as an organization. The five-year action plan that did result, however, did address in combination all of the problems identified and described in Chapter 5. Moreover, the Board of Directors of the organization voted in 2012 to adopt the five-year action plan as its Food Security Strategic Plan to be implemented

eventually among all of its member cooperatives as needed. Currently we are finishing Year 2 of the Strategic Plan. It is interesting to note that although the management was resistant to individual cooperative action plans, in the actual implementation of the plan, interventions have been individualized informally. Some examples:

- More attention to the women as vulnerable actors in the cooperatives with more women heads of household.
- Focus of irrigation systems within cooperatives with more water issues.

The Strategic Plan is presented in summary here:

Strategic Plan for Food Security and Sovereignty Objective of the Strategic Plan

The fundamental goal is to contribute to the food security and sovereignty of the families participating in the UCA San Ramon project, as well as that of the population living in the rural communities where the 8 participating cooperatives are located. To achieve this goal, we have identified three strategy lines: Production diversification and improvement of agroecological practices to improve availability of foods at the family and cooperative levels; increase access to, and availability of, diverse and nutritious foods, and promote the sustainability of local food systems; and the development of youth leadership in the cooperatives. A transversal axis of our approach is capacity building and strengthening through a participatory action research (PAR) approach that continually feeds back into project implementation through data gathering, analysis, and reflection.

Timeframe of plan

This strategic plan has duration of five years, beginning in March, 2011 and ending in March, 2016.

Desired Outcomes

Desired Outcome 1: Families associated with base cooperatives produce a diversity of foods in a stable and sustainable manner.

Desired Outcome 2: Improvement of production systems through the implementation of agroecological techniques and increased diversification of food crops.

Desired Outcome 3: Improved conditions for storage, usage and recycling of water for human consumption and irrigation to strengthen capacities to produce food during the dry season.

Desired Outcome 4: PAR strategy developed for training, focused on the revival of traditional practices favorable to FSS and the implantation of new practices favorable to FSS, in production, marketing, consumption and usage of food.

Desired Outcome 5: 8 base cooperatives have developed economic initiatives that permit members to access healthy and quality foods at the moment of need.

Desired Outcome 6: Families associated with the project, as well as the community, have diverse new habits of producing and consuming nutritious, diverse, and locally produced food.

Desired Outcome 7: Strong participation and leadership of youth and women in the cooperatives and in political processes in different spaces.

Desired Outcome 8: Strong economic opportunities for women and youth in the countryside.

Desired Outcome 9: FSS strategies and actions are integrated into other programs of the UCA San Ramon.

Strategy Lines

Production diversification and improvement of agroecological practices to improve availability of foods at the family and cooperative levels

- Focus on three production areas: the coffee field, milpa, and the patio. Some cooperatives do not have coffee production, and others depend heavily on coffee production for livelihoods at the cost of other crops, so each cooperative will have a different diversification strategy.
- Expanded production diversification in the patios/parcels to vegetable production, and to increased fruit production in coffee shade. This will expand upon efforts in the first two years.
- Among families with the land to do so, expansion of basic grains production and expansion of production to two planting seasons from only one. The irrigation systems installed during Year 2 of Phase 1 laid the foundation for initial expansion efforts.
- Improve capacity and knowledge among families around agroecological and traditional production techniques, including soil and water conservation, making fertilizers, etc.
- Improve the capacity of the technical staff at the UCA to provide technical assistance to farmers and youth promoters on agroecological farming techniques.
- Expansion and diversification of production aimed first at family consumption and secondly for sale in local and alternative markets.
- Improve access to uncontaminated water for family consumption.

Increase access to, and availability of, diverse and nutritious foods, and promote the sustainability of local food systems

- Improve economic access in rural communities to basic foods and vegetables through local markets for excess garden produce from participating farms.
- Creation of mercados campesinos and/or trading centers in the cooperatives to sell produce within cooperatives, among the cooperatives, or in the wider region. One strategy within this might be to exchange produce between the wet and dry zones, since they produce different varieties of foods.
- Storage & Distribution Centers (modeled after the CADAs in the Las Segovias project) can serve to maintain lower prices for basic grains throughout the year.
- Establishment of seed banks for basic grain and vegetable germoplasm at the cooperative level, to diminish families' dependence on bought or "gifted"

seeds, and at the same time assures the usage of locally appropriate and heirloom varieties. This strategy will include training of the families in selection and storage techniques, as well as the founding of cooperative-level seed banks, and the development of local administrative capacity.

- Building awareness around, and the implementation of practices of, vegetable seed selection and storage, and then develop mechanisms for seed exchanges among families, cooperatives, and in the community, to improve community-wide access to culturally-preferred vegetables and their seeds.
- Build the capacity of the technicians and staff of the UCA San Ramon to promote agroecological and traditional techniques, and to facilitate positive social changes in the cooperatives.
- Transform habits and techniques of food usage, preparation, and consumption.
- Revival of traditional recipes and food usage techniques, and training in new techniques, especially focused on vegetables and locally available foods.
- Raise consciousness around nutrition, the composition of meals, and their relationship to health, linking these efforts to efforts to diversify home food production.
- A strong focus on expanding work into local primary schools, to change the attitudes and habits of children around their food consumption habits, build their enthusiasm for food production, and in the long term, ensure the sustainability of healthier habits in the new generation.

Strengthening of cooperatives with a focus on the participation and leadership of women and youth in the base cooperatives

- Strengthening of participation and leadership of youth and women in the base cooperatives, y in political structures at different scales.
- Develop a training process for political involvement, to promote political activism as a way to improve personal, cooperative, and community life.
- Stimulate youth leadership in the communities that in such a way that it creates leaders who are conscious of their rights and responsibilities to participate in different initiatives, including Food Security.
- Promote exchanges of youth leaders at the regional, national, and international levels.
- Develop economic empowerment initiatives, such as a revolving fund for entrepreneurial projects.
- Develop training plans on organizing, project management, and agroecological production aimed specifically at youth and children.
- Develop and implement economic initiatives aimed at involving youth in work in rural areas.
- Establish special revolving funds for the development of entrepreneurial production and marketing projects managed by youth and women from the cooperatives (fair financing for small businesses).

- Explore and develop land banks for youth from the cooperatives to address the problem of a lack of access to land to produce.
- Increase the linkages and articulation of this food security action plan with all other strategies, programs and initiatives in the UCA San Ramon, to ensure long-term efficacy and efficiency.

A Wakeup Call

The implementation of the project began on par with the diagnostic study itself. The first actions were the establishment of 25 home gardens, made urgent because of the beginning of the rainy season in April-May (we received funding in February 2011). The gardens had mixed success the first year. Some challenges that were brought up after the first planting season were:

- The women did not know many ways of preparing tomatoes, carrots, and other vegetables, so dealing with the quantities they were producing was very difficult for them. The UCA San Ramón responded to this problem by placing a heavy emphasis the second year on nutrition and cooking capacity building, and the UCA is currently finishing the production of a recipe book that includes recipes contributed by the women themselves, along with the nutritional values of those recipes.
- The women had planted the same vegetables at the same time, so when the UCA San Ramón started putting on *mercados campesinos* (farmers markets) in San Ramón every other week, all of the women would arrive with the same vegetables to sell, and no one could sell everything. The result was a heavier emphasis on garden planning as a group the second year.
- After the first planting season was over, we installed low technology water pumps and water harvesting systems in 20 households to assist with irrigation during the

dry season and create the opportunity to cultivate during two seasons rather than only one. The challenge emerged that no one had saved seeds from their first vegetable gardens the first season, and so new seeds were needed from the project. Our response was to program training and organizational infrastructure improvement to promote seed selection, saving, and sharing among project beneficiaries and the community.

The gardens, kitchen trainings, and other actions are meant to increase dietary diversity as well as income. Other actions being implemented involve the strengthening of youth leadership and youth food cultures in the cooperative. CAN has been working on developing an international network of youth leaders in its food security projects in Mesoamerica, and the youth leaders from San Ramon have participated in two annual CAN youth exchanges so far, widening their network of resources and knowledge to draw from in their own community work.

In October of 2012 we began the two-year evaluation of the project impacts so far. We are currently in the process of the final analysis of the results of the evaluation, but it is clear that the impacts have been uneven so far. One challenge that has emerged is that women head of household beneficiaries have a hard time finding the time to work in gardens when they are in charge of everything – coffee production, caring for their children, food production and preparation, and the rest of their families' lives. Another finding that we already suspected earlier on was that the focus on production diversification to vegetables must be accompanied by strengthening of the basic grains storage and distribution systems at the local level, both to maintain access to inexpensive basic grains in the good years, but also to ensure access to food during a crisis year.

The issue of food resilience has become an urgent topic in the coffee world and especially coffee growing communities in the last five months, as Central American coffee fields have been essentially destroyed by a disease called *la roya*, or Coffee Leaf Rust. The disease is something that in normal years is present in coffee fields in minor amounts, and farmers can normally simply pick off affected leaves to effectively manage the disease. However, for reasons that coffee ecologists cannot agree upon yet, *la roya* has hit coffee fields this year in Colombia, Guatemala, Nicaragua, Honduras, and Costa Rica in “one of the worst outbreaks ... in memory” according to the *New York Times* (February 8, 2013). In Northern Nicaragua the cooperative PRODECOOP has cited 80% loss of income during the 2012-13 harvest, and region wide the disease is expected to halve harvests across the board. This means not only a supply crisis for the coffee industry next year, but also a crisis for those families that depend on coffee as their main source of income to purchase food for the year. The *la roya* crisis over the next two years will be a testing ground for everything we have implemented so far to improve food security and resilience with and among smallholder coffee farmers, and the crisis will show us where we should be focusing our attention to assure the survival and prosperity of the families we work with.

The Chain of Possibility: Multi-scalar roles and strategies to alleviate food insecurity in Smallholder Coffee Farming Communities

Given the challenges we are facing, it is critical to imagine what is possible, and to work with all actors and stakeholders to identify what each one brings to the table. No one actor can alleviate poverty, let alone seasonal hunger, alone. Moving beyond the price of coffee as a solution, and in turn moving beyond a single focus on farm-level

assistance, to address structural factors as well, is only possible with this kind of multi-scalar collaboration, as I show in Figure 42.

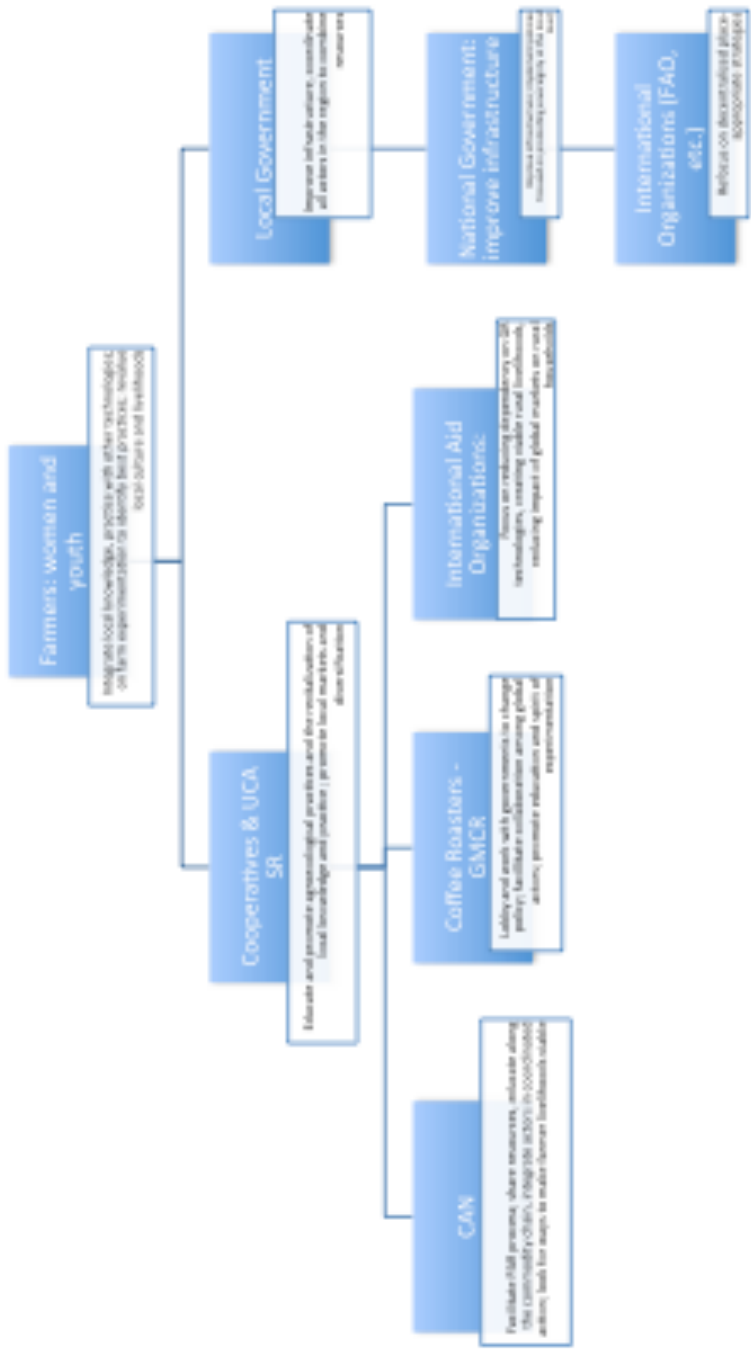


Figure 41: The Chain of Possibility

Conclusions: How can we use these lessons learned?

How applicable are the strategies and lessons learned to other places? The answer is that given what we know about the differences of the causal dynamics of food insecurity and seasonal hunger among eight cooperatives that lie in the same municipality, we must assume that in other countries the dynamics are even more different, and that we would be wasting time and resources if we tried to apply the same set of strategies to communities in another country. What is applicable is the PAR process, in which locally appropriate and culturally preferred strategies can be decided on with participants themselves, local and national civic and political structures and dynamics can be taken into account and integrated into the process, and the fluid scalar relationships can be taken into account as well. I am convinced of this because of experiences I have had implementing PAR processes in three different places. At the same time that we began the project in San Ramon, Nicaragua, we also launched the project in the mountains of Veracruz, Mexico. Without going into detail about the differences in social organization (we work with a local nonprofit there, not a producer cooperative), politics (Mexican party politics affect everything we do), environment (the altitude and climate of the region restricts what can be produced there in different ways), and other scalar relationships (the coffee farmers we work with there were not organized into a cooperative when we started, had not direct market linkages, but did have linkages with development organizations), I can tell you that the PAR process itself was completely different than in Nicaragua, and that although we had begun with exactly the same general project blueprint as in Nicaragua, the process shaped and changed as the PAR process progressed, and today the project has distinct goals, strategies, and actions

from the San Ramon project. It has its own definition of success as well. The point is that what we have learned is that the process can be applied in different places, and leads to locally appropriate actions. This has its challenges and critiques, and arguably has not led to generalized understandings that can be globally applied, but I believe that this is the future of this kind of work: decentralization and situation-appropriate collaboration guided by experimentation, participatory monitoring of results, collective reflection, and sharing. It might seem that the results will be small scale, but it could also turn out that one of these days we will create a viable model that truly is sovereign and independent of transnational GR companies, that we can present to the world as possible. So far the dominant model has not resulted in eradicating hunger and poverty at any scale, so what do we have to lose?

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Appendices

Appendix 1: List of Acronyms Used

CAN – Community Agroecology Network

CRS – Catholic Relief Services

CSR – Corporate Social Responsibility

FSS – Food Security & Sovereignty

GMCR – Green Mountain Coffee Roasters

LWR – Lutheran World Relief

NGO – Nongovernmental Organization

PAR – Participatory Action Research

PRA – Participatory Rural Appraisal

RRA – Rapid Rural Appraisal

UCA San Ramon—Union of Cooperatives San Ramon