Master's Thesis

The Thin Months:

Hunger in the coffeelands – how smallholder farmers in Nicaragua can generate more regular income streams through diversification

Anne-Laurence Zingg

University of St. Gallen Master in International Affairs and Governance (MIA) Supervisor: Ph.D. Urs Heierli

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ABBREVIATIONS

ACPC	Association of Coffee Producing Countries		
ADDAC	Asociaciòn para la Diversificaciòn y el Desarrollo Agrìcola Comunal		
CIA	Central Intelligence Agency		
CIAT	International Centre for Tropical Agriculture		
ECLA	Economic Commission for Latin America		
FAO	Food and Agriculture Organization of the United Nations		
FUNICA	Fundación para el Desarrollo Tecnológico Agropecuario y Forestal de Nicaragua		
GMCR	Green Mountain Coffee Roasters, Inc.		
ICA	International Coffee Agreement		
ICO	International Coffee Organization		
IDE	International Development Enterprise		
INFOCOOP	Instituto Nicaragüense de Fomento Cooperativo		
ITC	International Trade Centre		
MAGFOR	Ministry of Agriculture and Forestry, Nicaragua		
MAMSL	Meters above mean sea level		
SIMAS	Servicio de Información Mesoamericano sobre Agricultura Sostenible		
TCC	Tropical Commodity Coalition		
UNDP	United Nations Development Programme		

1. INTRODUCTION

In terms of volume and value, coffee is one of the most important agricultural commodities traded on the international market. Yearly, about 135 million bags containing 60kg of coffee are produced in 80 different countries all over the world (International Coffee Organisation (ICO), 2013). Thereby, for many, growing and processing coffee has become a very lucrative industry. Over 100 million people are engaged in production and processing alongside the 25 million coffee producers worldwide. A large majority of these producers are smallholder farmers who are directly dependent on coffee for their livelihood. The historical declining terms of trade and price volatility are putting a lot of pressure on the smallholder farmers, making escaping poverty both more difficult and increasingly important (Panhuysen & Van Reenen, 2012). Additionally, many coffee producing households are facing seasonal effects that lead to a regular, cyclical food insecurity, known as The Thin Months. Until recently, this seasonal food insecurity was a phenomenon that was ignored by many members of the coffee value chain. The fact that the Thin Months affects a significant portion of coffee farmers illustrates the severity of this phenomenon and the urgent need to develop ways of combating it. In the following chapters, background information and analysis on The Thin Months will be presented in order to increase understanding of this problem. Additionally, the present thesis will discuss diversification as a possible method to tackle the food drought of The Thin Months.

1.1. RESEARCH QUESTION AND RELEVANCE

The present thesis intends to answer the following research question:

How can diversification generate a more regular income for smallholder coffee farmers in Nicaragua and thereby alleviate food insecurity during the Thin Months?

This research question leads to several subsequent questions, which will be treated in the following chapters of this thesis.

- What is the background of smallholder coffee producers in Nicaragua? What difficulties do coffee producing households face?
- What are The Thin Months exactly and what are possible strategies to avoid them?
- How can diversification reduce food insecurity?

There is a growing effort amongst academics and players in the coffee value chain to understand the problems of coffee producing families in order to find suitable ways of mitigating them (Morris, Mendez, & Olson, 2013, p. 458). Food insecurity was not considered to be a widespread phenomenon in coffee regions until recent studies which focused on impacts of coffee certifications, revealed its severity (Bacon, Mendez, Flores Gómez, Stuart, & Díaz Flores, 2008). While there have been many studies that addressed the effects of different management systems and marketing structures on coffee producing households (Westphal, 2007; Bacon et al., 2008; Méndez et al., 2010) and the food security in rural households in Latin America (Shriar, 2007), researchers have only recently begun to focus on the food security of smallholder coffee farmers

(Morris et al., 2013). Therefore, only in the last few years it has been discovered that many coffee farmers suffer from a recurring period of hunger, called in Spanish "los meses flacos", The Thin Months (Morris et al., 2013, pp. 458,459). In 2007 the International Centre for Tropical Agriculture (CIAT), funded by Green Mountain Coffee Roasters (GMCR), conducted a study involving 179 coffee farmers. They found that one-third to two-thirds of the farmers in Nicaragua, Mexico and Guatemala suffered from one to eight months of seasonal food insecurity each year. This report led to an increased interest in the issue of food insecurity by the speciality coffee industry and researchers (Caswell, Méndez, & Bacon, 2013, p. 5). Additionally, the realisation of the gravity of this issue led to an increase in development support to smallholder coffee farmers in order to improve their food security (Méndez et al., 2010; Morris et al., 2013, pp. 458,459). Despite the growing interest in seasonal food insecurity, there has been little empirical research conducted to understand the complexity of The Thin Months. Most studies to date include data on the number of coffee producing households that have suffered from seasonal food insecurity (Shriar, 2007; Bacon et al., 2008), but don't provide an in-depth analysis on the complexity of this food insecurity. Very recent studies now address the nature of this phenomenon by identifying the causes and responses, and the role of food production for subsistence vs. income generation (Morris et al., 2013, p. 459). Further research on the complexities and unique circumstances of the coffee producers suffering from seasonal food insecurity are necessary in order to diminish the risk that planned interventions will fail to solve the problem at hand (Caswell et al., 2013, p. 6). A better understanding of the interconnection between coffee production and food security are still issues that need to be addressed (Caswell et al., 2013, p. 6).

While Caswell et al. (2013, p. 6) put forward that there is a need for a systems analysis of the root causes of seasonal food insecurity including issues like the international trade dynamics and the socio-political landscape, this thesis will not address such issues in-depth. The present thesis will analyse the complexity of seasonal food insecurity of coffee producing households, and how farm-level intervention strategies can alleviate this food insecurity. Furthermore, it will discuss how and if diversification, and especially diversification in vegetable production, can be a useful approach for addressing The Thin Months.

1.2 STRUCTURE AND METHODOLOGY

The present thesis consists of three main parts beginning with a broad overview and expanding into a more specific analysis.

- I. Background: the coffee industry and profile of smallholder farmers in Nicaragua
- II. The Thin Months
- III. Diversification as a solution to the Thin Months, with a special focus on vegetable production

The Thin Months and the respective food insecurity are a problem that is rooted in poverty. Thus, a better understanding of household economy and interventions that are directed at specific needs are likely to have a positive impact on food security (Rose, 2008, p. 163). Studying the livelihoods of coffee producing households therefore proves very important. Using various

research methods, I analysed the needs of coffee producing households in order to understand what interventions may alleviate the food insecurity during the Thin Months.

The present analysis on The Thin Months is based on different types of sources and information derived from a wide variety of literature. An important part of the data for the thesis was collected during a field study trip in Nicaragua (September 2012 - December 2012)¹ and was analysed by using qualitative and quantitative methods of interpretation. The core data of this fieldwork was collected from household-level studies comprising a survey with 18 random smallholder coffee farmers in the departments of Jinotega and Matagalpa. See annex 1. Furthermore, in depth case studies, group interviews and 3 focus groups were carried out. Additionally, the primary information comprises interviews with representatives of private organisations and experts and informal conversations and personal observations.

The primary data was complemented by an extensive study of secondary data sources including relevant literature from scientific articles, books and reports about smallholder coffee farmers in Nicaragua or Central America.

Despite the comprehensive nature of this research, there are some important limitations. Surveys and interviews with smallholder farmers have some inherent weaknesses that might influence the results of this research.

On my field trip in Nicaragua, the challenges in obtaining the necessary data quickly became evident. Many farmers had difficulty answering some of my questions. While most knew how much parchment coffee they sold, some didn't remember the exact price, forgot to mention that they also have a son that is working somewhere else, or had no idea how much they invested in their agriculture activities. Part of this may be explained by significant differences in education amongst the farming community. While some farmers had secondary school education, many lacked reading, writing and basic accounting skills. Another explanation may be that a lot of things which are evident for Nicaraguan farmers may not be evident for a foreign researcher.

Additionally, it is a common phenomenon people tend to say what they think the other person wants to hear or to exaggerate or understate a situation. Responses to survey questions likely were influenced by the respondents.

To ensure the overall quality of the data, I tried to spend as much time with coffee farmers as possible. Through building confidence and observing for longer periods, I was able to get more precise data.

¹ The three-month stay in Nicaragua was supported by iDEal Tecnologias, a social enterprise selling low cost drip irrigation systems.

2. BACKGROUND

2.1. The international coffee industry

2.1.1. Coffee production, export and consumption

In 2012, world coffee production was 136 million 60 kg coffee bags per year (International Coffee Organisation, 2013). The two main coffee species that are commercially cultivated are robusta (*Coffea canephora*) and arabica coffee (*Coffea Arabica*) (International Coffee Organisation, n.d.a), which each include several different varieties (Marsh, 2007, p. 1). Arabica is considered to have a superior taste and is traded at a higher price than robusta, which has a more bitter taste but is a hardier crop, resistant to some common plagues (for example leaf rust) (The Economist, 2013). However, variety is not the only factor that determines the taste of coffee. A combination of altitude, soil, microclimate, plantation management, post-harvest handling, coffee variety, milling, and selection all influence the quality and taste of the coffee. Overall, arabica accounts for 60% of world coffee production while robusta counts for 40%.

There are more than 75, mostly tropical countries, that produce coffee (International Trade

Centre (ITC), 2011, p. 6), from which Brazil is the largest coffee producer, having produced 43 million bags in 2012, see table 1. Combined, the three biggest coffee producing countries Brazil, Vietnam and Colombia, provided for around 55% of the world's coffee in recent years (International Trade Center, 2011, p. 2).

Over 53% of all coffee is produced in the Americas. While increasing competition from African and Asian coffee has led to a steady decline in production, Central America has maintained its position in producing around 13% of the world's supply (Chemonics International, Inc. , 2002, p. 1; International Coffee Organisation, 2013).

Production capacity and efficiency level varies significantly between different countries. Brazil's coffee production is highly technified compared to other countries where mostly traditional coffee producing methods are applied. To illustrate the difference, five people and a mechanical harvester are required to work 2-3 days in order to fill a container of coffee in some regions in Brazil. However, to fill the same

TABLE 1: TOTAL COFFEE PRODUCTION AND THE BIGGEST PRODUCERS, IN 1,000 BAGS OF 60 kg

Nr.	Crop Year	2011	2012
	World Total	134,140	144,611
1	Brazil	50,826	43,484
2	Vietnam	22,000	24,058
3	Indonesia	12,730	7,287
4	Colombia	9,500	7,654
5	Ethiopia	8,100	6,798
6	India	5,258	5,233
7	Honduras	4,900	5,903
8	Peru	4,133	5,373
9	Mexico	3,900	4,563
10	Uganda	3,200	2,817
11	Guatemala	3,143	3,840
12	Côte d'Ivoire	2,000	1,886
13	Costa Rica	1,671	1,462
14	Nicaragua	1,342	2,210
15	El Salvador	1,242	1,152
16	Tanzania	1,017	534
17	Venezuela	1,000	902
18	Ecuador	828	825
19	Kenya	767	680
20	Papua New Guinea	717	1,414

Source: based on data from the International Coffee Organization (2013) container in some areas in Guatemala, over 1,000 people are required to work one full day (Petchers & Harris, 2008, p. 46).

Small-scale farmers account for more than 70% of the world's coffee producers (Petchers & Harris, 2008, p. 50). In 2010, the International Coffee Organisation estimated that 26 million people were employed in the coffee sector from 52 coffee producing countries.

Most coffee producing countries export the majority of their coffee and only use a minor part for domestic consumption (Marsh, 2007, p. 3). The coffee is usually exported unprocessed and is only roasted later (International Trade Center, 2011, p. 29).

In many countries, coffee exports account for a major amount of foreign exchange earnings and also contributes significantly to tax income and gross domestic product. In six countries Burundi, Ethiopia, Rwanda, Honduras, Uganda and Nicaragua, the average share of coffee exports in total export earnings exceeded 15% from 2000-2010 (see figure 1). However, it is important to notice

that the importance of coffee exports is slowly diminishing in many countries as their economies are increasingly diversifying (International Coffee Organization, n.d.b).

In the years 2009/2010 global consumption amounted to a total of 133.9 million bags of coffee, whereby 72 million bags were consumed by importing member countries of the International Coffee Organization, 40.7 million in producing countries², and 21.2 million in non-member countries of the ICO (International Coffee Organization, n.d.b).

FIGURE 1: AVERAGE SHARE OF COFFEE EXPORTS IN TOTAL EXPORT EARNINGS



Source: International Trade Center (2011, p. 2)

Since 1980, the global consumption has increased on average by around 1.2%, with an initial impressive growth rate of 3.5% in Japan, now the third largest importer worldwide. Lately, the market growth in Europe has weakened and is nearly stagnating. In the United States, the increase of consumption is only slightly better. Coffee consumption in producing countries and non-ICO-members has increased rapidly though in the last decade with 6% growth (International Coffee Organization, n.d.b).

² Thereof over 19 million bags were consumed in Brazil (International Trade Center, 2011).

2.1.2. COFFEE TRADE AND PRICES

a. The roasters and traders of physical coffee

The world coffee market is dominated by three very large transnational food conglomerates: Nestlé, Mondelēz International (former Kraft Foods Inc.)³ and D.E Master Blenders 1753 (former Douwe Egberts)⁴ and a couple big roasting companies, such as Smucker's, Strauss,

Starbucks, and Tchibo (Panhuysen & Van Reenen, 2012, p. 12). Figure 2 shows, that in 2010, about a third of the exported green coffee was processed by the five largest roasting companies (International Trade Center, 2011, p.18) that sell their end product mainly to the European, American and Japanese markets (Tropical Commodity Coalition (TCC), n.d.).

Buying decisions of these big companies have a significant impact on overall demand. The big roasters tend to rely heavily upon trading companies for their supply of coffee rather than





Source: International Trade Center (2011, p. 18)

dealing directly with the producers and cooperatives. The major trading companies include Neumann Gruppe (Germany), Volcafé (Switzerland), and ECOM (Switzerland), who together trade 50% of the world's coffee beans (Wenger, 2012, p. 4).

b. Elements that influence the price

Coffee is always traded in USD (International Trade Center, 2011, p. 16). Thereby coffee beans have no single price as they are not a homogeneous product. The international coffee-pricing scene is comprised of four different elements:

• <u>Physicals - prices for physical coffee</u>

The price of physical coffee is determined by supply and demand. The criteria for this price are usually the quality and availability of the bean. Additional factors that influence the price setting are market expectations, speculative actions and changes in currency exchange rates. As all coffee is different, similar coffee is grouped together into standard groups on the market (International Trade Center, 2011, p. 10).

Indicators - prices that track groups of comparable coffees

The ICO in London publishes a daily indicator that tracks the four main types of coffee on the international market: Colombian mild arabicas, Other mild arabicas⁵, Brazilian and other natural arabicas, and Robustas. Furthermore, the ICO publishes a Daily Composite Indicator Price, a combination of the four broad groups into one single price representing "all coffee".

³ In 2012 Kraft Foods Inc. changed its name to Mondelēz International and spun-off the Kraft Foods Group (Mondelēz International, Inc., 2012).

⁴ D.E Master Blenders 1753 split of Sara Lee Cooperation in 2012 (D.E Master Blenders 1753, 2012).

⁵ The arabica coffee that is produced in Nicaraguan belongs to the group of "other mild arabicas" (International Trade Center, 2011, p. 4).

These indicators represent the spot or cash prices for coffee that is more or less immediately available. Additionally, the indicators help the ICO to monitor price developments for the four different categories (International Trade Center, 2011, p. 10).⁶

• Futures - prices are projected forward for standard qualities

Futures prices are estimations of future availability and demand for coffee. The arabica futures are generally traded in New York at the Intercontinental Exchange (NYSE: ICE) and the robusta futures in England at the London International Financial Futures and Options Exchange (NYSE Liffe). Traders in the coffee futures market are primarily interested in risk management, investment opportunities, or speculations, and mostly are not interested in physical exchange of actual coffee. Only very few futures contracts eventually lead to an actual physical delivery (International Trade Center, 2011, p. 10,132,133).

Differentials – linkage of physical prices to futures prices

Futures and the ICO price indicators deal with standard qualities of coffee by necessity. In reality however, the physical coffee market constitutes many more different qualities of coffee than the standards. Traders link these individual prices with the futures price by establishing a price difference called the differential. The differentials take into account the differences between an individual physical coffee and the standard quality, the physical availability of this coffee and the terms and conditions on which it is sold. In short, the differential is a premium or discount that represents the value that the market attaches to the coffee compared to the futures market. Physical coffee price differentials can be extremely volatile (International Trade Center, 2011, p. 10,133).

Speculating and hedging usually results in futures prices converging with the cash price as the futures contract approaches delivery. However, they don't always reflect the cash market, especially when large volumes are traded for speculative reasons. The volumes of futures that are traded easily exceed the volume of physical coffee traded as a whole. See figure 3. These large volumes on the futures markets also influence the price of physical coffee. Therefore, it is important

FIGURE 3: ANNUAL TURNOVER IN FUTURES COMPARED WITH GROSS WORLD IMPORTS, 2000 - 2010, IN MILLIONS OF TONS



Source: based on International Trade Center (2011, p. 134)

for persons that are involved in the physical trade of coffee to be aware of the activities of speculators and traders (International Trade Center, 2011, p. 134).

⁶ For further price information and the ICO indicator see: <u>http://www.ico.org/coffee_prices.asp</u>

c. Price volatility

The International Coffee Agreement (ICA) had provided some stability in world coffee price by imposing export quotas on their member countries in order to control the amount of coffee on the market and stabilise the price. In 1989 the agreement terminated, which resulted in a market with few restrictions and little control, leading to an extremely volatile coffee price (Marsh, 2007, p. 4). Aside from the the period when this agreement was in power, the coffee price has been extremely volatile in both size and suddenness of price moves, sometimes even during the same trading day (International Trade Center, 2011, p. 132). The volatility is the result of an inelastic demand curve, supply shocks, production adjustments in response to a price increase and policy changes (e.g. the suspension of the International Coffee Agreement) (Varangis, Siegel, Giovannucci, & Lewin, 2003, p. 31). Several events influence the price fluctuation such as overproduction and increased stock reserves, falling prices and failing of

producers, underproduction accompanied bv stock consumption, exhaustion of stock reserves and increasing prices, and increased planting (Chemonics International, Inc., 2002, pp. 1,2). The prospect of crops varies widely due to unforeseen events such as droughts, frosts and diseases. Since the balance of supply and demand is very uncertain, all the players in the coffee industry are exposed to a price risk constant



FIGURE 4: AVERAGE PRICE PAID TO GROWERS

Source: based on data from the International Coffee Organization

(International Trade Center, 2011, p. 132). For example, in 1994, the coffee price drastically went up within a matter of months because of frost damage in Brazil. In 2001, the world coffee prices reached a low point at around 30 cts/lb in Nicaragua and then started rising again slowly. See figure 4, for the average price paid to growers in three Central American countries.

Modern communication is making the markets even more volatile, as all events that can affect the coffee price are known to the market players immediately and simultaneously. Such events can lead to a jump or fall of the coffee price by as much as 10 cts/lb or more (International Trade Center, 2011, p. 135).

For the farmers, such radical price changes influence their income significantly and a price drop can easily lead to insolvency.

2.2. NICARAGUAN COFFEE INDUSTRY

2.2.1. Economic background and poverty in Nicaragua

Nicaragua is the second poorest country in Latin America with a Human Development Index of 0.599, ranking 129th out of 187 countries (United Nations Development Programme (UNDP), 2012). The per capita income is \$4,500 and adult literacy lies at 78% (Central Intelligence Agency (CIA), 2012). According to the World Bank, over 40% of the population live below the poverty line (World Bank Group, 2011). Accordingly, hunger is a pressing issue in Nicaragua. A report estimates that 27% of the nation's population was below minimum nutrition levels in 2005 (Bacon, Mendez, Flores Gómez, Stuart, & Díaz Flores, 2008, p. 264).

Nicaragua's economy puts an important focus on the agricultural sector, an entity that contributes 20.1% to the GDP. Large areas are used for cultivation of coffee and tobacco as well as meat production (Food and Agriculture Organization (FAO), 2012b, p. 26). Approximately 70% of the population in rural areas depend mainly on agriculture or livestock for their livelihood (Baca, 2013). However, the percentage of the population that is employed in agriculture has diminished over the last years, representing 14.2% of the economic active population in 2011. A majority of the work in the agricultural sector is characterised by seasonal nature. The approximate average salary in the agricultural sector is around \$91 a month, cumulating in around \$1,092 a year (Food and Agriculture Organization, 2012b, p. 26). Therefore, it is not surprising that Nicaragua's comparative advantage towards other Central American countries is its large and cheap labour force (Chemonics International, Inc., 2002, p. 59).

The agrarian sector plays a key role for the development of the country, as its contribution to the economic growth and the generation of foreign currency are fundamental for attacking the problems of poverty in Nicaragua (Ruíz García & Marín López, 2005, p. 16). Nicaragua's main export products are coffee, gold, and beef that together constitute more than 50% of total exports (Food and Agriculture Organization, 2012b, p. 25).

2.2.2. COFFEE INDUSTRY IN NICARAGUA

a. Coffee production area

Nicaragua is the largest country in Central America at 131,812 km². It can be divided in three morphostructural regions: The Pacific Region, The Atlantic Region, and The Central Region. In The Pacific Region, the main urban centres are situated and the land is rather flat (Baumeister & Rocha, 2009, p. 16) and scattered with some volcanoes (Ortells Chabrera & Ortells Chabrera, 2010, p. 199). The Atlantic Region, a combination of the territory of indigenous populations and the agricultural frontier is a humid, hot and rainy zone (Baumeister & Rocha, 2009, p. 16). Finally, there is the Central Region, whose elevation averages more than 600 meters above mean sea level (MAMSL) and whose average temperature lies below 20°C (Ortells Chabrera & Ortells Chabrera, 2010, p. 199). This mountainous region is the most suitable location for cultivation of coffee, and is also the point of origin for significant livestock and staple food production, such as maize and beans (Baumeister & Rocha, 2009, p. 16).

There are four major coffee growing regions in Nicaragua: Jinotega, Matagalpa, Pacific/Boaco and Las Segovias. These regions belong to the departments of Jinotega, Matagalpa, Estelí, Nueva Segovia, Madriz, Carazo, Granada, Managua, Chontales and Boaco. Together, the departments of Jinotega and Matagalpa are responsible for around 76% of total national coffee production. They are located in a mountainous, broken terrain, which reaches an average altitude of 1,200 MAMSL

and receives up to 2,000 mm of rainfall annually. On the other hand, Carazo, Granada, and Managua are only responsible for 7% of total coffee production. The coffee growing conditions in these departments are less favourable due to the drier climate and low elevation (Chemonics International, Inc. , 2002, p. 49).

In general, arabica coffee is best grown in areas which have a yearly average temperature between 15-24° C and receive between 1,500-2,000 mm of rainfall a year. The optimal elevation of a farm intended for coffee production lies between 1,000-2,000 MAMSL



FIGURE 5: COFFEE PRODUCTION AREA

Source: Magfor (2008, p. 10)

(International Coffee Organisation, n.d.a). Geographically, the most suitable conditions for coffee growing occur in a band that goes from northwest to southeast in the middle of Nicaragua, see figure 5. Additionally, there are a few small areas that are appropriate for coffee production in central Chontales and around Jinotepe in North-eastern Carazo (Chemonics International, Inc. , 2002, p. 53). The departments of Granada, Estelí and most of Boaco and Chontales are only marginal for coffee production. In Estelí, for example, the average annual rainfall in a normal year is around 800 to 1,200 mm, which is too low for optimal conditions (Chemonics International, Inc. , 2002, p. 53).

Climate forecasts show that the area suitable for coffee production will shrink significantly in the next few decades due to climate change. In their MAXENT model study⁷, Laderach et al. (2011, pp. 711-713) report that the best coffee growing areas in Nicaragua currently have suitability between 50%-80% and are located in Nueva Segovia, Jinotega, Madriz, Estelí, Matagalpa, Boaco, and smaller regions on the border of Masaya, Carazo, and Managua (figure 6). Other areas in the same departments as well as in northern Atlantic departments like Chinandega, León, and Chontales are suitable to a lower degree (around 30-50%). The results of the modelling indicate that in 2050, the area with optimal conditions for coffee production will decrease heavily. Climate change will cause an upward move on the altitudinal gradient so that lower areas lose their suitability. Mainly, the areas that currently have a very high suitability will still have favourable conditions in 2050. The dominant areas with a new suitability between 50-60% will be located in southern Jinotega, northern Matagalpa and in some other small areas in these departments. Further north, in Nueva Segovia and Madriz, and south in Boaco, there will be areas with suitability between 30-50%. While today the optimum coffee-producing zone in

⁷ "Maxent is a general-purpose method for making predictions or inferences from incomplete information. Its origins lie in statistical mechanics [...]. "(Phillips, Anderson, & Schapire, 2006, p. 234)

Nicaragua is located on an elevation between 800 and 1,400 MAMSL, by 2050 the optimal elevation will increase to 1,200 and 1,600 MAMSL (Laderach, Lundy, Jarvis, Ramirez, Perez Portilla, & Schepp, 2011, pp. 711,712). In short, by 2050, Nicaragua will lose between 20-60% of the area that is currently suitable for coffee production.



FIGURE 6: PREDICTED SUITABILITY FOR COFFEE

Through The Risk and Opportunity Analysis (ROA)⁸, Laderach et al., (2011, p. 719) identified the following specific climate risks that the smallholder producers already perceive as threats: increasing temperatures, extreme weather events, less rainfall leading to droughts, increased appearance of pests, and diseases. All these factors lead to declining yields and fruit quality and lower incomes for the coffee farmers (Rizo, Suárez, Lau, & Jährmann, Kathleen, 2008, p. 8).

b. History of coffee in Nicaragua

Until the middle of the 19th century, the main agricultural production in Nicaragua was cattle bred on big colonial haciendas. The same haciendas also grew some basic grain for domestic consumption. Coffee was only introduced in Nicaragua in 1840, making it the last country in Central America to be exposed to this industry. With this new agricultural activity, Nicaragua entered the world market. Fiscal and credit incentives were created to push immigration forward, which led to a great number of coffee producing German immigrants. During the same period, violent expropriations of land of the indigenous population took place and they were compelled to work under conditions similar to slavery. Many were forced to build pathways so that the coffee beans could be transported from the mountainous regions of Matagalpa and Jinotega to the more central areas (Ortells Chabrera & Ortells Chabrera, 2010, pp. 199,200).

In the 1950s, the high price for coffee beans helped maintain the new military dictatorship of Somoza Garcia. He became the biggest coffee producer in the country after declaring war on Germany and confiscating the farms of many German families. As coffee became by far the biggest export product of Nicaragua, a situation of great inequality in wealth distribution and

Source: Laderach et al. (2011)

⁸ a participatory methodology to identify site-specific vulnerabilities of smallholders and possible adaptation pathways (Rizo et al., 2008, p. 2)

high economic vulnerability was created (Ortells Chabrera & Ortells Chabrera, 2010, pp. 199,200). For a majority of the rural population, the monopolistic agroexport economy meant miserable living and working conditions with only very limited access to healthcare and education (Valkila & Nygren, 2009, p. 4).

The Sandinista Revolution and the end of the Somoza dictatorship in 1979 led to a change in the distribution of land in Nicaragua. Land reforms reduced the percentage of big proprietors to 10 percent of the territory, so that smallholder farmers controlled 78% of the cultivable land, which diminished to 65% in the 90s. Smallholder farmers and cooperatives are therefore a new economic phenomenon (Ortells Chabrera & Ortells Chabrera, 2010, p. 201). The Sandinista government (1979-1990) suffered from civil war, an US-imposed trade embargo and other problems from the agricultural reforms, which finally led to an economic collapse (Valkila & Nygren, 2009, p. 4). In 1990, the US-backed liberal party came to power, ending the Sandinista rule and the civil war. The 1990s were marked by a catastrophic economic situation and drastic social changes leaving Nicaragua the second poorest country in Latin America (Pirotte, Pleyers, & Poncelet, 2006, p. 444).

Meanwhile, the international coffee price was characterized by high fluctuations, which had occasional dramatic impacts on the producer countries. Eduardo Galeano, a Uruguayan journalist and writer, even compared the graph of coffee price to a clinical epilepsy chart⁹ (Galeano, 1997, p. 99). Between 1962 and 1989 coffee prices were more or less stable due to the International Coffee Agreement (ICA), which created a system of contingents of export and defined minimum and maximum prices. In 1989, the consumer and producer countries could not manage to keep their accord anymore and the system broke down (Ortells Chabrera & Ortells Chabrera, 2010, pp. 199-201). This led to a price valley with the lowest real coffee prices ever experienced at that time (Chemonics International, Inc., 2002, pp. 1,2). Between 1993 and 2000, another attempt was made to stabilize the coffee prices when 14 producer countries came together to form the Association of Coffee Producing Countries (ACPC) (Ortells Chabrera & Ortells Chabrera, 2010, pp. 199-201). The new agreement initiated a drop in production and a rebound of the price. A frost in Brazil led to even lower supply of coffee and to an additional price increase. These high prices again attracted the attention of investors worldwide who started planting more coffee trees, especially in Vietnam (Chemonics International, Inc., 2002, pp. 1,2). In 2001, the ACPC resolved that when the member countries were asked to keep back 20% of their coffee exports (which did not succeed) they ended up with 10% oversupply (Ortells Chabrera & Ortells Chabrera, 2010, pp. 199-201).

The failure of another coffee price agreement turned into a world coffee crisis in 2001 and led to a dire hunger situation in Nicaragua (Ortells Chabrera & Ortells Chabrera, 2010, pp. 200,201). With an estimated average production price per quintal¹⁰ of around \$70 and the low prices paid at that time, a quintal of coffee meant an average loss of \$27 (Flores, Bratescu, Martínez, Oviedo, & Acosta, 2002, p. 59). Because of the fall of the international coffee price, a lack of financing

⁹ "In 1889 coffee was worth two cents and six years later it had risen to nine; three years later it was down to four, five years after that to two. A typical period. The graph of coffee prices, like those of all tropical products, has always resembled a clinical epilepsy chart..." (Galeano, 1997, p. 99)

¹⁰ The quintal (q) is a unit of mass equal to 100 pounds (lb) or 45 kilograms (kg). Usually the coffee bags are equivalent to one quintal (Ortells Chabrera & Ortells Chabrera, 2010, p. 198).

possibilities, coffee recession and bank embargos for farmers, many small, middle and big coffee producers had to default (Ortells Chabrera & Ortells Chabrera, 2010, pp. 200,201). During the worst period of the coffee crisis, more than 3,000 farmers (close to 10 % of Nicaragua's coffee farmers), lost their land to bank foreclosures and debt accumulation (Bacon et al., 2008, p. 264).

The combined effects of war, political change, the coffee crisis and natural disasters led to a situation in the beginning of the 21st century where most smallholder coffee farmers lived under precarious conditions and many farms where abandoned. The coffee plants were old and damaged and productivity was very low. Overall coffee yields were only about 290 lb of exportable coffee per manzana¹¹ in 2005 (Bacon et al., 2008, pp. 262,263). Currently, the economy is characterized by an unequal distribution of resources and nearly half of the rural population is estimated to live in extreme poverty. Although the official unemployment rate in 2006 was only 5.2%, most working people in Nicaragua work in the informal sector that provides them with poverty wages and no security (Valkila & Nygren, 2009, p. 4).

c. Description of the coffee supply chain

The traditional coffee chain in Nicaragua starts at the farmer's level, where the coffee is cultivated, harvested, and processed. The wet parchment coffee is then sold to a local middleman, who resells it to a local trading firm (Guzmán & Castellón Zamora, 2011, p. 51). These two steps can also be taken care of by a cooperative that may be a direct link between the smallholder and the curing plant (Panhuysen & Van Reenen, 2012, p. 2).

The trading firm delivers the coffee to a curing plant where the coffee is further processed. Then, the resulting green coffee is transported to an exporting company. After passing through the hands of the roaster and the retailer the coffee finally lands in the hands of the consumers. On this path, the coffee undergoes many different processing steps (Guzmán & Castellón Zamora, 2011, p. 50). In the following paragraphs, the step-by-step process involved in converting coffee cherries to green coffee that is ready for exporting and roasting will be explained.

Production

In Nicaragua, out of a total population of 5.8 million people (CIA Factbook), there exist around 30,000 to 40,000 coffee producers that employ 175,000 agricultural workers and more than 300,000 seasonal workers during the period of the harvest (Ortells Chabrera & Ortells Chabrera, 2010; Baca, 2013). Furthermore, coffee production indirectly generates many jobs for other families because in certain regions it is engine of the local economy (Baca, 2013). The importance of the coffee sector in Nicaragua becomes clear by examining some reported numbers of the Economic Commission for Latin America (ECLA) on individuals in the labour force. In the year 2002, they found that an estimated 42% of the rural active labour force is employed in the coffee sector (Varangis et al., 2003, p. 8).

Of all the coffee farms, 96% belong to smallholder farmers with less than 20mz territory, that together, account for 50% of all the territory where coffee is cultivated (Ortells Chabrera & Ortells Chabrera, 2010, p. 198). In Nicaragua, the farmers produce high quality arabica coffee. The common coffee varieties are Bourbon, Caturra, Catuai, Paca and Maragogype. Thereby 95%

¹¹ The manzana (mz) is a unit of land area commonly used in Nicaragua. One manzana equals 0.7 hectares or 7,000 m2 (Shriar, 2007, p. 278).

of the coffee is shade grown with different shade densities (Guzmán & Castellón Zamora, 2011, p. 49) and a high diversity of shade and fruit species (Baca, 2013). The time of harvest varies according to the climate and the elevation of the farm and takes place between October and February, with a peak between November and January.

Wet processing and milling

The harvested coffee cherries can either be wet or dry processed. Compared to the dry processing method, wet processing requires a lot of water but is usually perceived as ensuring better quality and therefore, sells for higher prices. For arabica coffee, usually the wet processing method is applied, which is also the case in Nicaragua (International Coffee Oranization, n.d.a).

After the harvest, some partially dried, unripe cherries, dirt and stones can still be found among the ripe cherries. The preliminary sorting and cleaning is conducted by washing the cherries in tanks that are filled with flowing water (International Coffee Oranization, n.d.a). Following this process, the pulp is removed. Most farmers own a manually operated pulping machine (Guzmán & Castellón Zamora, 2011, p. 51) that squeezes the cherries between a moving and fixed surface, removing the pulp and leaving beans covered with parchment and sticky mucilage. This process should be done as soon as possible in order to avoid loss of bean quality. The pulped beans then go through another washing stage in which floating separates further defected beans (International Coffee Oranization, n.d.a).

In the next step, the mucilage coating is removed, which helps the bean to dry properly (Loveridge, Mpyisi, & Emmanuel, 2002, p. 13). The beans are put into fermentation tanks where the mucilage is removed by natural enzymes. Generally this process takes between 24 and 36 hours. After the fermentation, the coffee is washed again (International Coffee Oranization, n.d.a). Many smallholder farmers process their coffee in outdated wet mills that don't meet the necessary standards for high quality coffee (Guzmán & Castellón Zamora, 2011, p. 51).

After the pulping and the fermentation process, most farmers sell the wet parchment either to middlemen and acquisition centres (Guzmán & Castellón Zamora, 2011, p. 51), or to cooperatives and farmers' organisations, which then control the further processing steps. The choice of to whom the producers sell their coffee depends much on geographical location and access to a purchaser (Magfor, 2008, p. 12).

Drying

The resulting parchment coffee at this stage consists of around 57% moisture, which needs to be reduced to 12.5%. At the curing plant, the coffee is dried in the sun on flat concrete areas, where the beans are turned frequently to ensure even drying. This drying process takes approximately 10 days (International Coffee Oranization, n.d.a). Most curing plants are located close to the cities of Sébaco, Matagalpa or Jinotega (Guzmán & Castellón Zamora, 2011, p. 51).

After the drying, the coffee is called parchment coffee and is stored without further processing until it is exported. At the final stage, just before exporting, the coffee is hulled to remove the parchment, and then goes through some more cleaning, sorting and grading operations (International Coffee Oranization, n.d.a). In Nicaragua this selection is usually done by hand, and in a minority of cases, supported by machines (Magfor, 2008, p. 10).

Export and roasting

The resulting green coffee is then ready for export or for the domestic roasting industry. However, very little green coffee stays in Nicaragua to be roasted domestically. Only a few companies control the small roasting industry in Nicaragua. A majority is instant coffee for the domestic market and a small amount for other Central American countries (Magfor, 2008, S. 11).

d. Nicaraguan coffee export

In 2011, Nicaragua exported 1.4 million 60 kg bags of green coffee, which amounted to a total of 443 million USD - equal to 6.1% of Nicaragua's GDP. See table 2.

According to ECLA, 80% of the coffee produced in Nicaragua could theoretically be sold as speciality coffee, but most of it lacks certification. In 2011, the most important buyer of speciality coffee in Nicaragua was Starbucks, followed by buyers from Japan. The two biggest purchasing and exporting

Exports of green coffee (60-kg bags)	1,421,546
Exports of processed coffee (60-kg bags GBE)	46,164
Value of exports of all forms of coffee (mln US\$)	443
Value of exports of all merchandise (mln US\$)	2,264
Value of coffee as a percentage of all merchandise	19.3%
Value of coffee as a percentage of GDP	6.1%

Source: data from country datasheets of the International Coffee Organisation (2011)

companies in Nicaragua are CISA Exportadora S.A. (Mercom Coffee Group) and the Exportadora Atlantic S.A. (ECOM group) (Guzmán & Castellón Zamora, 2011, pp. 51,52). In 2002, there were more than 70 export companies registered in Nicaragua, out of which only 30 were in operation (Chemonics International, Inc. , 2002, p. 51)

2.3. Smallholder coffee farmers in Nicaragua

2.3.1. HOUSEHOLD AND FARM CHARACTERISTICS

There exists a large diversity of coffee producers and farms that vary in terms of property size, location, altitude, age of the coffee plants, technology used, productivity, quality of the yield and also in terms of how the producer commercialises his product. In general, the size of the property has a direct relation with the other factors or at least part of them (Flores et al., 2002, p. 26). Smallholder farmers have many similarities regarding their livelihoods. This chapter will give a general picture of smallholder farms. At the same time one should not disregard the fact that there are many exceptions to the general model.

Very small farms of less than 2.1 manzanas represent around 79% of all growers in Nicaragua. They mostly produce poor quality coffee that was planted as a diversification crop to provide additional income to subsistence maize and bean production. The farms are managed using traditional agricultural practices with low agrochemical input, and the coffee may be harvested entirely by family labour (Chemonics International, Inc. , 2002, p. 52). To give a complete picture of coffee growing households, I will discuss some general characteristics of the eighteen farmers

(6 males, 12 females) that were surveyed in Matagalpa and Jinotega. The participating families had an average number of household members of 5.8 persons (max = 10, min = 2). In average the surveyed persons were 41 years old and had completed 3.7 years of schooling, whereas four have never been to school. Out of the eighteen participants, three had been to University for one or two years, but had abandoned their studies before completion.

On average they owned 6.5mz of land, with two of them owning just one single manzana. All of them, except two, had access to water on their property. The average size of land used for coffee cultivation was 2.9mz, on which they harvested 41.5 quintals parchment coffee that provided them with 4000 USD gross income. A third of the farmers sold at least part of their coffee as certified fair trade coffee. The yields per manzana varied significantly as the minimum output was at 2 and the maximum at 28 quintals parchment coffee per manzana.

Only two of the surveyed farmers didn't have any plot for food production, while the remaining sixteen cultivated maize and/or beans on an average plot of 2mz. Out of these sixteen, five used the whole yield for family consumption, whereas eleven sold at least part of their maize and/or beans to generate extra cash-income. Most farmers kept enough maize and/or beans to sustain their family with the respective crop for around one year (maize: n=14; beans: n=12). Eleven engaged in an economic activity apart from farm production.

Many coffee producing households have a clear gender division of responsibilities. Women are involved in domestic work (Beuchelt & Zeller, 2011, p. 1319), where they are heavily engaged in food preparation (Shriar, 2007, pp. 278,279). Some women also take care of tiny convenience

stores. Apart from managing a home garden, if there is one, and taking care of small livestock (e.g. chickens, pigs), they usually don't do any farming work (Shriar, 2007, pp. 278,279). During the harvest however, most women help out in the coffee plantations (Beuchelt & Zeller, 2011, p. 1319). Figure 7 shows which sectors are usually managed by which gender. It demonstrates that women are especially often involved in fruit





Source: based on Guzmán & Castellón Zamora (2011, p.81)

production. For other sectors, like vegetables, legumes and meat, mostly the male members of the household are responsible. However, it is worth noting that households are very different and that the gender division of labour is just a general trend that may not be true for every household.

2.3.2. INCOME

Whether a coffee-producing household can generate an income above the poverty line depends on the net income in relation to the family size (Beuchelt & Zeller, 2011, p. 1321).

The calculation of the total income of coffee-producing households proved to be quite difficult. For example, many farmers were unable to give detailed information about their production and

investment costs. In order to develop an approach that is as realistic as possible, I used different production cost estimations. The first (scenario 1) is based on cost data from the survey, respectively, on the farmers' responses. The survey accounts for investments such as fertiliser, insecticide, pesticide, and herbicide as well as wage labour. Additionally, I also used the minimum estimated production cost of 0.54 USD per pound (scenario 2), applied by (Bacon et al., 2008, p. 164). This amount is a minimum standard, as it does not cover the costs of sustainable production. Also compensation for the farmer's labour and training is not included, and neither are depreciation costs. The last calculations (scenario 3) are based on an estimation of production cost of 70 USD per quintal, an amount that according to Varangis et al. (2003, pp. 12,30) was the average cost of production in Nicaragua in 2001.

While the survey data about production cost may not always be accurate, it includes the difference of investment of the farmers that clearly varies widely. While for example one surveyed farmer indicated to invest an amount of 14 USD per quintal parchment coffee, another indicated to invest 41 USD per quintal. In return, the former only harvested 4 quintals

	Scenario 1	Scenario 2	Scenario 3	
Net income in \$				
Average	4,832	3,590	2,923	
Maximum	13,544	9,969	9,569	
Minimum	153	362	310	
Households below the poverty index (n=18)				
\$2 a day (PPP)	6	5	8	
\$1.25 a day (PPP)	3	4	4	

TABLE 3: NET INCOME AND POVERTY INDEX

Source: own data

per manzana, while the second was able to pick 14 quintals on one of his manzanas. In a different case, one farmer wasn't able to harvest anything, as the coffee trees were still in development and not fruiting yet. Nevertheless she invested 150 USD per manzana for her young coffee trees. With the average production costs, such differences are not accounted for.

It should be noted also that household income varies from year to year and that the survey data only captured income that was reported for 2011/2012, a year with rather high coffee prices and not too many pests. Accordingly, six farmers indicated that the income from 2011/2012 was a good income compared to other years, and only three responded that the income was worse (nine did not respond this question). Often pests were the reason for a bad year in which farmers lost a major part of their yield (e.g. beans, maize and coffee).

The average yearly income of the surveyed households lies between 2,923 USD and 4,832 USD whereby it varies a lot from a 153 to 13,544 USD (using the survey cost data).

The results indicate that three or four out of the eighteen surveyed households live below the extreme poverty line of \$1.25 (PPP). Between five and eight households have a total income below the general poverty line of \$2 (PPP).

Typically, having many children that are still in school can put a significant amount of financial pressure on a household. Accordingly, six of the seven households with a low ratio of working members (\geq 50 %) to non- working members did not reach the benchmark of \$2 a day.

2.3.3. PRODUCTIVITY

Productivity studies show that while coffee farmers with up to 6 manzanas control 69% of the area cultivated coffee, they generate only 48% of the total coffee production. The productivity of 13.3q/mz parchment coffee (SIMAS, 2011, p. 12) is clearly below the national average and also quite low compared the average global output per manzana (Ortells Chabrera & Ortells Chabrera, 2010, p. 198). Big producers (>40mz) have a return of 45.7q/mz. The reason for this huge difference in productivity lies in the fact that small producers usually don't use appropriate technologies (SIMAS, 2011, p. 12).

Size of the Farm (mz)	Production (000s q)	Area (000s of mz)	Return (q/mz)	Production %	Area %
Less than 3	6,969	543	12.8	32%	48%
3-6	3,372	232	14.5	16%	21%
6-15	2,574	142	18.1	12%	13%
15-40	1,268	51	24.5	6%	5%
More than 40	7,424	162	45.7	34%	14%
TOTAL	21,607	1,131	19.1	100%	100%
Less than 6	10,341	775	13.3	48%	69%

Source: based on SIMAS (2011, p. 12)

Indeed, the production systems of smallholder farmers are mostly traditional or semiconventional, and therefore very little technified (Baca, 2013). At the same time, smallholder farmers have lower investment costs compared to bigger landowners (Ortells Chabrera & Ortells Chabrera, 2010, p. 198). According to Guzmán & Castellón Zamora (2011, p. 49), smallholder coffee farmers' yields are often reduced because of technical problems. The most important one is the incoherence of variety and tree density adopted in relation to the elevation of the farm. In addition, the incorrect application of fertilizer, bad trimming practices, and improper shading according to coffee variety also contribute to reduced yields. Data from qualitative interviews in the departments of Madriz and Nueva Segovia indicate that the main reasons for low production of smallholder farmers per manzana are poorly managed coffee plantations, insufficient fertilization and low planting densities (Beuchelt & Zeller, 2011, p. 1320).

Even though coffee production is an important sector of the Nicaraguan economy, productivity has not changed significantly in the last 40 years. Production per manzana was fluctuating between 6 to 12q/mz green beans per manzana. Cafenica notes that the main reasons for this low productivity lie in the limited access to medium and long-term credits, limited investments in productive infrastructure, and limited knowledge of better agricultural and technological practices. Also according to Cafenica, Nicaragua has the potential to double or even triple its production by increasing productivity up to 20 q/mz green coffee (Cafenica, 2013, p. 6).

2.3.4. FARMERS' ORGANISATIONS

Many farmers organise themselves in agricultural cooperatives. The appearance of cooperatives began on a big scale after the Sandinista took over the government in the 1980s (Valkila & Nygren, 2009), and was strongly supported by public institutions (SIMAS, 2011, p. 12). Not many of these original cooperatives survived the neoliberal politics of the 90s (Bacon et al., 2008, pp. 268,269). Nevertheless, the number of organisations is continuously growing. In 2002, INFOCOOP¹² counted 881 registered cooperatives. Nine years later, in 2011, this number has already increased to around 1,260 cooperatives. SIMAS¹³ estimates that 48% of all smallholder producers in Nicaragua are organised in cooperatives. The umbrella organisation of 10 coffee cooperatives, Cafenica, has 10,885 farmer associates alone (Cafenica, 2013), which adds up to around a fourth of the coffee producers in Nicaragua.

Many small community level cooperatives organise themselves in unions. They provide economic, political and legal support to the smallholder farmers. Another very important element of their activities is that they assist their members in the form of technical assistance, scholarships to send children to school and sometimes even financially support some housing and healthcare expenses. They also act as bridging partners and connect smallholder farmers with speciality and certified coffee markets. Long-term partnerships with NGO's and socially responsible businesses are an important source of support for cooperatives (Bacon et al., 2008, pp. 268,269).

The farmers' organisations try to have more direct contact with buyers in order to skip the middlemen and traders and sell the coffee beans for a better price. This requires a certain level of organisational development, as it has to meet legal, quality and volume requirements for exporting. There are high transaction costs that act like barriers to the markets. The costs refer to taxes, technical assistance fees, cost of entry to speciality markets (certification, administration, and quality control costs) and export related fees (Petchers & Harris, 2008, p. 53).

2.3.5. Problems of coffee farmers

Coffee farmers face several difficulties. Table 5 summarises the problems of coffee producing households. The table is based on a list of (Panhuysen & Van Reenen, 2012, p. 6) and complemented with some more issues that were put forward by other researchers (Oxfam, 2005, p. 11; Petchers & Harris, 2008, p. 50; Valkila & Nygren, 2009; Morris et al., 2013, p. 460), see table 5. The highlighted issues: lack of farm credit, no direct market access and poor organisational management, are mentioned by a majority of sources and seem to be prevalent problems of the coffee producers in Nicaragua. Many of the problems are naturally interrelated.

¹² INFOCOOP stands for Instituto Nicaragüense de Fomento Cooperativo

¹³ SIMAS stands for Servicio de Información Mesoamericano sobre Agricultura Sostenible

	Smallholder level	Estate level	
Social issues Economic issues	 Food insecurity Low level of farm organisation Poor access to education and healthcare Gender inequality Ageing farmer communities Lack of farm credit No direct market access Poor organizational management Lack of market information Rising costs of living Low productivity Low coffee quality Ageing coffee trees Overdependence on coffee as single source of income 	 Labour abuse Access to clean water Poor living conditions Discrimination, gender inequality Lack of unionisation High casualization of labour Low minimum wages. Lack of participation in International debate 	
	Price fluctuation		
Environmental issues	Coffee tree diseases, changing weather patterns, conversion of primary forest habitat, loss of biodiversity and habitat destruction, soil erosion and degradation, agrochemical use and runoff, degradation of water quality and supply		

TABLE 5: DIFFICULTIES OF THE SMALLHOLDER FARMERS

Source: Based on Panhuysen & Van Reenen (2012, p. 6) complemented with Oxfam (2005, p. 11); Petchers & Harris (2008, p. 50); Valkila & Nygren (2009); Morris et al. (2013, p. 460)

A combination of these problems (e.g. rising food prices, price fluctuations, pests, droughts, possible health problems) causes coffee farmers to face extreme vulnerability (Morris et al., 2013, p. 460).

2.3.6. Limitations of coffee production

Most families are not able to sustain themselves with just the income from coffee. By strictly examining the net income from coffee alone, it is estimated that more than half of the households would live below the poverty line with some households even experiencing small losses (see table 6).

Beuchelt & Zeller (2011, p. 1321) had similar results with a study conducted in the departments of Madriz and Nueva Segovia with 327 cooperative members. They stated that per capita net coffee income is not high enough to enable the households to meet their basic needs, since per capita coffee incomes were below the national and international \$2 a day poverty line. This result was the same for conventional, organic, and organic-fairtrade certified farmers. Additionally, Bacon et al. (2008, p. 264) studied 177 conventional and fair-trade farmers and found that the average net coffee sales contributed to about \$0.38/day per person. It becomes clear that currently, coffee sales alone are not sufficient to eliminate extreme poverty. In order to meet the \$2 a day per capita benchmark only through coffee production (assuming a price to producer of 90 USD for a quintal), the average family in my survey with six family members and 2.9 manzanas of coffee would have to produce $18.4q^{14}$ to $33.1q^{15}$ per manzana. With a current average production of 13.2q/mz (standard deviation = 7.2), reaching a high enough productivity

¹⁴ Using the minimum production cost (Bacon, Mendez, Flores Gómez, Stuart, & Díaz Flores, 2008, p. 164).

¹⁵ Using a production cost of 70 USD per quintal (Varangis, Siegel, Giovannucci, & Lewin, 2003, pp. 12,30).

may be very difficult for some households. Currently, only five farmers have productivity above 18q/mz and six produce below 10q/mz. It is important to note that the necessary productivity to reach the benchmark depends heavily on the coffee price.

This clearly illustrates that in many cases, coffee production is not enough to provide the required resources for a coffee-producing household. Of course there is the option of planting

another crop or by acquiring additional land. Nevertheless, this process takes time and requires significant financial input, a measure that only very few farmers in the survey could afford. some farmers, coffee For production is not even a profitable option in the long-term, but the high switching costs out of farming coffee and lack of feasible alternatives keep them

100 01	TABLE 0: NET INCOME FROM COFFEE						
luiring		Scenario 1	Scenario 2	Scenario 3			
s, this	Average net income	2,990	1,748	1,081			
quires	Maximum	9,468	7,239	9,569			
ut, a r few	Minimum	-209	0	-59			
afford.	Per Capita						
coffee	Average per day /(PPP)	3.25	1.87	1.14			
fitable	Median (PPP)	1.7	1.07	0.57			
ut the	Households below the poverty index (out of 18)						
arming	\$2 a day (PPP)	10	13	15			
easible	\$1 .25 a day (PPP)	5	10	13			
from	Source: own data						

more coffee on the demise of TABLE 6: NET INCOME FROM COFFEE

moving out of coffee farming (Petchers & Harris, 2008, p. 57). Beuchelt & Zeller's (2011, p. 1321) citation of a NGO-expert (key-person interview, 13 May 2008) confirms that coffee in many cases is not enough to financially sustain a family: "We need to see what [coffee producers and their cooperatives] can do in addition to coffee, because you have producers which will not even escape the situation of poverty in which they are now even if the coffee prices reach 200 US\$ el quintal. If they do not have a diversification strategy and see how they can create other alternatives to generate income opportunities [...], the people will not escape their situation – producers with three manzanas which each produces four to five quintals [of coffee] and with seven children – not even if they earn 250 US\$ [per quintal] or more".

3. The Thin Months – a recurring period of food insecurity

3.1. Theoretical approach to food security

3.1.1. The concept of food security

The concept of food security emerged in the mid-1970s (Food and Agriculture Organization, 2003, p. 26) and evolved over time (Caswell et al., 2013, p. 2). Since then, there has been a multitude of literature published on the subject. Already in 1992, Maxwell & Smith (1992, p. 4) counted more than 180 attempts to define and explain the concept of food insecurity. The initial focus concentrated on food supply problems (availability) and to some degree, price stability of basic food (Food and Agriculture Organization, 2003, p. 26). While the FAO acknowledges that food security has been a "flexible" concept (Caswell et al., 2013, p. 2), it now uses the following definition that was developed at the 1996 World Food Summit: Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization, 2008, p. 1).

This definition includes four main dimensions of food security. For food security, all four dimensions must be fulfilled simultaneously.

Physical AVAILABILITY of food	Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade.
Economic and physical ACCESS to food	An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives.
Food UTILIZATION	Utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet, and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals
STABILITY of the other three dimensions over time	Even if your food intake is adequate today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status.

TABLE 7: DEFINITION OF FOOD SECURITY

Source: Food and Agriculture Organization (2008, p. 1)

People who are food insecure are experiencing periods of insufficient food, insufficient dietary diversity, or are vulnerable to this risk (Caswell et al., 2013, p. 2). Food security is strongly affected by livelihood, a central element for the general wellbeing of a household. Therefore, the term "livelihood security" has already gained prominence (Rose, 2008, p. 163). A stable livelihood is necessary for a household to be food secure (Morris et al., 2013, p. 461).

3.1.2. TYPES OF FOOD INSECURITY

The FAO defines two types of food insecurity: chronic food insecurity and the transitory food insecurity. Chronic food insecurity refers to a long-term or persistent situation. It results from poverty, inadequate access to productive or financial resources, and lack of assets (Food and Agriculture Organization, 2008, p. 1).

On the other hand, transitory food insecurity is temporary and short-term as a result of a sudden drop in the ability to produce or access enough food. The reason for such food insecurity lies in short-term shocks and fluctuations in food availability and access, including yearly variations of domestic food production, food prices and household incomes. Compared to chronic food insecurity, transitory food insecurity is less predictable as it can emerge suddenly, which makes planning of an intervention more difficult (Food and Agriculture Organization, 2008, p. 1).

Seasonal food insecurity, as in the case of the Thin Months, thereby falls somehow in between these two concepts. The predictability emphasises the chronic characteristics. But since seasonal food insecurity is of limited duration, it can also be seen as transitory food insecurity. It is characterised by a cyclical pattern of lack of availability and access to food. The reasons for this phenomenon lie in "seasonal fluctuations in the climate, cropping patterns, work opportunities (labour demand), markets and disease" (Food and Agriculture Organization, 2008, p. 1).

3.1.3. DIFFERENT ASPECTS OF HOUSEHOLD FOOD SECURITY

In order to plan effective programs for reducing food insecurity sustainably, researchers are trying to understand the specific nature of household's subsistence. The main focus thereby lies on three aspects of household food security: the understanding of vulnerability, the emphasis on livelihoods, and strategies to support the food insecure people in managing the risks (Rose, 2008, p. 162).

a. Vulnerability

Vulnerability in the context of the food insecurity "is the probability of an acute decline in food access or consumption due to hazards in the physical or social environment" (Rose, 2008, p. 163). Hazards can be climatic disturbances, such as floods and droughts, or manmade disturbances such as civil wars and price fluctuations (Rose, 2008, p. 163). People can be vulnerable to food insecurity, without actually experiencing hunger. To avoid threats to food security in the future it is important to decrease this vulnerability. There are two main intervention options: first, to reduce the degree of exposure to the hazard, and second, to increase the ability to cope (Food and Agriculture Organization, 2008, p. 2).

b. Livelihoods

Livelihood refers to a household's "capabilities, assets and activities that are required to secure basic needs - food, shelter, health, education, and income", or in short the household's means of support or subsistence (Rose, 2008, p. 163). Most of the poor households in the developing countries have a diversified portfolio of income streams, such as production of staple food, production of cash crops, small livestock, fruit trees, farm or non-farm employment, fishing or hunting, and artisanal sales. It is important to understand the individual contribution of each economic activity for a household to see which types and what magnitude of interventions are

required as a response to a particular event. The household's physical, financial and human (education, skills, health) capital are central elements of the livelihood approach as they are the basis of the ability to generate income. In order to improve food security, it is important for households to maintain their assets in times of food security shocks and to enlarge it in better times (Rose, 2008, p. 163).

Additionally, Ellis (2000a) highlights the importance of social capital (social networks and associations) and natural capital (natural resource base). How these assets can be used is mediated by social factors (social relations, institutions and organisations), exogenous trends (e.g. economic trends), and shocks (disease, floods, drought, pests).

Morris et al. (2013, pp. 439,440) put forward that many of the assets that contribute to food security overlap and also

FIGURE 8: KEY ASSETS FOR FOOD SECURITY AND LIVELIHOODS



Source: Morris et al. (2013, p. 440)

affect livelihoods, which makes it more difficult to isolate the factors that drive household food insecurity. The key assets of a coffee-producing household include access to income, labour, land, small livestock, and support networks, see figure 8.

c. Managing risks

According to Rose (2008, p. 164) the literature also puts an important focus on "strengthening a household's or community's ability: (1) to prevent a shock, or negative event, from occurring; (2) to mitigate, or lessen, the effects of a shock that might occur; and (3) to cope with a problem once it has happened."

The first two might have some overlaps, as they are both ex-ante, while the latter is ex-post since it is only implemented after the shock has already occurred.

The prevention strategy seeks to reduce the probability of an event that impacts food security negatively. For example, events like droughts and low rainfall can lead to a situation where food availability is limited. Strategies taken against such an event could be improving the rural infrastructure, or to build irrigation systems, storage facilities, and markets. Furthermore, some strategies can be tackled on the household and community level, such as increasing or securing the income sources so that the households can afford to purchase food in the case of such events. Last but not least, there is also the option to invest in household assets- for example, the investment in human capital through education, which can assist a family's food security (Rose, 2008, p. 164).

The mitigation strategy seeks to minimize the potential impact of a hazard that might influence food security negatively. One way this could be accomplished is through diversification of income sources so that a household can respond better to shocks. In case there is a high risk of a year with very little rainfall for example, it may be sensible to plant more drought-resistant crops to keep damage low in case of such an event. Another strategy might be non-farm wage labour (Rose, 2008, p. 164).

Finally, the coping strategies are a relief, emergency response that fall under the safety net approach. Measures can include direct assistance to increase access to food, which can improve a household's food security and also have a positive effect on preserving their assets. Coping strategies can have a long term effect such as eating the next year's seeds or selling off livestock, or property, which can endanger the future earning power of a household (Rose, 2008, p. 164).

3.2. COFFEE FARMERS AND FOOD INSECURITY

Coffee production areas are often isolated rural regions that are exposed to multiple food insecurity risk factors such as: depletion of natural resources from which the population makes its living, degradation of the environment, shocks (such as natural disasters and conflict), and seasonal changes in food production and food prices (Caswell et al., 2013, p. 4).

Periods of food insecurity in coffee-growing communities most often take place during (1) the rainy season when travelling and delivery of goods is compromised (Caswell et al., 2013, p. 5), and/or (2) in the planting season for food crops (June to September), when scant resources from the previous year's crop are directed to the application of farm inputs (Morris et al., 2013, p. 438) and/or (3) the early months of the coffee harvest before payment for the current year's crop has been received (Caswell et al., 2013, p. 5). Food insecurity periods vary from restrictions to staple food (risk of malnutrition), to an insufficient intake of calories, to skipped meals and reduction of portions (Caswell et al., 2013, p. 5).

Several studies show that many coffee producers in Central America are not making sufficient income to sustain their families throughout the year (Sustainable Food Lab, 2008, p. 42). See table 8 from Caswell et al. (2013, p. 5) that lists studies that have provided empirical data on food insecurity in coffee regions. Food insecurity is a global phenomenon that touches all coffee farmers, whether they produce robusta or arabica, and whether they do conventional or organic farming (Caswell et al., 2013, pp. 9,10).

In Nicaragua, the most prevalent seasonal food insecurity occurs between May and August (the Thin Months) when the food plots are actively managed. Therefore, the present thesis will focus this specific food insecurity period. However, one needs to be aware that there exist several periods of food insecurity and that different coffee producers may be most affected during different periods. While a big majority of the surveyed farmers responded that they experience the most difficulties between June and August, the participants of a focus group (FG2) revealed that they only perceive the months of November and December as difficult. This may be explained by the fact that for nearly all the participants of that group, coffee is the sole income and they do not grow food crops. Appropriately, the period in which resources are most scarce takes place right before they get their once-a-year payment for their coffee yield and require significant financial resources to pay the costly harvest (e.g. harvest wage labour, coffee bags, investments in their mill and pulping machine).

Region	Study size	Study type/Research date	% Experiencing Food Insecurity	Reference
Nicaragua, Guatemala, El Salvador, México	469 households	Stratified survey, 2004-05	63% struggle to meet basic food needs	Mendez et al. (2010)
Northern Nicaragua	177 households	Participatory Action Research (focus groups, surveys, and long term case study), 2006	69% unable to meet basic food needs at some point	Bacon et al. (2008)
Nicaragua, Mexico, Guatemala	179 households	Household level surveys and interviews (unpublished), 2006, 2007	31% in Mexico, 44% in Nicaragua, and 61 % in Guatemala are unable to meet food needs at some point of the year	Fujisaka (CIAT), 2007
Western El Salvador	29 households	Semi-structured interviews, 2008	97% Unable to meet basic food needs at some point	Morris et al. (2008)
Northern Nicaragua	256 households	Stratified survey and household interviews, focus groups, anthropometric measures (unpublished), 2009/10	82% unable to meet basic food needs at some point	Bacon et al , unpublished
Northern Nicaragua	87 households	Household surveys and interviews stratified by participation in food security initiative, 2009	100% unable to meet food needs at some point during the year, average of 3 months of food insecurity/year	Pino, unpublished
Dominican Republic	41 households	Participatory Action Research, 2011	82.9% have trouble covering basic food necessities	Gross, 2011

TABLE 8: PREVIOUS RESEARCH ABOUT FOOD INSECURITY AMONG COFFEEFARMERS

Source: Caswell, Méndez, & Bacon (2013, p. 5)

To give a complete picture on food insecurity in Nicaragua it must be acknowledged that coffee producing households, despite many difficulties, are generally better off than other smallholder farmers and rural workers of the drier and lower regions in the north (Bacon et al., 2008, p. 264).

3.3. FACTORS CAUSING THE THIN MONTHS

3.3.1. INTRODUCTION TO THE THIN MONTHS

In Nicaragua, the coffee harvest starts in November and ends in late February. By the end of May, most of the funds from coffee are already depleted and the supply of maize and beans from last year's harvest has run out in many homes. This happens at a time when the prices of staple food reach the peak of the year. As a consequence, many farmers are unable to meet basic household needs and are left with a shortage of food and limited financial resources for several months. This period of scarcity ends around September, when the new crop of maize and beans are ready for harvesting (Sustainable Food Lab, 2008, p. 39). The Thin Months are an annually recurring period that some coffee farmers refer to as the "meses flacos"¹⁶.

While it has always been known within the coffee industry that poverty is an issue among producer households, persistent predictable hunger has long been a reality not spoken of in

¹⁶ Another term that is used is: "los meses de los vacas flacas" (engl. the months of the thin cows)

coffee buying circles. Rick Peyser, the Director of Social Advocacy and Supply Chain Community Outreach of the Vermont-based Green Mountain Coffee Roasters, Inc. (GMCR), comments this "It is a big issue and it is a mystery to me that something so commonplace at origin is not spoken of in the halls of the industry" (Sustainable Food Lab, 2008, p. 42).

Only in 2007 did researchers start to identify the seriousness of the Thin Months among coffee producing households. New results have redirected considerable development support to smallholder farmers in the form of livelihood strategies intended to improve food security.

Additionally, the speciality coffee industry has since begun to address the seasonal food insecurity among coffee farmers (Morris et al., 2013, p.459). GMCR put a special effort into this issue and already in 2006, commissioned the International Centre for Tropical Agriculture to conduct a study on the topic (Fujisaka, 2007). Based on the shocking results, many development organisations such as Save the Children and Food 4 Farmers have launched projects aimed at improving food security among



FIGURE 9: THE CAUSES OF THE THIN MONTHS

Source: own illustration

smallholder coffee farmers (Morris et al., 2013, p.459). Figure 9, shows a simplification of the issues that combined, are causing the Thin Months. The following chapters will explain in detail how these elements influence the months of scarcity.

3.3.2. Impact of The climate on maize and beans

a. Production cycle

Coffee is produced in the Pacific part of Nicaragua which has a tropical to sub-tropical climate and even temperatures throughout the year (Alfsen , De Franco , Glomsrod , & Johnsen, 1996, p. 132). Precipitation ranges mainly from around 1,000-1,800mm per year with some highly elevated regions accumulating more than 2,500mm. The rainy season takes place between May and November (Morrás Dimas, 2004, pp. 30,31). During the dry season, there is virtually no rain and the trees and plants start to dry out. Once the rain starts again around May and June, everything starts growing and the plants turn green and start to blossom. In August and September it mostly rains once a day (Average Weather and Climate in Nicaragua, n.d.). This seasonality is very important for the farmers as it only allows a certain agricultural cycle. For the traditional staple food production (e.g. maize and beans) the year is therefore divided into three growing periods: the "primera" from May to August, the "postrera" from September to December, and the "apante" from January to April.

As chapter 2.3.1. (*household and farm characteristics*) already demonstrated, most coffee producers also cultivate some maize and/or beans. After harvesting this staple food, they dry the maize and beans and store them inside their home. The period immediately following the

food crop harvest is characterised by very low food insecurity as households have abundant food. Some producers sell a portion or their entire yield when their income is low and they need cash money, for example, at the beginning of the coffee harvest. A couple of months later, many farmers have to purchase staple food for family nutrition, because their storage is depleted (Morris et al., 2013, p. 434,438).

This yearly cycle of maize and beans production and the fact that many farmers sell part of their yield, leads to a situation where often coffee producing farmers have run out of basic crops as early as May. Accordingly, in the field study conducted by Morris et al. (2013, p. 434) 29% of the participants stated that the reason for the periods of hunger was that the family ran out of dried corn and beans. Further, it was discovered that the size of owned land did not matter, as households with bigger properties were equally likely to run out of staple food as those with smaller landholdings.

b. Price

The seasonality of staple food production also impacts the respective prices that vary accordingly with supply and demand. The seven farmers represented in the survey who sold some of their beans were compensated at very different prices that varied from 23 to 34 USD¹⁷ for a quintal. Similarly, maize was sold between 8.50 and 15 USD¹⁸ for a quintal. Nicaragua's Ministry of Agriculture and Forestry (MAGFOR) even shows a larger variation in their database where prices of maize fluctuate from 10 to 33 USD, see figure 10.

The price to producer depends mainly on the supply and demand of the product. Staple food prices tend to fluctuate with the climatic season, in conformity with the production cycle. During the harvesting period, there is an oversupply which results in low prices. As demonstrated in the previous chapter, the harvesting periods take place in the primera (August and September), postrera (November and December), and apante (February and March) (Food and Agriculture Organization, 2012a, p. 37). The largest availability of beans in Central America is between November and December when the postrera is harvested. See table 9. Nicaragua compared to other Central American countries, stands out with its big production of beans in the apante, giving producers an advantage to receive better prices during times of shortage in neighbouring countries (IICA, 2007, pp. 47,48).

-		-		
	Primera	Postrera	Apante	Total
	August/September	November/December	February/March	
Tonnes	29,615	54,555	71,701	155,871
Percentage	19	35	46	100

TABLE 9: PRODUCTION OF RED BEANS IN THE DIFFERENT GROWING PERIODS

Source: IICA (2007, pp. 47,48), based on data from 2005

Figure 10 shows the different prices paid to producers in 2011 and the influence of the climatic production cycle. While both maize and beans have a peak in July, the beans don't seem to fluctuate only seasonally. The reason for the high price of beans at the beginning of year 2011 is that nearly a third of the harvest was lost due to a lack of rain in December (La Prensa, 2011). Naturally, climatic events or plagues can diminish supply significantly and result in a price jump.

¹⁷ 550-800 NIC

¹⁸ 200-350 NIC

An additional factor that influences the price paid to producers is the farmers' knowledge about the market and their ability to sell the product at a good price. Such negotiation capabilities play a key role, especially for farmers who are new to this activity and don't know the market. Taking

into account the low education level and that many farms are located far away from urban centres, negotiating a good price can be very difficult.

In conclusion, the climatic conditions of Nicaragua lead to a situation where the prices of the most basic nutritional products in Nicaragua are very elevated during the times when many coffee producing households already have difficulties acquiring enough food to





Source: based on Magfor (2013)

cover daily basic household needs. Accordingly, in the field study conducted by Morris et al. (2013, p. 434) 14% of the surveyed households cited that the high cost of basic goods contributes to their food shortages.

3.3.3. Impact of The climate on the coffee cropping pattern

The climate also lends to a certain coffee growing cycle. The beginning of the rainy season triggers the coffee plant to flower (OIRSA, 2000, p. 15). About eight months later, between November and February, the coffee fruits are ripe and ready for careful harvesting. Since most coffee producing families rely heavily on the income from the annual coffee harvest, they receive only one or two lump sums just after the harvest, rather than an income that is spread evenly throughout the year (Morris et al., p. 458). In May, many families have already spent the majority of their income from the coffee harvest, but must wait another six months for the next coffee payment.

3.3.4. Impact of The cropping pattern on available wage labour and economic alternatives

During the period of the Thin Months, there is also a lack of economic alternatives (Peyser & Mares, 2012, p. 109). A large amount of work needs to be done during that period (e.g. maintenance of coffee trees and food crops), but most farmers lack the financial means to pay farm workers. Furthermore, since a major part of the rural population in coffee regions is employed in this sector, the whole region's economy usually depends on coffee. Therefore, the local economy as a whole runs on a low level during the Thin Months. Two owners of a small convenience store explain that between June and September people only buy very few things in their store and usually only basic products. M.B. says that her store, located in the rural zone of

Tuma la Dalia, sells products worth about 85 USD¹⁹ a day during the harvesting season. During the Thin Months, her sales only amount to about 34 to 43 USD²⁰ (CS4). In general, people don't have money to spend, be it on products or on human labour. Only very few businesses are not affected by this seasonality, as for example, tourism.

Accordingly, half of the surveyed farmers in Morris' field study indicated that the main reason why they experienced the period of shortages is that there was no work in their community and therefore no income (Morris et al., 2013, p. 433).

3.3.5. Impact of loans on available income

Taking out loans is an additional element that complicates the situation of the Thin Months. Farmers are very dependent on financing options. In general smallholder farmers finance their activities through savings from profits of their yields (SIMAS, 2011, p. 11), but some also draw on a credit. Most of the credit service for smallholder farmers is provided by the private sector, private banks, and micro-finance institutions. Households who are organised in a cooperative or as part of a farmers' association often also have the possibility to take out loans from their respective organisation or from an NGO, but this support only reaches very few farmers in Nicaragua (SIMAS, 2011, p. 11). Many producers do not have access to credit, because they are not considered to be creditworthy (Chemonics International, Inc. , 2002, p. 52).

Nevertheless, in my survey thirteen out of eighteen farmers indicated to have a credit of an average amount of 750 USD (standard deviation = 752 USD). This number may be above average because the sample of the survey is comprised of many farmers that are part of a cooperative or a farmers' organisation and therefore have better access to loans. Nevertheless, even some of the participants who were part of an organisation took out a loan from a private institution as some cooperatives and financial institutions would only issue a credit for certain activities (e.g. just for investments in the coffee cultivation) (F. Zamora, personal communication, December 4, 2012). In case a household wants to invest in another activity or they need the loan for buying nutritional products for sustaining their family, they may need to find another lender. One option may be to buy food on credit or to take out a loan from a person in their community.

Often coffee farmers take a credit in form of an "adelanto" (engl.: advance money), which means that they sell part of their future yields. When they can finally harvest, they need to pay back the borrowed money plus interest in form of the "adelanto" coffee or food crop.

Access to credit is very important for smallholder farmers, as a loan can provide them with the necessary financial capital to build up a new activity, an initial investment. A loan during the Thin Months can also be very crucial for the productivity of coffee as neglect of the coffee plants can have a significant negative impact on the quantity and quality of future yield. So M.B. says "There are people that [because they have no access to credit] abandon their plants that are still developing. You know that one needs to take care of his plants" (C4).

¹⁹ 2,000 NIC

²⁰ NIC 800-1000

Nevertheless, if the credit is spent on unprofitable things, or the credit has bad terms (e.g. high interest rate or short timeframe), credit will only increase the future problems of the household. A farmer may for example have to sell newly harvested maize when the price is low just to pay back his debt, even though it would be more profitable to sell it a couple months later for a higher price. C.B.G. for example sold all her maize for 10 USD per quintal after harvesting it in November to pay back her credit of 340 USD plus interest of 3% a month (CS8). This practice of selling staple foods after the harvest and then buying the same food later at higher prices has also been documented by other researchers. While selling the maize made sense as C.B.G. had to pay back the credit, it also had the disadvantage of reducing the amount of staple food that is available to her family later in the coming year (Morris et al., 2013, p. 438).

Borrowing money has the negative effect that households have to give away a major part of their income from coffee to repay their loans. The resulting lower income then makes it harder to save for the next period of The Thin Months, so they usually have to take out a loan again when the coffee plants ask for costly investments and resources are scarce. Therefore, if the credit is not used efficiently, it contributes to the problem of the Thin Months. Accordingly, F. Zamora (personal communication, December 4, 2012) states, "and the majority of the coffee producers use the loans they are getting, if they can, to make a living during the Thin Months, and they say we will pay it with the coffee at the end of the harvest. But this is not an integrated solution, but only a temporary solution. Because if in the coming year they don't obtain a credit, in that case they'll have a very serious problem".

In case the credit is invested in the coffee plantation, it is profitable if the additional gross income from coffee minus the invested credit plus interest rate and minus the additional variable costs (e.g. labour input, material requirements) is bigger than zero. In case the equation is negative, the loan does not generate any profit.

$\label{eq:additional gross income-(credit+interest)-additional variable \ cost>0$

Therefore, in case a farmer is taking a credit, it is important to make sure that it increases the productivity of the farmer sufficiently. In case the farmers don't manage to increase their profit by using the loan, they risk entering a vicious cycle. F. Zamora (personal communication, December 4, 2012) comments "And if it [the credit] does not help them to increase productivity, because they are not applying the fertiliser adequately, nor the control of pests, nor an adequate pruning. In that case it is a vicious circle. They are producing only to pay the credit, but don't increase their productivity and are always in this cycle. And they don't get out of this cycle. And if suddenly the interest rate increases they may lose their farm, in case they deposited it as security. So it [credit] is not a solution [to the Thin Months]. This is the wrong approach" (F. Zamora, personal communication, December 4, 2012).

3.4. EFFECTS OF THE THIN MONTHS

The effects of the Thin Months on coffee producing households can be very different depending on many elements such as the specific composition of the family, their income portfolio, the environment, their coping capabilities, etc. In the survey taken, eleven out of eighteen farmers

FIGURE 11: EFFECTS OF THE THIN MONTHS

reported suffering from difficult months (average = 3.3 months), but their specific problems and the extent to which they suffered varied a lot. While some households where short of money and had to economise more than usual, others had no food and money left and had to find something to eat on their farm or elsewhere. In one focus group, the participants agreed that the



Source: own illustration

most affected households are large families with a lot of children in school and little resources, and the families who suffer from health problems (FG1).

The surveyed farmers responded to having the following problems during the "difficult months": shortage of money (e.g. no work, no income to cover the costs, lack of money for investments in the coffee, lack of money to pay the workers, there is nothing left to sell), shortage of food (only eat maize and beans, food is expensive). Figure 11 shows how the different elements are connected. Most often the farmers mentioned "shortage of money", "shortage of food" and "change of diet".

I will discuss these elements and some additional ones in the next subchapters.

3.4.1. NO INCOME, NO MONEY

During the Thin Months most coffee farmers don't harvest any agricultural product and there are very little work opportunities. In short, this means that they don't have any income possibilities. It is clear that lack of income opportunities and the shortage of food and money are correlated both ways. Because many farmers are affected by the Thin Months, most of them also lack the financial means for employing workers to help them on their coffee plantation and with their staple food production. At the same time, low employment contributes to the severity of The Thin Months even more as farmers can't find employment and therefore lack the necessary income.

Shortage of money implies also that many smallholder farmers are not able to invest enough money into their coffee plants, which may explain part of the low productivity of the smallholder farmers (see chapter 2.3.3.). In 2007 field study conducted by Fujisaka, it was discovered that 23% of the surveyed Nicaraguans thought that they had not been able to cover the desired investment cost into their coffee enterprise. Only a third said that they had met all investment
needs. Investments included those of weeding, pruning, pruning of shade trees, fertilization and harvesting (Fujisaka, 2007, p. 3). The lack of sufficient resources to invest in the coffee plantation has an important impact on productivity, and in this way, indirectly increases the duration of The Thin Months of the next year.

While indeed many farmers do not have any income during the Thin Months, some farmers do have one. A few of the surveyed farmers were employed during the Thin Months or during part of it. Others have a small business such as a tiny convenience store, or they sell some of their livestock products, like eggs. However, most of these businesses are running on low level during The Thin Months, because people in their community don't have money to buy things (see chapter 3.3.4.).

Furthermore, it may also happen that a farmer has employment during the Thin Months, but that his employer is unable to pay right away, which again puts a lot of financial pressure on the household.

3.4.2. Shortage of food

Results from previous studies show that food insecurity is indeed a major issue in coffee producing regions in Latin America. In the survey, a third indicated that they suffer from food insecurity during the Thin Months. Nobody expressly indicated that his household members are suffering from hunger, but rather that they had to change their diet significantly. A reason for this may be that many families grow a majority of their household consumption by themselves. In a field study with 177 households in Nicaragua (Bacon et al., 2008, p. 264) find that most households (65%) surveyed grow more than half of the food they eat. Consistent with these results, 66% of the farmers in my survey indicated that they produce essentially all of their maize and beans - the major part of their diet, for household consumption by themselves. So during the Thin Months, many families still have some maize and/or beans, but they are lacking the financial resources to buy additional food products that they would usually eat.

There are also some farmers that reduce food intake during the Thin Months. In the Case Studies some farmers recounted that they have had a lot of difficulties in nourishing their families during the Thin Months and have had to cut back on food (CS4, CS5). Also the fact that the interviews took place during times of abundance (September to November) may have had an impact on the responses. It is apparent that some coffee farmers in Nicaragua do indeed reduce food intake during the most difficult time of the year. Accordingly, in a field study in El Salvador, Morris et al. found that 25% of the farmers reported eat less during The Thin Months (Morris et al., 2013, p. 434).

3.5. FARMERS' RESPONSES TO THE THIN MONTHS

Household members use a variety of ways to respond to the periods of food shortage. To help ensure household food security, smallholder coffee farmers use harvests from their farm land; family, community and social networks; monetary income, including revenue from coffee sales; and credit (Bacon et al., 2008, p. 264). Some strategies are: borrowing money from family and

friends (29%), eating less (25%), changing their diet (25%), borrowing food (25%), selling chicken (17%), seeking other work (14%), and using their savings (7%). The focus groups in the Morris et al. study (2013, p. 434) also revealed that some households decided to take one or more children out of school when the family was facing difficulties in providing enough food for the household. Some parents also mentioned that they skipped one or more meals per day, in order to have enough food left for their children.





Source: own illustration

In my survey, the farmers were asked what they did to combat these difficulties in the Thin Months. The results show that household food security was pursued through strategies like saving money for food and cases of illnesses, saving staple food, seeking work somewhere else, growing more staple food, drawing on a credit, buying food on credit, selling staple food, selling eggs and chicken, increasing productivity, eating what they find on their property (e.g. oranges, banana), and changing their diet. Figure 12 shows the farmers' responses to the specific problem. The most common responses were saving money (n=4) and saving food (n=5).

The responses of the farmers can be split up into prevention and coping actions. Prevention measures are the options of saving money/food, increasing productivity, and growing more staple food. Typical coping strategies are reactions like eating what they can find on their property, taking a credit, seeking for employment elsewhere and the change of diet. As *after* the Thin Months is *before* the Thin Months, classifications like this are not stringent, because one strategy may be more than one thing. Seeking work elsewhere or taking out a loan for example can be preventative and coping, depending if this action was taken as a preparatory measure or as a response.

The next paragraphs will describe some responses of the smallholder coffee farmers.

3.5.1. CHANGE OF DIET

Change of diet is not just a result of shortage of food, but it is also a response. A fourth of the surveyed persons indicated that they eat different food during the Thin Months. Such a change of diet may turn into malnutrition. Households that grow basic crops and store enough for a whole year's consumption may rely on their food savings and thus guarantee enough basic food for their family. Many farmers indicated that they live only on maize and beans and abstain from products such as rice, cheese, chicken, meat and oil during the months of scarcity. One surveyed woman, who indicated that she experienced the Thin Months from April to October, mentioned that her family normally eats meat once a week, but during the Thin Months they abstain from it. Farmers that don't grow staple food need to pursue other strategies in order to sustain their families. One farmer that only grows coffee reported that her family only eats bananas during times of economic scarcity, as they can find them easily on their farm.

Access to land is a big advantage for coffee farmers, as it opens up many options for coping strategies. Households can always try to find something to eat on their farm or grow some food crops that provide them with the most basic food during difficult times. On the other hand, landless farmworkers employed in the coffee sector don't have the advantage of such coping strategy options. So A. J. Márquez Garcìa (personal communication, November 11, 2012) says, "It is difficult to innovate, when you don't have a place to live, when you don't have a farm to live, when you have no lot of land where you can grow some beans. It is very difficult to innovate when you are extremely poor".

3.5.2. Use savings (money/food) and sell something

The use of savings may be closely related to selling something. Some smallholder farmers save some money or basic crops for times of economic scarcity. Frequently, the farmers don't save in terms of money, but keep certain agricultural products, such as small livestock (e.g. chicken) that they can turn into cash quickly in situations when they need it. J.R. for example, says that she saves a little bit of her maize, beans and coffee so that she can sell it in more difficult times (CS2). 3.5.3. Draw on a credit

One important coping strategy for obtaining the necessary food is to buy food on credit. Many smallholder farmers may have difficulties obtaining a credit from a proper institution, because they are mostly not considered creditworthy or may only get money for a specific investment. However, farmers can usually buy products on credit in local convenience stores. E.L. owns a convenience store in a small community about one hour from Matagalpa. He explains "the people always buy on credit and pay back later. The majority takes about NIC 3000-4000 [125-170 USD] and then pay back. But there are others that take around NIC 20'000 [850 USD]. Some also take an adelanto. For example the ones who want to pay back their debt quickly, they promise me some quintales." For this purpose E.L. keeps a notebook for each of his clients where he writes down every product they buy and when they pay him back. He also has a list of families that haven't paid back well and therefore always have to pay in cash.

3.5.4. Seek employment elsewhere

During times of scarcity, farmers move to other regions or countries in search of an income to sustain their families (Baca, 2013). Many try to find employment on bigger coffee farms, in the city, or even abroad. One woman for example, reported that it takes her husband 2-3 hours to walk to work every day. Another woman, with very limited resources, said in a group discussion, "My husband goes to work on a hacienda and I stay home waiting. Sometimes they don't pay. Thus we have a crisis."

In his study, Bacon reported that a third of the surveyed households have at least one family member who emigrated during the last two years, of which 28% explained that they emigrated for economic reasons. The most popular destinations were other Central American countries (69%) followed by the USA (10%) (Bacon et al., 2008, p. 264). Migration creates dissociated families, which becomes an increasing social problem in rural communities (Baca, 2013). In my survey, only a few participants had family abroad (e.g. husband, children), all of whom were working in Costa Rica, as salaries there are higher compared to the domestic labour market.

3.6. Farmers' ideas of how to avoid the Thin Months

When farmers were asked how it would be possible to avoid these difficult months (Spanish: ¿Cómo sería posible de evitar estés meses difíciles?), many farmers didn't have any ideas. It seems that there is a generalized apathetic response to The Thin Months. Many coffee producers seem to have accepted the fact that every year brings a couple of months that are very difficult.

The surveyed farmers, some after being asked repeatedly, had the following ideas of how to avoid the Thin Months: Saving more, seek employment, work harder, increase stock of chicken so that they can sell them during difficult times, start a small business (for example sell nacatamales²¹), open a bakery for maize tortillas, breed livestock, produce more agricultural products, take out a loan, have a little bit of everything (diversifying), and increase productivity.

Different farmers take very different approaches. In order to answer some relevant questions about the Thin Months I conducted three focus groups. The results show that households take different approaches to a solution and may also need different intervention strategies and support. The following table 10 demonstrates the results from different groups when farmers were asked what we could do against the Thin Months.

²¹ Nacatamales is a traditional dish that is usually eaten on sudays in Nicaragua. It is a small steamed cake of dough made from maize with typically a small filling of meat.

Table 10: Concluded results from the focus groups

Focus Group 1			
Characteristics			
8 mixed participants.			
The cooperative was located about two hours away from the next small town. The majority of the farmers			
don't have electricity and there is no mobile phone signal. Most farmers have very little land (around 1-4			
manzanas) and poverty is widespread. The participants were very shy.			
Ideas of how to avoid the Thin Months			
Sell something (e.g. chicken), to cover their needs			
• Plant maize and vegetables during the dry period of the year with the help of irrigation tubes in order			
to assure food			
ightarrow This idea has probably come to mind, because a handful of very poor farmers in the community are			
participating in a drip irrigation project of the cooperative ²² .			
Help the families that are suffering the most			
Help the men with their work.			
The women who put this idea forward argued that women would have time to help and that women			
could produce maize and beans.			
Focus Group 2			
Characteristics			
6 male participants.			
The cooperative benefits from ideal climatic conditions for coffee. The cooperative is very small, where most			
associates have 5 to 15 manzanas. With very few exceptions their sole income is from coffee. When asked			
what the difficult months of the year are, they indicated the preharvest period (October, November).			
Ideas of how to avoid the Thin Months			
Increase productivity of the coffee trees			
Find a buyer for Fair Trade Coffee			
The cooperative does have a Fair Trade certificate already for some years but hasn't been able to find a			
Fair Trade buyer yet and is selling it all as conventional coffee.			
Diversification			
While they are not at all excited by idea of producing another crop for income, they have many ideas in			
the non-farm sector: a project with tourism, building a diner, opening a sewing business with the			
women of the cooperatives, opening a convenience store in order to offer lower prices to the			
community, opening a tortilla bakery.			
Focus Group 3			
Characteristics			
8 female participants.			
The community is located about 20 min from a small town with public transport. Monetary income comes			
mainly from coffee, agricultural wage employment and tourism. The majority of the participants also			
produces some maize and beans for family consumption.			
Ideas of how to avoid the Thin Months			
Working with tourism			
Some women in the community are already participating in a tourism project of their cooperative			
Diversification			
Family gardens			
• Cultivate pipian ²³ and use part of it to sell it on the market and another part for family consumption			
Save money			
Seek for employment in the city			

Source: own data

²² With irrigation systems by iDEal technologías.²³ also called cushaw pumpkin

3.7. Strategies to alleviate the Thin Months

3.7.1. Three necessary conditions to avoid the Thin Months

Total income does not seem to be the sole factor that influences the occurrence of the food insecurity. Accordingly the survey, four out of ten households who have an income above the poverty line of \$2 a day (PPP)²⁴, reported suffering from the Thin Months. Several points become clear regarding the needs of a coffee-producing household. Two key interrelated challenges of attaining food security are to produce sufficient food for household consumption and income generation and to reach a total income that is high enough and well distributed throughout the year (Morris et al., 2013, p. 438). In a nutshell, the following three criteria need to be fulfilled on the farmer's level in order to avoid the Thin Months:

TABLE 11: THE THREE CONDITIONS

1	Total income	The household needs to have a large enough total income plus in-kind income to sustain the family and to do the necessary investments on the farm for a whole year.
2	Distribution	The total income plus in-kind income need to be distributed evenly so that it's sufficient for every day of the year, including the Thin Months.
3	Vulnerability	The household's vulnerability needs to be lowered, so that even in a difficult year the first two conditions are given.

Source: own illustration

For a sustainable solution to the Thin Months, all three points must be fulfilled. Clearly, there are many options on different levels (e.g. buyers, estate level), as for example providing the farmers with higher fixed prices of coffee. However, I will not consider these options in this chapter and will only concentrate on farm level strategies.

A household whose only income comes from coffee but does not fulfil criteria number one, has several options:

- Increase production of coffee
- Increase productivity of coffee
- Sell coffee for a better price
- Start producing other things on-farm
- Find employment or self-employment in non-farm or off-farm activities

Obviously they can also apply a combination of these strategies.

In case a household fulfils criteria number one but not criteria number two in which the family faces shortages of food and money during the Thin Months despite a theoretically sufficiently high total income, there are several options for the farmer:

- Distribute the income plus in-kind income more evenly so that it also lasts for the Thin Months
- Start an activity that provides the household with income during the Thin Months, in order to fill the gap:
 - Deal with the climate (e.g. by using irrigation) and grow a crop for consumption and/or commercialisation that is harvested during the Thin Months.

 $^{^{24}}$ By using the data of Varangis et al. (2003, pp. 12,30) of 70 USD production cost per quintal

• Find (self) employment in non-farm or off-farm activities that provides the farm with the necessary income during the Thin Months

As chapter 3.3.4. has demonstrated, finding employment during the Thin Months is quite difficult, although not impossible.

In order to fulfil criteria number three, a household needs to reduce its vulnerability to risk. For this purpose a farmer has two options:

- Save enough from his income and in-kind income to use it in times of scarcity
- Diversify income streams with different risks in order to be less severely affected in case one income stream experiences losses

The "right strategy" for a farmer thereby depends on his individual situation, from the capital (human, financial, environment, physical) he has at his disposal and also from his environment (e.g. local economy, social environment). It is therefore important that a farmer adopts a strategy that suits him best where he can use the strengths of the farm and household.

3.7.2. MOST COMMON INTERVENTION STRATEGIES

Caswell et al. (2013, p. 7) list the most common intervention strategies to alleviate food insecurity in coffee growing regions. The choice of a strategy usually depends on the specific conditions as the type of food insecurity (availability, access or utilisation), its severity and the social, political and environmental conditions. Interventions range from projects that address the symptoms to those that target the causes.

According to them, a very effective intervention strategy is (1) increasing production of food crops for consumption.

The production of subsistence food is often included in (2) livelihoods diversification approach, from which it is one of the strategies to improve wellbeing. Factors like low coffee prices, seasonal fluctuation of cash, and low food availability lead the coffee producers to pursue other livelihoods (Caswell et al., 2013, p. 8), such as cultivation of basic crops, breeding of livestock and/or temporary off-farm wage work, among other activities (Valkila & Nygren, 2009, p. 5). Ellis (2000a, p. 2) defines rural livelihood diversification as "the process by which households construct a diverse portfolio of activities and social support capabilities for survival and in order to improve their standard of living". This livelihood diversification can be very crucial as per capita net coffee income is often not high enough to meet all basic needs. Accordingly, Méndez et al. (2010) found in 2010 that having more different income sources is associated with being better able to meet food needs.

Another common intervention utilized to alleviate food insecurity is through (3) certifications or price premiums (Perfecto, Vandermeer, Mas, & Pinto, 2005, pp. 442,443; Caswell et al., 2013, p. 9) such as fair trade to ensure better prices for their coffee. Price floors for coffee that is produced in adherence with a certain standard are used to protect farmers against market uncertainties. Sales of fair trade coffee started in 1988, when certified Mexican coffee was offered for sale in Holland. Since then, various different certifications have been developed in order to benefit the farmers, the environment, and to improve working conditions (Caswell et

al., 2013, p. 9). But while certifications have clearly been an important gain for smallholder coffee farmers, they often still earn less than a dollar a day per person from coffee sales (Bacon et al., 2008, p. 264). Beuchelt & Zeller (2011, p. 1321) even found in their sample that "compared to 33% of the conventional producers, 45% of the organic and organic-fairtrade certified producers have per capita incomes below the extreme poverty line- which means that they cannot cover their basic food requirements". While certifications are a potential response to address these difficulties by providing higher and more stable prices, research shows that certifications alone cannot ensure sustainable livelihoods for most coffee-farming households. Certifications may only be a part of the solution (Morris et al., 2013, p. 460).

In conclusion, the most common strategies either address the problem of insufficient income, through certifications or other kinds of payments, or the vulnerability to risks and seasonal effects through livelihood diversification and an increase of nutritional self-supply.

Further possible intervention strategies are augmenting productivity (e.g. with enhanced technologies), nutritional education and diet diversification, changes in food use patterns (e.g. processing, storage, preservation), and direct assistance (Caswell et al., 2013, p. 3).

3.7.3. Concrete Policy recommendations

Caswell et al. (2013, p. 10) call for a systemic change where all stakeholders in the coffee value chain are involved. Some of the key strategies that they recommend are the following:

- □ Support livelihood diversification to create multiple sources of income and food for the coffee farmers. Diversification strategies are necessary to provide the coffee growers with stability and to reduce their sensitivity to risk and vulnerability towards market fluctuations. Especially if food insecurity is an issue, there should be a focus on food production for household consumption and not just on generating an extra cash income (Caswell et al., 2013, p. 10).
- □ Provide farmers with support and technical assistance to maximise food production and attain balanced nutrition. Food maximisation strategies include other actions than just production. Possible ways to increase access to food are through postharvest storages and decreasing of food waste. Such strategies are especially important, since annual subsistence grain production is usually not possible in the mountainous coffee growing regions (Caswell et al., 2013, p. 10).
- □ Increase the awareness and initiatives within the coffee industry to address food insecurity in coffee regions. There already exist several approaches of tackling the problem of food insecurity. One option puts a focus on corporate social responsibility programs and investment in coffee suppliers as it is done for example by GMCR. Other possible options are more direct and supportive relationships between importers and coffee farmers, as well as funding of rural development organisations by coffee companies. Initiatives like the film "After the Harvest"²⁵ can increase commitment by different players in the coffee value chain (Caswell et al., 2013, p. 10).

²⁵ Access on this website: <u>http://aftertheharvestorg.blogspot.ch/p/watch.html</u>

- □ Develop long-term multi-stakeholders interventions. It is important to include all stakeholders in the process, as unequal power dynamics have always been a fundamental part of the problem of food insecurity. This can be done by raising awareness of the food insecurity in the North (consumer countries) and South (producer countries). By including all these players in the discussion, there is a better chance that the intervention will get the necessary funding and be effective. Furthermore, the decisions about interventions should be taken with patience and the interventions should be directed towards long-term solutions (Caswell et al., 2013, p. 10).
- □ Encourage research to contribute with empirical evidence. Research may provide crucial information about best practices, policy directions, and needs that should be supported. It should also include analysis of household livelihoods in order to generate information about ideal balance and feasibility of "alternative livelihoods in terms of time, energy, investment and profit." (Caswell et al., 2013, p. 11).

3.8. BARRIERS TO SUCCESS

Even if these policies are accurately applied, there are a lot of risks to a successful outcome. Events like an outbreak of the civil war, a crash of the economy, or cases of illness can always cause a failure of a program. Nevertheless, this chapter will not consider such external events, but rather the individual barriers of coffee farmers. During the collection of primary data, some arguments were mentioned again and again from various participants of the case studies, interviews and informal discussions. It is still unclear how serious such issues are in reality and exactly how they are affecting the Thin Months. Nevertheless, researchers who are trying to develop strategies to alleviate the Thin Months should keep such social barriers in mind.

a. Bad spending

The first issue affects point two of Table 12 negatively, as it impacts the income distribution. One major argument that was mentioned is that many coffee producers who are having a lot of problems sustaining their families, have a bad habit of spending. In an Interview J. Monterey, managing director of Funica mentions: "The two previous years were good ones for coffee. And what did the people do? They bought a car, bought a house, [...] and didn't invest [in their farm]. There exists a very low culture among coffee farmers. These years were excellent and the people didn't invest, and they should invest" (J. Monterey, personal communication, December 3, 2012). Often also experts and farmers would argue that some men are spending too much on alcohol. D. Rivera, Director of UCA Mujeres Productoras Rurales Jinotega, estimates that some men spend around 20 USD or more every month on alcohol (D. Rivera, personal communication, October 2, 2012). Another interviewee confirms this point, and adds that during some periods some farmers get drunk every day (CS1). To quote D. Rivera (personal communication, October 2, 2012): "[Some men are drinking too much] when there is money, when there is no, it [the drinking] is less. After the harvest it [the drinking] cumulates. This is an additional expense." Accordingly, the WHO ranked Nicaragua as one of the five countries in the region with the highest risk to health due to their pattern of alcohol consumption. Nicaragua is characterised by high rates of episodic heavy drinking. Approximately 30% or more of adult males reported one episode of heavy drinking per week. Alcohol consumption among men tends to be higher than among women (Bonilla-Chacín, 2014, p. 53,55).

A simple projection, assuming a head of the family who spends 20 USD on alcohol every month, suggests a spending of 240 USD a year. For families with very low income, this can be a significant threat to a healthy household budget. For an average income of about 3,500 USD this accounts for 8% of total income. Additionally, alcohol is often combined with domestic violence and other negative effects.

Bad spending can also happen even if the incentive of the farmers is good. A farmer may try to invest in something that should augment profit in the longer run but utilize wrong or bad practices in doing so. Guzmán & Castellón Zamora (2011, p. 49) argue that sometimes farmers apply fertilizer badly (see chapter 2.2.3.). Incorrect application of fertilizer and bad maintenance in general can have a negative impact on the farmers' expenses without generating extra profit. One element that certainly also contributes to bad spending is that most farmers have a very low accounting level. A majority of the farmers don't do any bookkeeping and therefore don't have a necessary overview of their financial resources.

b. Demotivation

A second social barrier that was mentioned was the demotivation of some farmers. This issue affects condition number one (see table 11) negatively as it reduces the total available income of the household. Farmer M.C.B. (CS4), who went from being extremely poor to gaining some stability told me that some people don't want to work, "There are people that don't like to sow fifty fifty [a media] and prefer to work per day and buy their pound [of maize and beans] daily. Sometimes these are the families that always live like this and never develop. They have always nothing, do nothing [...]. Well, there are people that just don't like to work all the time, they don't go seeking for work, they don't go to work in the hacienda, and therefore they always live like this."

F. Zamorra (personal communication, December 4, 2012) confirms much of this in his interview: "You can give the same preconditions to a group of [coffee] producers and you will see that there is a group that moves forward and another that will stay behind. This depends a lot on the motivation of the people and if they like to work." N. Kränzlin, managing director of iDEal, says that there are farmers that get a lot of support but they don't make anything out of it. As soon as support stops, they don't use their drip irrigation systems anymore. She believes that the question of success or failure depends a lot on the type of person, if he really wants to succeed or not (N. Kränzlin, personal communication, December 4, 2012).

It is difficult to say how big the impact of these issues is for different families. However, social barriers are key determining factor for success of an intervention program and should not be left aside when an intervention strategy is developed.

4. Income diversification – as a strategy to avoid the Thin Months

4.1. The concept of diversification

4.1.1. DEFINITION OF INCOME AND LIVELIHOOD DIVERSIFICATION

Many economic studies about diversification focus on different income sources and their composition, in short, on income diversification. Usually, several different categories and subcategories of income sources are distinguished. The primary categories are farm, off-farm, and non-farm income sources. Farm income refers to livestock and crop income, and includes cash income from selling the products as well as consumption in-kind of farm output. Off-farm income includes wage or exchange labour on other farms in the agricultural sector. It also includes non-wage labour contracts (Ellis, 1998, p. 5), such as for example the typical "a media"²⁶ system in Nicaragua. Such labour payments in kind are prevalent in a major part of the developing world. Finally, the non-farm income refers to non-agricultural income sources. Ellis (1998, p. 5) identifies several sub categories of non-farm income, as (a) non-farm rural wage employment, (b) non-farm rural self-employment, (c) property income, (d) urban to rural remittances (from within national boundaries), and (e) international remittances.

Researchers often use the term "livelihood diversification". Frank Ellis (Ellis, 2000a, p. 2) defines livelihood diversification as "the process by which households construct a diverse portfolio of activities and social support capabilities for survival and in order to improve their standard of living". In this context, livelihood means a lot more than just income. Livelihood includes also an in-kind income that can be valued at market prices, like consumption of farm products, payments and exchanges of consumption items (for example food) between families and communities. Additionally, in reference to income, livelihood refers also to social institutions, gender relations, and property rights that support the respective standard of living. Furthermore Ellis (1998, p. 4) argues that livelihood also includes social and public services, such as education, health services, roads, water supplies and so on.

In order to not go beyond the scope of the present thesis, I focus here on household income diversification.

4.1.2. MOTIVES FOR DIVERSIFICATION

The existing literature often tries to classify diversification. One branch emphasises that the reason for diversification is desperation- for example poverty, lack of assets, disaster and vulnerability (Ellis, 1998, p. 7). Reasons for this could be smaller harvest due to environmental factors, civil and natural disasters, loss of farmland due to inheritance or dispossession, or

 $^{^{26}}$ "a media" means that person provides the land, the second the labor and the yield is then shared half-half between the two of them.

accidents and health problems that lead to a lower ability to do the field work (Ellis, 2000b, p. 291).

However, other branches say that the reason for diversification is a matter of choice and an opportunity for improving the living standards (Ellis, 1998, p. 7). It refers to a voluntary and proactive decision. A household might see the opportunities of seasonal wage labour, save money to invest in non-farm activities, buy equipment for farm investments and so on (Ellis, 2000b, p. 291).

According to Ellis (1998, p. 7) often these typologies are inaccurate as they are based on generalities and ignore the complexity of the specific circumstances. The reasons for diversification are diverse and vary both from family to family and over time. Also, the location of the household might play a role, as well as special events such as disasters. A division of determinants for diversification in just these two main groups can be very misleading. In reality, there exist a continuum of causes, motivations and constraints for diversification that vary between different households and over time. The main determining factors, according to Ellis (1998, p. 7,11), are seasonality, differentiated labour markets, risk strategies, coping behaviour, credit market imperfections, and intertemporal savings and investment strategies.

a. Seasonality

Seasonality is an inherent feature that concerns all rural households (Chambers, Longhurst, & Pacey, 1981). It explains a lot of patterns of diversification, especially those including diversity on the farm and off-farm wage employment. Economically, this means that returns to labour change during the year for on-farm and off-farm activities, so that people change from lower to higher return activities. A major motive for income diversification is to confront income instability associated with seasonality. The farmers need to find an occupation that doesn't have the same seasonal cycle as the farms. Seasonal or permanent emigration would be one option to confront this difficulty (Ellis, 1998, pp. 11,12).

b. Differentiated labour markets

The rural labour market is differentiated by location, time, skills, gender and culture. Economically differentiated labour markets as a motivation for diversification means that "when the marginal return to labour time in farming for any individual falls below the wage rate or the return to self-employment attainable off the farm, then the household is better off switching that individual into off-farm or non-farm activities (Ellis, 1998, p. 12)". The work opportunities however depend on the specific skills, education and gender of a person. Furthermore labour allocation often underlies some social rules of access within the family and the community, which might result in "social exclusions" of individuals from particular income streams (Ellis, 1998, p. 12).

c. Risk strategies

Anderson, Dillon & Hardaker (1977) define risk as the subjective probability attached by individuals or by the household towards the outcomes of the various income generating activities in which they are engaged. In order to limit income risk, households diversify their farm production or their occupation. Another way of dealing with this risk is migration of a family member (Alderman & Paxson, 1992, pp. 48,49). Income diversity as a strategy against

risk usually means that a household is prepared to switch from an occupation that generates a higher income, but involves a bigger risk of income failure, towards an activity that generates lower total income but involves a smaller probability of income failure. But diversification does not always mean a smaller income, as different activities might be complementary, so that the total income diminishes only very little (Ellis, 1998, p. 13).

For a successful risk spreading it is important to have an income portfolio with a low covariate risk between the different income sources. Often in developing countries, many incomegenerating activities such as on-farm labour and off-farm labour in the agricultural sector suffer from a high correlation between the job and the risks attached to the respective occupations. Natural events, such as droughts and floods, might affect several income streams negatively. A diversification in non-farm incomes might lower this risk correlation between income streams (Ellis, 1998, pp. 12,13).

d. Coping behaviour

Coping compared to risk strategies is the involuntary response to a disaster or failure that was not anticipated, and is therefore ex-post coping with crisis, while risk management is ex-ante. Coping is a measure to assure consumption by for example, using up savings and food stocks, by receiving gifts from relatives, by selling livestock and other assets and by community transfers (Ellis, 1998, pp. 13,14).

Usually, the assets that are necessary for future income are protected, even if this means a compromise for the current consumption. These assets are sold only to avoid starvation. Responses to a crisis might lead to searches for new income streams and often creates new livelihood patterns of a household (Ellis, 1998, p. 14).

e. Credit market imperfections

Some diversification literature has also linked credit market failures with income diversification. Low credit availability and high interest rates can lead to diversification into non-farm activities in order to generate a substitute cash income that is needed for cash inputs for the production or for farm investments (Ellis, 1998, p. 15).

f. Intertemporal savings

Rural households take a long-term approach towards the security of their livelihood rather than just taking advantage of currently available income earning opportunities. An important additional motive for diversification is therefore making investments in order to increase income-generating capabilities in the futures. This motive can also be described as a "household's asset strategy" and includes five main asset categories that determine the livelihood robustness of a household survival strategy. The asset categories are natural capital (water, land, trees); human capital (skills, education, health), physical capital (equipment, roads), financial capital or substitutes (cash savings, pigs and cattle, jewellery), and social capital (networks, associations) (Ellis, 2000b, p. 296).

4.2. CURRENT LEVEL OF DIVERSIFICATION IN COFFEE PRODUCING HOUSEHOLDS

Most rural families have multiple income sources which often includes rural self-employment, off-farm and non-farm wage work, and remittances that they receive from urban areas or from abroad (Ellis, 2000b, p. 291). Furthermore, farms are often diversified with fruit trees and food crops of maize and beans next to their coffee (Chemonics International, Inc. , 2002, p. 50). Accordingly, nearly all coffee farmers in Nicaragua that were in the sample of 110 coffee producers in the departments of Boaco, Jinotega, Matagalpa, and Las Segovias of Valkila & Nygren (2009, p. 5), were also generating income through activities other than their own coffee, such as basic cropping, animal husbandry or temporary wage work.

Other researchers that based their studies on the departments of Matagalpa, Jinotega, and Estelí, found that generally, smallholder coffee producers in Nicaragua rely on coffee as the sole source of income and grow other crops only for subsistence (Pirotte et al., 2006, p. 443). Pirotte et al. (2006, p. 443) explain this issue by illustrating that many households have only very small landholdings and there are no other crops that offer the farmers sufficient incentive to justify the investment, in short, there exists a lack of alternatives.

My sample confirms the results of Valkila & Nygren (2009, p. 5) that most smallholder farmers have a diversified income. Nevertheless, coffee for many farmers is the most important income stream and there are indeed some farmers that rely solely on coffee that are relatively non-diversified. Diversification varies significantly between farms, villages and regions.

Sector	Source	Percentage of farmers	Details
	Coffee	100	
	Maize	88	While 43% of the farmers sold at least part of their yield, the other 57% used it only for auto consumption
Farm income	Beans	83	While 46% sold at least part of their yield, the other 54% used it only for consumption
	Livestock	55	Pigs, chicken and eggs
	Fruits	16	Banana, oranges for sale
	Vegetables	16	Tomato, sweet pepper, malanga, lettuce, pipian for sale
Off-farm income	Off-farm rural wage employment	44	All of the 44% were employed in the coffee sector
	Non-farm rural wage employment	11	Construction work
Non-rarm income	Non-farm rural self- employment	44	Tiny convenience stores, sewing, tourism

TABLE 13: FARMERS INVOLVED IN INCOME ACTIVITIES, IN PERCENTAGE

Source: own data

Of the total sample of eighteen farmers, just one reported depending only on his income source from coffee. A significant majority relied on multiple income sources (average = 4.3; max = 11). In table 12, the in-kind income of maize and beans are included, as the value of consumption of home-grown maize and beans is significant. The most common option was maize production,

produced by 88% of the farmers, followed by 83% who produce some beans, and 55% having some income from livestock husbandry. Furthermore, nearly half of the farmers (44%) generated some income from employment in the coffee sector, mostly during the harvest. Another 44% earned some income from non-farm rural self-employment. Only 16% grew some vegetables for commercialisation on their food plots, such as tomatoes, peppers, pipian, and lettuce that were mainly destined for sales.

In total, only four reported not producing any staple food for subsistence. Out of these four, only two didn't grow any staple food at all, while the other two did, but sold everything, as they needed cash money.

On average, the surveyed farmers relied 59% on their income from coffee, 11% on staple food, and 10% on off-farm rural wage employment and non-farm rural self-employment (see table

13). It should be noted however, that while only one farmer relied exclusively on the coffee yield, there were five for which the income of coffee contributed to over 90% of total income, which means that 27% of the surveyed are almost fully dependent on coffee as an income generating crop.

Additionally, income from coffee, staple food, vegetable production²⁷, and off-farm rural wage employment (mostly coffee harvest), which together generates 85% of the average income, is responsible for revenue between September and

TABLE 14: CONTRIBUTION OF ACTIVITIESTO TOTAL INCOME, IN PERCENTAGE

On-farm income			Off-farm income	Non-farm	income		
Coffee	Staple food	Vegetables and Fruits	Livestock	Off-farm rural wage employment	Non- farm rural wage labour	Non-farm rural self-employment	Total
59%	11%	5%	3%	10%	2%	10%	100%

Source: own data

February. Splitting up the non-farm rural self-employment through the year, results in another 5% of income between September and February. On average, therefore, the households in the survey had roughly 90% of their income generation distributed between September to February and only 10% of their income distributed in the remaining six months.

However, smallholder farmers are usually involved in even more activities than indicated in the survey. While the results above include only income generating activities plus production of beans and maize for family consumption, many farmers have several other food generating activities. While only around 44% of the farmers have some income generated by chicken or other livestock, nearly every farmer has some chicken for family consumption. Also there are many farmers who have some fruit trees on their farm that they need for family nutrition.

²⁷ Nobody in the sample was using an irrigation system to produce during the dry season.

4.3. VERTICAL DIVERSIFICATION VS. HORIZONTAL DIVERSIFICATION

There are many different ways to increase and stabilize the income of farmers through diversification. The producers have the options to diversify *within* coffee²⁸ and to diversify *out of* coffee, also referred to as vertical and horizontal diversification. Finally, a farmer can also choose to pursue a diversified strategy that combines diversification *within* and *out of* coffee (Varangis et al., 2003, p. 20). The next subchapters will describe both strategies, but the subsequent chapters will focus just on horizontal diversification.

a. Vertical Diversification

Smallholder coffee farmers can increase their income by diversifying in coffee-related activities. There are several different options such as quality differentiation and capturing more upstream margins from the value chain (Petchers & Harris, 2008, p. 56). Coffee producers' share of total value has declined from approximately 30% to less than 10% in two decades (Varangis et al., 2003, p. 26)²⁹, which coffee producers can try to win back. To increase their share of the value chain, coffee farmers need to develop downstream supply chain linkages and promote their coffee's comparative advantages. This can be achieved by several strategies such as (1) working with the retailers. For this, there are demanding requirements in terms of quality, packaging, and "just in time" fulfilment so that only the more organised producer groups and associations will be able to deal with retailers directly.

Furthermore, there is the option of (2) reducing dependence on middlemen. While this sounds like a simple strategy, one needs to keep in mind that middlemen have special knowledge and are often very cost efficient. Therefore, inexperienced farmers need to consider this option with caution.

Another strategy is (3) capturing product-oriented value by marketing processed or transformed coffee (e.g. soluble or roast and grind). This diversification can require considerable expertise and investment. Process-oriented value (e.g. certified coffee) can be less costly and provides higher coffee prices and income directly to the producer.

There are also (4) promotional strategies for coffee. Farmers can use instruments like "The Cup of Excellence" competition, Eco-tourism, market information and producer oriented promotion (Varangis et al., 2003, pp. 26,27).

b. Horizontal Diversification

Horizontal livelihood diversification, on the other hand, means finding new ways to earn a living. An important goal of horizontal diversification is to provide an alternative for the coffee producers who will not be competitive in their sector. Such alternatives allow them to keep their farm as an agricultural enterprise, and/or include non-agricultural activities, and/or off-farm activities (Varangis et al., 2003, p. 38).

On-farm diversification includes diversification of food cultivation, non-food crop cultivation, livestock and forest gathering (Morris et al., 2013, p. 457). There are myriad alternatives such as cultivation of fruits and vegetables, flowers, timber, spices, poultry and fish (Chemonics

²⁸ Diversification within coffee is also refered to as "increased competitiveness"(see Varangis et al., 2003).

²⁹ Reasons for this low percentage of producer value include improvements in roasting technology, processing efficiency, and financial means and knowledge of roaster to add value and reduce costs of raw material (Petchers & Harris, 2008, p. 56).

International, Inc. , 2002, p. 60). For example, farmers can produce a variety of different crops in different locations at the same time, or over successive periods of time. They can thereby use multicropping and intercropping strategies which both have their respective advantages and disadvantages (Dorsey, 1999, pp. 181-183).

Off-farm diversification means sustained employment in the agricultural sector, but on somebody else's farm. Many producers already work on other farms for coffee production, mainly during the harvest.

For non-farm diversification, researchers mention a lot of ideas such as: weaving, trade, employment in the service sector (Morris et al., 2013, p. 457), light industry, adventure tourism, woodcraft, and migration out of the area (Varangis et al., 2003, p. 38).

4.4. POSSIBLE BENEFITS AND CONSTRAINTS OF HORIZONTAL DIVERSIFICATION

4.4.1. BENEFITS

On the farm level, horizontal diversification can be very advantageous. However, the success of a diversification strategy depends heavily on how the diversification strategy is implemented. Potentially, there are many benefits. First, it enables the farmers to spread the resource requirements (e.g. labour, capital) more evenly over the agricultural season. Second, it provides some protection against price and production risks, as low returns from one crop may be compensated by a return from another activity. For successful risk spreading, it is important to diversify in activities with a low covariate risk between the different income streams. Third, it gives the farmers some flexibility for exploiting potential improved market opportunities and enables them to adjust more quickly to changed market conditions. However, all these advantages of horizontal diversification might be reduced in reality, because of the loss in average profits incurred by not specialising in the most profitable activity. Advantages of economies of scale from specialisation are usually compromised when farmers diversify their income portfolio (Petit & Barghouti, 1992, p. 6).

For coffee farmers specifically, horizontal diversification can lead to a more regular income, known as "income smoothing" by Westphal (Westphal, 2007, p. 196). In her study, the smallholder coffee farmers mentioned this argument as a criterion for product diversification. Households with limited resources and a lump-sum payment for their coffee often have a lot of difficulties during the Thin Months. Even if limited in absolute terms, a small income gained during times of scarcity can be crucial in times of shortages of financial resources (Westphal, 2007, p. 197). Generating a more regular income helps in fulfilling condition two of table 11.

Additionally, diversification can have a direct positive impact on household consumption needs. If a coffee farmer diversifies in nutritional products, he can produce a larger amount of food for household consumption and therefore relieve a family of a financial burden. In some cases, the share devoted to subsistence can have a considerably higher economic value than the income generated by the share that was sold (Westphal, 2007, p.197).

Certain diversification activities can also have positive complementary effects. For example, some tree species not only contribute to shade cover, but also have a beneficial effect on coffee trees (Westphal, 2007, p. 186). With diversification, a farmer can benefit from such positive effects.

4.4.2. BARRIERS AND CONSTRAINTS

According to Cafenica, there exists a low adoption level for agricultural and economic diversification alternatives. They explain this phenomenon with (1) the fact that there exists little financial and technical knowledge, and (2) that there exist cultural barriers, that are related to the coffee farmers "way of thinking and seeing the things" (Cafenica, 2013). Producers have a long tradition of coffee production, which may be difficult to overcome. Therefore, it may require a significant amount of effort to convince coffee farmers to produce something else (Varangis et al., 2003, p. 44).

Other researchers put forward the concept that underdeveloped organisational management is a huge obstacle for the successful diversification of a farmer. Additionally the low adoption levels of diversification *out of* coffee may be explained by a "lack of profitable alternatives" mentioned by (Petchers & Harris, 2008, p. 57). They argue that it is exceedingly strenuous to find legal alternatives that can deliver equal benefits and partly replace coffee income. While many farmer leaders agree that diversification should be a priority, they have difficulties finding an appropriate substitute, as many alternative crops to coffee are too low-priced (as bad as coffee or worse). Even if coffee production is not profitable in the long-term, the costs of switching *out of* coffee are substantial. It may include replacing part of the coffee with alternative crops, which is time and cost intensive, and also requires training, as farmers often lack the skills for the alternative activities. Furthermore, most families don't have savings to live off while waiting for the new crop to generate an income (Petchers & Harris, 2008, p. 57).

Any diversification strategy must consider this sort of resistance and cultural aspects when designing programs (Varangis et al., 2003, p. 44).

4.5. WHICH FARMERS SHOULD DIVERSIFY OUT OF COFFEE?

It is a legitimate question to ask which farmers should be recommended to diversify *out of* coffee. Since specialisation operates according to comparative advantage, one of the basic tenets of economic theory, it increases returns. Specialising in a very profitable activity might therefore make economic sense. On the downside, specialisation can lead to higher risk exposure. The criteria for recommended diversification depend on the three conditions already mentioned in chapter 3.7.1. If a farmer cannot fulfil condition number one in creating enough total income for a year, finding additional and/or alternative income sources is "necessary". Reasons for this non competitiveness are either their cost structure or the agro climatic conditions that don't allow them to be profitable (Varangis et al., 2003, p. 22). For such non-competitive coffee producers, diversification is a viable alternative to achieve economic sustainability and food security. One needs to keep in mind also, that the agro climatic suitability of many farms will decrease, as

projected by Laderach et al. (2011) (see chapter 2.2.2.a.). Therefore, many farmers may lose their competitiveness in the next decades and will need to diversify *out of* coffee in the long run.

Similarly, if condition two, an activity which creates enough income plus in-kind income for the whole year, but for one reason or another is not sufficient during some time of the year, is not met, diversification may be recommendable. There are several options that can address this problem, such as better saving or accounting practices to distribute the income more evenly. Diversification can address this issue by generating an income during times of increased scarcity.

Even in case a household generally fulfils condition one and two, it might make sense to diversify as a risk management strategy in order to decrease a household's vulnerability (Varangis et al., 2003, p. 21).

For families who are experiencing some months of scarcity (The Thin Months) at least one of the three conditions is not fulfilled. If they are unable to avoid the Thin Months through other action (e.g. for increase productivity, access to higher prices, learn how to save money), diversification is very recommendable in order to sustain the family.

For farmers who do fulfil these three conditions and are unaffected by the Thin Months, it might make economic sense to specialise in coffee, as recommended by the economic theory, or diversify *within* coffee.

4.6. IN WHAT ACTIVITY SHOULD A FARMER DIVERSIFY?

The income portfolio of a smallholder household should be characterised by a low covariate risk; in this way, the farmer may benefit from lower risks. Ideally, diversification means that farmers create a diverse income portfolio that best matches their individual situation (Oxfam, 2005). The activity a farmer should diversify in depends on a lot of factors. It is important to be aware of conditions that limit choices. For example, in case the markets are far away and infrastructural accessibility is bad, diversification in fruits may not be very profitable. Characteristics of the terrain, like steep slopes, availability of water, altitude and climate, and bad infrastructure access, already exclude certain diversification options (Chemonics International, Inc. , 2002, p. 4). It is important to exploit the strengths of existing farming systems before attempting to introduce radical changes (Varangis et al., 2003, pp. 20,21). Farmers need to assess their present and future conditions and their relative comparative advantages (Varangis et al., 2003, p. 44).

The choice of what activity to diversify in should not only be based on the terrain and the location of the farm. In case a producer also aims to commercialise, the choice needs to be demand-driven because usually shortage of supply is not a big constraint (Varangis et al., 2003, pp. 20,21). For this reason, solid market research is necessary to identify markets and demand alternative products (Varangis et al., 2003, pp. 42-44).

Additionally, the process of choosing an alternative activity should also include the farmer's perspective. Coffee producers may have objective or less objective reasons for not being motivated to diversify in general or within a certain activity. Without the farmer's motivation a

diversification strategy will hardly be successful. Therefore the coffee farmer's opinion should be a major influence in the choice of a diversification activity.

Some objective reasons for not wanting to diversify were already outlined in chapter 3.8. For example, farmers may find no better alternatives to coffee. Producers who benefit from a savebuyer for certified coffee may be reluctant to diversify out of coffee, as many alternatives are unlikely to be equally profitable. For such farmers, clearly diversification alternatives need to be found that are supplementary, meaning that they don't claim land or work force at the expense of coffee. One option would be to utilize space between the coffee plants, without diminishing coffee production (e.g. fruits trees for shade, crops and vegetables in-between newly planted coffee trees). Other options are diversification activities that are not very space-intensive. Also, the new activity should not compromise the work on the coffee plantation. If for example, the man is already operating at capacity in taking care of coffee production, this household should find a diversification alternative where the women of the house or the children who are already out of school could get involved. For this, one may also need to be aware of the classical separation of tasks by gender, as explained in chapter 3.2.1.. In case one is planning to engage women in non-typically female tasks, one should expect that the program needs more support and supervision to keep women in their new activity.

Other farmers may be competitive coffee producers and therefore, have an objective reason to specialise in coffee and vertical diversification instead of practicing horizontal diversification (see chapter 4.5. Which farmers should diversify out of coffee?).

A third objective argument to not want to diversify is the high risk of horizontal diversification resulting from a lack of experience. Indeed without the necessary knowledge, experience or training, it may be difficult to succeed in a new activity.

4.7. DIVERSIFICATION IN VEGETABLE PRODUCTION

4.7.1. BACKGROUND

a. Vegetable Production in Nicaragua

Export products such as coffee and basic grains dominate agricultural production in Nicaragua, whereas cultivation of vegetables clearly plays a less important role. In Nicaragua, 21,467 manzanas are used for vegetables production, which only accounts for 1.6% of the cultivable land. In total, about 36,000 tonnes of vegetables are produced in one year. The production of vegetables is labour intensive³⁰ and therefore, creates many employment opportunities for workers and family labour. Around 15,000 producers in Nicaragua cultivate fruits, vegetables and herbs in the centre and north of Nicaragua for domestic use or export. Of these producers 90% cultivate on less than one manzana. While Nicaragua has optimal conditions for the production of vegetables, there are some factors that limit its production (Food and Agriculture Organization, 2012b, pp. 27-31) which will be explained in the next chapters.

There is a large variety of vegetables cultivated in Nicaragua. On around 79% of the total land used for vegetable cultivation, farmers plant tomatoes, onions (red, yellow and white), pipian, sweet pepper, cabbage, squash, potatoes and carrots. In the remaining 21%, one can find

³⁰ Vegetable cultivation needs in average 120 to 130 working days per manzana (Food and Agriculture Organization, 2012, pp. 27,28).

cucumbers, lettuce, beetroot, chilli, radish, eggplant, broccoli, cauliflower, celery, garlic and okra, amongst others. The second group of vegetables are mainly consumed by the middle and upper class and therefore, the demand is relatively low (Food and Agriculture Organization, 2012b, p. 52).

TABLE 15: AVAILABILITY AND APPARENT CONSUMPTION OF VEGETABLES, INQUINTALES, 2011

Vegetable	Annual Production	Demand	Deficit/Surplus	Import	Apparent consumption
Tomatoes	1,468,700	422,400	1,046,300	35,200	1,198,700
Onions	147,300	501,600	-354,300	384,650	501,600
Peppers	180,992	110,000	70,992	25,049	110,000
Cabbage	472,200	242,000	230,200	72,920	241,040
Carrots	114,000	264,000	-150,000	174,000	264,000

Source: Food and Agriculture Organization (2012b, pp. 63,64)

As the table 14 shows, in 2011, the domestic demand for some vegetables, such as onions and carrots, was bigger than the domestic production, so a major amount had to be imported (Food and Agriculture Organization, 2012b, pp. 63,64). This undersupply of some vegetables is a great opportunity for new vegetable producers to step in.

b. Vegetable consumption

In rural Nicaragua, the common diet is based on maize tortillas and red beans. The main sources of calorie intake are grains, followed by meat, foods with added sugar, and oils. Consumption of vegetables and fruits tends to be lower than recommended to maintain a healthy life. The WHO and the FAO advocate a daily consumption per person of more than 400g of fruits and vegetables. The respective consumption in Nicaragua in 2005 lies clearly below this threshold with 103g consumed in urban areas and only 52g in rural areas. Interestingly, the poor population is eating much less vegetables than the wealthier, with the poorest eating only 20g a day compared to the wealthiest with in average 150g (Bonilla-Chacín, 2014, pp. 42-45).

The figure 15 shows the calory sources in the diet in Nicaragua for 2009, and the respective percentage of vegetable consumption.





Source: based on Bonilla-Chacín (2014, p. 44)

c. National vegetable prices

The national vegetable prices reflect the interaction between supply and demand (Chemonics International, Inc., 2002, p. 70). Similar to the fluctuations of the prices of maize and beans, the prices of vegetables are also fluctuating heavily. During the dry season, it is much more difficult to grow vegetables as there is nearly no rainfall which leads to less supply and boosts the prices (J. A. Baltodano Cuadra, personal communication, November 15, 2012). On the other hand, during the rainy season a major problem is overproduction, which can cause a drop in prices

and a reduction in growers' returns (Chemonics International, Inc., 2002, p. 70). Vegetables are a sector with high risks because of a strong dependence and vulnerability towards climate change, the main cause for seasonality and price variability. Some other factors that influence the supply of vegetables are plagues, increases of petrol prices (Food and Agriculture Organization, 2012b, pp. 56-57), droughts, and floods.

In particular, the prices of non-perennial vegetables vary considerably (J. A. Baltodano Cuadra, personal communication, November 15, 2012). They can change weekly and even daily (see

figure 16 for the price to producer of onions and potatoes in 2011). This creates a very unstable price situation for producers and consumers. The vegetables with the highest price variations on the market are broccoli, beetroot, lettuce, and tomatoes, with tomatoes sometimes having monthly variations of 24% (Food and Agriculture Organization, 2012b, pp. 56,57). Within a year, the price of a box of tomatoes varies between around 3 to 20 USD, with the former being far under production costs. For 3 USD





Source: based on Magfor (2013)

a box, it is not even worthwhile for the farmers to pick the tomatoes. Vegetables and fruits with a lower price fluctuation are the perennials and semi-perennials. Perrenial fruits are for example: avocado, mango and citruses. Semi-perennials include plantain, banana, papaya, passionfruit and dragonfruit (J. A. Baltodano Cuadra, personal communication, November 15, 2012).

While the market price reflects the interaction between supply and demand, the price to producer also depends considerably on the power relations between the actors in the value chain. The vegetable producers mostly have a very low organisational level, which is a bad precondition for their negotiation capacity with middlemen and other potential buyers. Because most vegetables are highly perishable, the farmer has to sell quickly and does not have the necessary time to speculate the price (Food and Agriculture Organization, 2012b, p. 56).

4.7.2. IRRIGATION IS NECESSARY

The previous chapter demonstrated the strong variability of prices and how the climate is a major influence on cultivation. For smallholder farmers who want to grow and sell vegetables profitably, it is therefore strongly recommendable to produce counter-seasonally, in order to avoid direct competition with domestically grown products. Since during the dry season there is little rainfall, irrigation is necessary. Various different irrigation methods can be utilized. While it may be possible to irrigate manually for a small home garden, on bigger cultivation areas an irrigation system (e.g. sprinkler, drip irrigation tubes) becomes a more viable option.

The most important requirement for irrigation is the availability of water. Specifically, water needs to be reasonably accessible on the location where it is intended to be used. As an example, if a farm is located next to a river, water is per se, available. But in case the river is 30 meters below from where the farmer wants to cultivate, such a project is very hard to implement. While it is generally still possible (e.g. with the help of a motorised pump), the project may be costly and complicated. In such a case, it may make sense to try to find another diversification strategy.

4.7.3. Advantages

Diversifying in vegetable production has a lot of advantages for households. Those who are developing such a program should be aware of all these advantages in order to benefit from them. The next subchapters specify the various benefits.

a. Option of staggered planting

In case a farmer is using irrigation he can practice staggered planting³¹. This means subdividing the farm into plots and then planting one or more crops in some plots at regular intervals throughout the year. As a result, the entire farm would be fully planted, with vegetables continuously sowed and harvested throughout the year. This practice of staggered planting requires irrigation and might also need protected agriculture³² during the rainy season. Staggered planting contrasts with the traditional planting practice where a crop is planted in synchrony with the rainfall patterns (Chemonics International, Inc. , 2002, pp. 61,62). Some benefits of staggered planting are that:

- It provides farmers with longer periods of cash flows instead of relying only on one or two cash inflows during the year (Chemonics International, Inc. , 2002, pp. 61,62). By generating income during the Thin Months, it can provide coffee-producing households with the much-needed cash or nutriment during times of scarcity.
- Farmers can benefit from counter-seasonal high selling prices during the dry period of the year.
- It smoothes out the risk of low returns from a market downturn, as the farmer can also benefit from market upswings (Chemonics International, Inc. , 2002, pp. 61,62).
- It reduces the risk of a complete loss of a crop (Chemonics International, Inc. , 2002, pp. 61,62).

b. Short payback period

Vegetables, compared to other diversification options, have a short payback period. They are a quick cash crop as their production cycle is of only about 2-4 months. Because of this, characteristic vegetable growing is within reach of most farmers who have small financial resources and a short timeframe. Diversifying in vegetable production is especially appropriate for farmers who need a quick cash turn-around. While one could argue that earning credit would be an opportunity for investments in longer cycle crops or other longer-term diversification options, it is a fact that long-term credit options in Central America are very rare and thus

³¹ Also called "calendarised" or "scaled planting" (spanish: siembras escalonadas)

³² Protected agriculture is the use of cover such as for example plastic covers and tunnels, to protect the crop from too much rain.

extremely difficult to access for farmers with little resources. Additionally, most loans are limited to less than a year (Chemonics International, Inc. , 2002, p. 61).

c. Low initial investment cost and flexibility of the size

Compared to many diversification options, vegetable production needs only a small amount of start-up money (Chemonics International, Inc. , 2002, p. 61). However, the size of the initial investment cost depends considerably on how much a farmer is planning to produce and to irrigate. One advantage of vegetable production is that a farmer can choose a size that suits him individually and that he can afford in terms of money and time. Therefore, a smallholder farmer might only produce on a couple of square meters for family consumption or cultivate on a couple of manzanas for commercialisation. Flexibility also means that a farmer can easily increase and decrease his vegetable business in the speed and size he wishes. In short, he can adapt very quickly to new conditions.

d. Increase of food security and improved diets

By growing food crops, a farmer can provide some measure of food security for his household, and is therefore less likely to be food insecure (Chemonics International, Inc. , 2002, pp. 61,62). Morris et al. (2013, p. 470) find in a field study in El Salvador that generally, the coffee producers interviewed suffer from a food insecurity period during January and February. While the farmers still had staple food, like maize and beans, from the previous months, they lacked money to buy other food products. It is interesting to note that during this period the interviewed households that grew a variety of vegetables did not report that they were food insecure during January and February. This means that especially when farmers still have some staple food left for consumption, but no cash income, a vegetable garden can be crucial for providing food security. This is extremely important during the Thin Months, since during this period many coffee producing households are food insecure.

Additionally, it may boost household consumption of home-grown vegetables and thereby improve the diet of the family (Food and Agriculture Organization, 2005, p. 17).

e. High returns and reduced risk of pests

An advantage of irrigation is that it makes it much more feasible to intensify production through the use of fertilizer, soil conservation practices (e.g. contour strips, retaining walls) and improved varieties (Shriar, 2007, p. 284) and at the same time requires less labour input. Indeed, several studies from the International Development Enterprise (IDE) show that microirrigation allows a yield increase of 30% compared to traditional irrigation methods (IDE, n.d.). Furthermore, it reduces the risk of vegetables becoming infested by insects, fungi, or bacteria because of less humidity during the dry season in form of standing water. It therefore lowers the risk of losing a crop due to pests and allows for the application of fewer pesticides (Hallensleben, 2012, p. 66).

Accordingly, J. Monterey (personal communication, December 3, 2012) comments, "a good yield of tomatoes is much more profitable than coffee. Tomatoes, peppers with good handling and good negotiation, already as you can harvest several times a year. The coffee is more secure. It [vegetables] is a risk. And they [the coffee farmers] are right. A bad plague... But many times, I repeat, with the right context the profitability of tomatoes is very high. In case one manages to harvest at the right time and with little plagues."

4.7.4. LIMITATIONS AND CONSTRAINTS

Diversification in vegetables is also characterised by many limitations and constraints. The next subchapters will summarise the major issues of horticulture.

a. Diversification of vegetables is impossible - Limitations of the farm

Some coffee farmers are beyond the means of agricultural diversification. Not every farmer has a non-coffee agricultural alternative because they face one or more of the following constraints: their land is too steep; the soil is too thin or not fertile enough; the farm size is too small; the farm is located in a too remote area; there is not enough rain for rain-fed agriculture and not enough water for irrigation (Varangis et al., 2003, p. 44). For many of these producers, solutions beyond agricultural diversification need to be found. Nevertheless, some of the criteria may just reduce the options. While the size of the farm is certainly a decisive argument, there exist some options for coffee farms with little space available. In such a case, it is recommended to find a method of diversification that does not claim too much space (e.g. herbs production) or can be grown complementary with the coffee (e.g. fruit trees as shade for coffee, crops between the newly planted seedlings) (J. A. Baltodano Cuadra, personal communication, November 15, 2012). Simultaneously, the argument of remoteness may only be a decisive argument if the vegetable production is planned for commercialisation. In case a farmer wants to produce vegetables mainly for family consumption and maybe some of the farmers in the same community, the remoteness may not be such a decisive argument.

b. Constraints for starting production

There exist three important barriers for smallholder coffee farmers to start vegetable production.

First there is a low availability of credits for smallholder farmers and often the cost of lending for agricultural enterprises is high (Chemonics International, Inc. , 2002). Many smallholder farmers are unable to start producing vegetables without financial support (e.g. in form of credit) because they don't have enough savings.

Second, many farmers are risk averse. One reason for this is that they have a lot to lose. Results from focus groups by Morris et al. (2013, p. 432) show how farmers are very reluctant to experiment with new crops, because their current food plots are a very important source for household consumption. Farmers try to avoid new risks with a crop that they don't know. Production of vegetables is indeed, very risky. Factors that cause the high risk are the constraints of commercialisation, the fragility of production and their little knowhow in both production and commercialisation.

Another important aspect is demoralisation because of failure. In a group discussion, farmers put forward that they are not interested in growing vegetables as in the neighbouring community many vegetable farmers had experienced huge losses because of a plague some years ago. The success and failure of others also influences the perception of the risk that is connected with vegetable production.

In general, there are some farmers that may be described as being risk averse, while others engage in more risk-taking behaviour. Commercial production is viewed as a high-risk strategy because of the extreme fluctuation of the market prices. Indeed, the smallholder farmers face a

considerable risk in diversifying their production and favourable market conditions are critical for their success (Dorsey, 1999, pp. 190-192).

Third, there is the coffee farmer culture and habits. People in Nicaragua consume on average, very few vegetables, and consumption is especially small among the poor. Because of these food traditions, it may be difficult to convince farmers to grow vegetables, as they constitute only a small part of their diet. Farmers may therefore be much more motivated to produce alimentary goods that account for a bigger part of their diet, such as meat or dairy.

Additionally, the traditional culture of coffee farmers may not be favourable for vegetable production (J. Monterey, personal communication, December 3, 2012).

c. Constraints for a successful production

An important disadvantage of horticulture is that it is rather fragile (Food and Agriculture Organization, 2012b, p. 63). Vegetables are characterised by a high vulnerability to climatic changes (Food and Agriculture Organization, 2012b, p. 45) and to plagues, which can cause a major part of the production to go bad and the farmer to suffer from great losses (Food and Agriculture Organization, 2012b, p. 63).

Additionally, many coffee farmers have a limited knowledge about vegetable gardening compared to other cultivations (Food and Agriculture Organization, 2012b, p. 45), which can pose a huge challenge to successful production. Disadvantages to staggered planting are increased disease and pest pressure. It also requires more management, such as crop rotation, soil conservation and pest control (Chemonics International, Inc. , 2002, pp. 61,62). For year-long cultivation, a farmer therefore needs even more knowledge which may overstrain an inexperienced producer.

Farmers who want to commercialise are facing difficulties meeting the specifications for product size and quality. Furthermore, frequent improper post-harvest handling deteriorates the quality and vegetables are often harvested when too immature or too mature (Chemonics International, Inc. , 2002, p. 72).

d. Constraints of commercialisation

Vegetable producers often have difficulties finding an appropriate buyer (Chemonics International, Inc. , 2002, p. 72), so that sometimes they even have to let their yields go bad. Coffee, on the other hand, can always be sold. As J. Monterey (personal communication, December 3, 2012), managing director of FUNICA, comments "I have seen withered tomatoes, I have seen withered peppers, cabbage. But there is always somebody who buys your coffee [....]. It [coffee] always sells, even if for a cheap price. [...]. On the other hand the business of vegetables is very delicate".

In case the producer does not arrange for a buyer before the harvest, when the vegetables are ready, he is left with a perishable crop with no clear destination. This way, he is forced into a price-taking position where he often gets paid a price below break-even. In case he doesn't want to sell it for that price and cannot find another buyer quickly, the producer is forced to dump the product (Chemonics International, Inc. , 2002, p. 72).

Additionally, coffee farmers often have low negotiation power. Many smallholder farmers, especially the ones living in remote areas, are very ignorant of current vegetable market prices (Food and Agriculture Organization, 2012b, p. 45). Since the price is very volatile, the lack of information can have significant impacts on negotiation power and therefore, on the sales price. An issue that certainly also impacts the ignorance of market prices is that Nicaragua has a poorly developed communication system (Chemonics International, Inc. , 2002, p. 72) with many farmers living in communities without phone signal (Food and Agriculture Organization, 2012b, p. 45). It is therefore, often very difficult for farmers to access information.

Another constraint for commercialisation is the poorly developed rural transport system (Chemonics International, Inc. , 2002, p. 72). Many farmers mention difficulties with transporting their vegetables to the markets (Food and Agriculture Organization, 2012b, pp. 27,28).

e. Summary of the limitations and constraints

The constraints and limitations of vegetable production vary a lot between different farmers. Production of vegetables has two main risk factors, the fragility to plagues and difficulties with commercialisation (e.g. bad market access, prices). So while vegetables can be very profitable and generate high returns, there is also a high risk of losing or failure. The farmers who are only producing for family consumption have a smaller risk, as they are not confronted with the risks of commercialisation. Both risks can be diminished significantly through increased experience and knowledge. Failures and bad experiences, on the other hand, can demoralise not just the growers, but also those who were not involved in the production.

4.7.5. REQUIREMENTS

There exist a variety of different producer types and agro-ecological conditions. Accordingly, coffee farmers are facing different opportunities and constraints (Varangis et al., 2003, p. 21) and need different support for diversification in vegetables. In general, the farmer requires four different types of capital in order to produce profitably (see figure 17). Obviously having all these assets is not enough. There are external events that can influence the success of production such as shocks (e.g. pests, droughts), economic trends and social capital. The present thesis however, puts a focus on farm-level requirements.

In case a farmer does not possess the necessary natural capital, other diversification options likely make more sense, as it would be very costly to produce vegetables without the three requirements of water, land and fertile soil.

Most smallholder farmers don't have the necessary financial capital to start production. A significant initial investment is required for physical capital such as the irrigation system and other equipment, seeds/seedlings, pest control appliances, fertilizer and so on. Additionally, the farmer may need a financial bridge until the vegetable enterprise is profitable enough.

If a farmer possesses enough financial capital, he can buy most of the physical capital required. Depending on how much capital a household has available, he can also buy labour force to do the necessary fieldwork. In case the financial resources are not sufficient, the horticulture needs to be done by family labour. In that case, it is important that somebody of the family is available for the vegetable production and not already fully occupied with another crop or work. One should bear in mind, again, that traditionally women work in home gardens, but that larger cultivations are commonly worked by men.



FIGURE 15: REQUIRED CAPITALS

Source: own illustration

Finally, a smallholder farmer also requires considerable human capital for a successful vegetable production. Many coffee farmers do not have sufficient knowledge in vegetable production and therefore, need a lot of training. Additionally, the farmer needs to be motivated to get engaged in horticulture and also have eating habits that are favourable to vegetables.

For coffee farmers, especially the financial and human capital seem to stand out and to need support in form of transitional financing and training in terms of knowhow and general human capacity.

A household cannot successfully diversify without transitional financing for investments in the new activity or crop (Tabora, 1992, pp. 95-103; Varangis et al., 2003, pp. 42-44; Oxfam, 2005; Petchers & Harris, 2008, p. 51). Targeted support programs can finance the first investments so that the farmers can begin with production (Varangis et al., 2003, pp. 42-44). As new enterprises often require longer development periods before becoming viable, a possibility of long term financing should be available. Thereby, the terms should be characterised by appropriate repayment rates (Tabora, 1992, pp. 95-103).

It may also be necessary to create a modest scheme of support for some individual producers during the unproductive phase, a temporary income substitution for basic needs (Petchers & Harris, 2008, p. 51). However, such a system should be minimal and not distract from the goal of market-oriented rationale for diversifying (Varangis et al., 2003, pp. 42-44). Some farmers may additionally need debt payments (Petchers & Harris, 2008, p. 51).

Another requirement is support in form of training. Many coffee farmers may lack the skills for the cultivation of alternative products and few have the training, technical knowledge and market access to take an alternative activity to the scale that is needed to generate a significant economic improvement (Petchers & Harris, 2008, p. 56). Therefore, previous technical and commercial training and support are very essential. Especially in the case that a household is planning to commercialise home-grown vegetables, bookkeeping is also an essential issue. Farmers therefore, also need to learn to master their finances. Especially less educated smallholder farmers are at disadvantage and may need special attention. Additionally, farmers should also learn how to save money in order to build a safety net for the Thin Months (F. Zamora, personal communication, December 4, 2012).

There is a large need for human capital in terms of skills mix and entrepreneurial capacity (Tabora, 1992, pp. 95-103). J. Monterey (personal communication, December 3, 2012) agrees on this. He states that first there needs to be training to strengthen the human capacity, amongst others, the capacity to innovate. Chapter 3.8. demonstrated how important human capacity can be for the successful outcome of a program. A program that increases the income of coffee producing households is not enough. The families need integrated support, with technical and personal training. It is therefore apparent that the notion of responsibility is important. A. J. Márquez Garcia (personal communication, November 11, 2012) from ADDAC (Asociación para la Diversificación y el Desarrollo Agrícola Comunal) argues, "We try to get an integrated development of the families we work with. There are many organisations that try to achieve an economic development. More income, more sowing, more income. Often this economic development is not accompanied by a personal development. Therefore there are people that one day they have money [...], they start spending badly, and many other things, right? What we try is that additionally to their economic development they also develop as a person. That they care about their family, about their children and their education, about the farm, about improving the living conditions etc."

If the farmer is planning to commercialise, some other requirements may also be crucial. One point is infrastructure development. Tabora reviewed some diversification experiences in Central America and found that substantial crop diversification has occurred near urban areas and close to agricultural production of major export goods (e.g. big coffee farms). Farmers who do not benefit from an existing infrastructure system may need to invest much more in the commercialisation of new products. Finding a new business model can therefore be especially difficult for farmers who live in remote rural areas that are only slightly commercialised, which is the case for many smallholder coffee producers (Tabora, 1992, pp. 95-103). In short, bad infrastructure means bad market access. To give an example of the importance of infrastructure: the family from I.B.R. (CS3) lives on a farm about half an hour walk from the road with a few rows of orange trees. Because many farmers have orange trees there is an oversupply during the season and accordingly, the prices are very low. For her family it is not worth it to sell the oranges, as it is not worth carrying the oranges to the road for such a low price. Additionally, it is very difficult to find a buyer so many farmers don't sell their oranges, and only use some fruits for family consumption. In my survey, more than half of the households had some orange trees on their farm, but only two were able to sell their oranges and by selling thousands of them, only made around 100 USD.

4.7.6. CHOOSING THE RIGHT CROP

A specific program may be planned globally, but at the moment of implementation the decision of what the smallholder farmer should diversify in should depend on the individual conditions of the farm (Chemonics International, Inc. , 2002, pp. 60,61). As every farm and household have different preconditions, the solutions should also be diverse. It is recommended to build initiatives that help farmers create a diversified income portfolio that best matches their individual situation (Petchers & Harris, 2008, p. 56).

For a successful vegetable diversification program, first the agro-ecological characteristics of the farm have to be considered. Additionally, in case the vegetable production is for commercialisation, the market has to be assessed and a marketing strategy needs to be planned in order to choose a successful crop for diversification (Varangis et al., 2003, p. 45). At the farmer's final decision-making stage, the report from Chemonics International puts forward that "there is no substitute for a farm visit by an experienced, well-prepared and well-trained field agronomist" (Chemonics International, Inc. , 2002, pp. 60,61).

Based on Chemonics International, Inc. (2002, pp. 60,61), Varangis et al. (2003, pp. 39,44,45) and Shriar (2007, p. 285) I developed a list with all the points that need to be analysed for choosing an appropriate crop (see table 15). The list is complemented by some results from my own research.

Issue	s that need to be analysed before the crops are chosen					
a.	The agro-ecological conditions of the farm:					
	• Terrain					
	• Soil					
	Climate					
b.	The farmer's timeframe and resources (e.g. financial, natural, human and physical capital)					
	Some questions that one should ask, are:					
	What are the financial needs to start the production?					
	 What are the necessary skills and resources for cultivation? 					
	What are the economic and environmental advantages of the farm?					
	How big is the risk management capacity of the household?					
с.	Knowhow and opinion about the respective crop					
In ca	se the farmer plans to commercialise his product, the following factors should also be analysed					
d.	The proximity of roads and infrastructure					
e.	Potential markets for possible vegetables.					
	The choice of a crop should be based on the determination that there is a buyer for the new product					
	and that the price offered for the new crop will be high enough to generate a reasonable profit for					
	the farmer.					
	For this reason extensive market research and marketing planning of potentially successful crops					
	needs to be done.					
f.	Barriers to entry, such as investment costs and infrastructure requirements					
g.	Challenges of vegetable commercialisations (logistics, quantity, quality)					

TABLE 16: ASSESSMENT FOR CHOOSING A CROP

Source: own illustration

The coffee production area in most of Central America consists of hillside terrain with some medium- and large-sized farms scattered among many small farms. It is extremely important that the alternative product to coffee is suited to the farm's specific altitude, weather, soil, microclimate, slopes, rainfall patterns and so forth. Strategies must be flexible enough to consider a number of alternative products, but on the same time structured enough to ensure that the products meet the criteria for a successful delivery to the market (Chemonics International, Inc., 2002, pp. 11, 60, 61).

Furthermore, cultural elements need to be taken into account. As we have seen, there exist a number of cultural barriers as well as knowledge gaps. For example, it would be an advantage if the crop is already grown in the area and if the local producers already know its agricultural practices and post-harvest handling requirements (Varangis et al., 2003, p. 45). It is extremely important that the farmer is motivated to engage in the production of that crop.

In case the vegetable is planned for commercialisation, the market behaviour also must be observed in order to schedule planting, so that the vegetable arrives on the market on time and leaves when more competitive growers start harvesting. Also, the volume of vegetable production needs to be planned to ensure that a sufficient quantity is grown to fill buyer's orders on time and to benefit from the advantages of economies of scale from transportation and packaging costs. "Planting the wrong thing in the wrong place at the wrong time results in missing the target market window, which frustrates the buyer; low yields and high costs (losses) frustrate farmers and clients (non-sustainable)" (Chemonics International, Inc. , 2002, pp. 60,61).

Diversification in only one vegetable usually doesn't make sense as it is subject to high risks. In order to reduce the probability of losing everything, J. A. Baltodano Cuadra (personal communication, November 15, 2012) recommends cultivating various vegetables and fruits. To lower the covariate risk farmers should produce vegetables from different plant families. For example, pepper and tomato both belong to the nightshade family and therefore, are vulnerable to mostly the same plagues.

As a concrete example, he recommends a farmer with around one manzana of available land to produce maize and beans in the winter for subsistence. He does not recommend growing vegetables for commercialisation during this period, as it is very difficult to produce profitably. It may be nearly impossible, especially for farmers who are new in this field. In the summer on the other hand, J. A. Baltodano Cuadra recommends producing cash crops to cover the monetary needs of the family. The vegetable mix should thereby depend on the previous assessment.

5. Recommendations for actors that want to address the Thin Months through diversification

Based on the results of the present thesis, several recommendations must be pointed out. In general, a well thought-out planning and design of the intervention strategy is crucial for a successful outcome. Those planning a program to alleviate the Thin Months should first ask themselves who they want to reach. A project needs to be designed differently if it is directed towards the least developed farmers or towards the relatively wealthy. As smallholder farmers are the most vulnerable to food insecurity, the programs should be able to adapt to the reality of coffee producing households with limited resources.

After deciding on the target group, it is crucial to understand the complexity of the strategies and perspectives of the respective coffee farmers. Often relief programs have standard responses and are not designed for a specific region and context (Rose, 2008, p. 169). Furthermore, the results of such a program are unlikely to be sustainable and positive, if not based on an understanding of the multidimensional nature of the local reality (Shriar, 2007, p. 285). Complexity also needs to be kept in mind when dealing with the question of the appropriate geographic scope of a program. Factors that should influence this decision are for instance, the resources of the project that are available for research and diagnosis, and the level of cultural, biophysical and economic diversity of the area (Shriar, 2007, p. 285). Rose (2008, p. 169) argues that a food insecurity information system should be central in developing an appropriate program. Detailed household information allows for diagnosis of which households are likely to be affected by shocks, which aspects of their livelihoods are at risk, and to what extent. This information also helps to recognise the magnitude of the solution that will be needed. I suggest that such an information system should also include an assessment of the households' physical, financial, human and natural capital.

These capitals are the basis of the ability to generate income and provide insight on how much support and in what form is needed for a successful diversification. Especially the assessment of human capital may prove challenging, as it is not easy to estimate a household's motivation and attitude towards a certain activity as well as their degree of responsibility. It may therefore be useful to collaborate with a cooperative or a farmer's organisation as they are in constant contact with their associates. This way, the assessment process may be less costly as less information needs to be newly collected. Farmers who do not fulfil the human capital requirements should not participate in a program without caution. In order to be successful they need training and personal development until they are adequately prepared. Depending on the specific participant and if the deficit lies in responsibility, motivation, or knowledge, such training may take different amounts of time. For farmers who do not fulfil capital requirements, there is always the option of developing intervention strategies that require less capital. Therefore, a strategy should only be designed after having analysed the respective target group and their capabilities.

The decision on what smallholder farmers should diversify in additionally needs an analysis of several other factors on the farm level in order to decide on an optimal diversification activity for a specific farmer. Table 15 provides examples of possible assessment factors. The income

portfolio needs to be designed individually for every household according to its preconditions, and should benefit from the comparative advantages of the farm. For example, a family that lives at a busy road may, if all the other conditions are right, have an advantage of selling products in a tiny convenience store. Or in case the respective farmer already has some experience with vegetable production and has access to enough water, subsistence and commercial horticulture with irrigation may be advantageous. Therefore, a program should not focus on standard responses but be open to different diversification activities.

Assessment of the capitals and farm specific factors could be done with the help of a questionnaire that could be filled in by a technician, partly in collaboration with the participants of the project. All the collected data should play a major role in the design of the specific program and support the decision of what activity is suitable for a respective participant. However, one should always also consider if not another strategy than diversification may be more appropriate. In the case that a farmer may have the option of being competitive in coffee production, it is worthwhile to look into specialisation in this activity because it might make economic sense and therefore, alleviate the Thin Months alone. On the other hand, households with very limited resources that don't seem to be prepared capital-wise for a diversification strategy may need a different kind of support in the form of short-term relief, for example. In case the difficulties of the household are not caused by general economic problems, but rather other issues like illness or being a single parent with a lot of small children are responsible, another strategy for alleviating the Thin Months may be needed.

Since the purpose of diversification in the present paper is to alleviate the effect of the Thin Months, the new activity needs to generate some income or in-kind income during the relevant months. Although this may not be necessary for all households if they fulfil condition number two (see table 11: the three conditions), just an increase of income may be sufficient for providing food security for the family. But as the previous chapters have demonstrated, not all farmers who are above the \$2 a day poverty line, manage to avoid the Thin Months. Unless a family distributes their income very equally throughout the year, the income generation specifically during the months of scarcity, is therefore an absolute requirement for diminishing food insecurity.

A further issue that one needs to think about is the magnitude of the planned diversification activity for a specific farmer. The previously collected data should provide the basis for this decision. The household's capital and risk management capabilities need to be compared with the requirements for starting the new activity. Therefore, a starting size should be chosen that the respective family is capable of implementing successfully. In case the program demands too much of a household at once, chances are high that implementation will fail and thus discourage the participants. For example, in case a household has very little knowledge about horticulture, without extensive training and supervision it will be very hard to produce a large amount of vegetables successfully. Also N. Kränzlin believes that for a farmer with no experience in vegetable cultivation, it may not be possible to produce vegetables with micro-irrigation successfully, because of a lack of knowledge. Such a farmer needs a little experience or more support during the production process (N. Kränzlin, personal communication, December 4, 2012).

The work division of the respective family and the current workload per family member should also contribute to the decision of the size. As indicated in previous chapters, the women of the household may traditionally attend a small home garden while the men usually take care of bigger plots for commercialisation. Therefore, evaluating which person of the household has time and is willing to take care of a new activity is crucial. In case the program aims at an untraditional work division, the project may need more supervision and support to keep persons in their new field of activity. In case the whole family is already at capacity with current activities, it will be difficult to diversify. For example, most coffee-growing households would not be ready to diversify in vegetables on demise of coffee production.

Rose (2008, p. 170) mentions another important element for food security strategies. According to him interventions need to be participatory. It's not only a question of which components are employed, but also how they are developed and finally implemented. A participatory approach relies on community involvement in assessment, program design and evaluation. The reasons why such approaches should be adopted are the following: first, research has demonstrated that participatory approaches have the potential to increase program effectiveness. Community members understand the local conditions better than somebody from the outside, and can thus develop better-targeted and more realistic programs. Second, participatory programs have the potential to develop local capacities beyond the specific objectives of a particular program. Working together in developing solutions to a problem can have a very empowering effect that may be useful for confronting future challenges of the community (Rose, 2008, p. 170). As previous chapters demonstrated, the motivation of households can be crucial for a successful outcome. The participatory approach may have a positive effect on this factor, as the participants are part of the decisions and the design of the program.

Finally, as the Thin Months are a climatic phenomenon that repeats itself every year, the setting *after* a problem has occurred is also the setting *before* the next problem arrives (Rose, 2008, pp. 168,169). Therefore, the solutions should clearly be long-term. In case short-term relief is necessary, this should also be done with a focus on long-term development. This long-term approach should also be aware of future challenges. As chapter 2.3.1. demonstrated, the suitability for coffee growing will decrease in many regions due to climatic change. Especially farms that are situated on a lower height above sea level may lose their comparative advantage in growing coffee. In the long run, such issues need to be considered so that the households will be prepared for the environmental changes. Additionally, one should be aware of other uncertainties such as the international coffee price. While it was rather high in recent years without international agreements, it will most likely drop again sooner or later. While some farmers may seem competitive today, they may not be in the future.

6. CONCLUSION

The previous chapters demonstrated that diversification can indeed lead to a more regular income for smallholder coffee farmers and support alleviation of food insecurity during the Thin Months. While diversification can be very useful for this purpose, it is definitely not a silver bullet. The present thesis has shown that most coffee farmers are already diversified up to a certain degree. The motivations for diversification are diverse, such as risk management strategies, dealing with seasonality, coping behaviour, differentiated labour markets and so on. Nevertheless, a major problem of the Thin Months is that many families do not have income during times of scarcity, when food insecurity among coffee producing families is very widespread. Diversification has the advantage, that depending on the specific activity, it may provide income or in-kind income exactly during the period when it is needed the most. Therefore, a successful strategy to tackle the Thin Months needs to identify activities that provide smallholder farmers with an income during these difficult times. Since the whole economy in coffee growing regions runs on a low level during the Thin Months, this may prove rather challenging.

The case of diversification in vegetable production demonstrates the difficulties of such a strategy. Many diversification activities demand a variety of requirements for a successful endeavour. While the financial, physical and natural capital requirements may sound relatively easy to fulfil (eventually one can purchase these capitals), the human capital requirements are increasingly difficult. Farmers who are not behaving responsibly towards their family and their farm may have extreme difficulties in producing vegetables successfully and alleviating the food insecurity of the Thin Months. Additionally, farmers who have absolutely no knowledge about horticulture will not have an easy time. Training in these required human capitals is very time-intensive and costly. At the same time, it is very important that participants of a program meet the requirements, because failure of one farmer can demoralise not just one household, but also bystanders.

Those planning a program for alleviating food insecurity among coffee farmers need to be aware of the complexity of coffee farmers and of the requirements. More farm-centred research about the livelihoods, the behaviour, and habits of smallholder farmers needs to be made to support developing sustainable intervention strategies.

Additionally, it is important to include the participants of the program in the different processes of the program in order to increase the probability of success. Programs should not offer a standard response to food insecurity, but rather try to find individual responses. Therefore, the decision should not only be based on the context of the farm and the ability of the farmer, but should also value his opinion. In case a farmer prefers a certain activity to another, it may be useless to put him on the latter. While all the recommended assessments and training will be very time intensive, the participatory approach can have an empowering effect on the households that may be useful in confronting other challenges of the community. In conclusion, diversification can be a good strategy for diminishing food insecurity, but one needs to be aware that a successful implementation is not as simple as it may sound. However, if done properly, diversification can offer an important contribution to the alleviation of the Thin Months.
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ANNEX

ANNEX 1: LIST OF INTERVIEWEES

Code	Name	Function	Interview Date
E1	Damaris Rivera	Director of UCA Mujeres Productoras Rurales Jinotega	02.10.2012
E2	Marcos Zeledon	Technician in the UCA San Ramón	11.10.2012
E3	José Antonio Baltodano Cuadra	Engineer	15.11.2012
E4	Aldo José Márquez G	Gerente Programa de Crédito	23.11.2012
E5	Julio Monterey	Managing director of Funica	03.12.2012
E6	Nadja Kränzlin	iDE Country Director Nicaragua	04.12.2012
E7	Francisco Zamora	Legal representative of iDEal	04.12.2012

ANNEX 2: LIST FOCUS GROUPS

Code	Date	Nr. of participants	Gender	Average age	Department
FG1	16.11.2012	8	3 M, 5 F	44	Matagalpa
FG2	22.11.2012	8	F	34	Matagalpa
FG3	21.11.2012	6	Μ	39	Jinotega

ANNEX 3: CASE STUDIES

Code	Initials	Gender	Age	Household size	Cultivated land in manzanas
CS1	B.L.M.	F	39	4	3.25
CS2	J. R.	F	40	10	3.25
CS3	I.B.R.	F	53	5	3
CS4	M.C.B.	F	33	8	3.5
CS5	C.E.L.O.	Μ	25	9	8
CS6	S.S.Z.T.	Μ	58	8	7.5
CS7	R.I.H	F	39	6	1
CS8	C.B.G.	F	25	3	1
CS9	A.L.	F	62	4	6

ANNEX 4: SURVEY

CUESTIONARIO: EL HOGAR DE LOS CAFETALEROS

INFORMACIÓN SOBRE ENCUESTADOR				
NUMERO DE	FECHA	CUESTIONARIO LLENADO POR		
ENCUESTA				

Información Básica:

1.1	INFORMACIÓN SOBRE EL ENCUESTADO					
				М	F	
NOMB	BRES	APELLIDOS	EDAD	SEXO		

1.2	DIRECCIÓN		
COMU	INIDAD	MUNICIPIO	DEPARTAMENTO

1.3	ORGANIZACIONES				
COOP	ERATIVA	ASOCIACION DE	CERTIFICADO DE	CERTIFICADO	
		PRODUCTORES	COMERCIO JUSTO	ORGANICA	

1.4	EDUCACIÓN	
NIVEL	DE ESCOLARIDAD ALCANZADO?	

Información sobre el mantenimiento del hogar: NR= No respuesta; PI= Parece inseguro			NR/PI
2.1	El Hogar		
¿ Cuár actual	¿ Cuántos personas integra su familia actualmente?		
¿Cuán ella?	tos de ellos trabajan en la finca o fuera de		

2.2	¿Cuántos años tienen de cultivar café?	

2.3	¿Tienen fuente de aguas disponibles en el verano para uso agricola?	
2.3.1	¿Qué tipo de fuente de agua tienen?	

2.4	¿Cuánta es el area total de la finca o del	
	sistema de producción?	

2.5	¿Como estan distribuida?								
Café									
Manzanas									

2.6	El alquiler				
		Area	Mensual	Anual	
¿Usteo para s	d alquila terreno de otros productores embrar en otras fincas?				
¿Usteo ellos s	d alquila terrenos a productores para que iembran en su finca?				

3.1	έQι	ué cultivos si	embra usted	?					
Cultivo	S	Área en mz	Producción total	Unidad de medida	Producción Vendida	Precio Unit. de venta	Venta Total	Auto- consumo	
Café									
Café el ano atras									
Sub To	otal								

3.2	Otro	osIngresos de origenPecuarios								
Pecuarios		Cantidad	Cantidadan	Unidad de	Precio Unit. de	Venta	Auto-			
		mensual	ual	medidas	Venta	Total	consumo			
Ventas de										
Cerdos										
Ventas de										
Gallinas										
Ventas de										
ternero										
Ventas de										
Huevos										
Sub Tota										

3.3	Produc	ProductosBasicosqueno se producen en la finca							
Producto		Cant. Mensual	Unidad de medidas	PrecioUnitario	Compra Total				
Arroz									
Azucar									
Aceite									
Jabon									
Sub Total									

3.4	¿De la familia ex	kisten personas que	trabajan fuera de l	a finca ?		
¿Qué t	tipo de empleo?	Medida	¿ Cuanto dias?	¿Pago al dia?	¿Pago al año?	
		Catorcenal				
		□Ajuste				
		🗆 Hora/Dia				
		Catorcenal				
		□Ajuste				
		🗆 Hora/Dia				
		Catorcenal				
		□Ajuste				
		🗆 Hora/Dia				
Sub To	otal					

3.5	Otros ingresos				
		Origen de la actividades	Mensual	Anual	
¿Ustedes tienen otros					
ingresos?					
¿Ustedes reciben un					
ароуо	económico de				
algun familiar?					
Sub Total					

3.6	Ingresos totales	
¿Usted	d sabe cuánto fueron sus ingresos	
totales en el último año? ¿Cuanto?		
¿Era u	n poco igual a los otros años?	

4.1	¿Usted ha solicitado financiamiento en este año?							
¿Pued	e decirme el monto?	Taza de Interes	Plazo	Interés pagado (último año)				

¿Para que utilizaron este	
financiamento?	

4.2	Generación de em	npleo en la	a finca				
¿Usted tiene		No	Dias mensual	Dias anual	Costo por dia	Costo Total	
Trabajadores							
perma	inentes?						
Trabaj	adores						
tempo	orales?						
Cuánt	os familiares						
trabaj	ando en la finca?						
Otros	contratos (ej:						
seguridad, cocinera)?							
Sub Total							

4.3	Insum	nosqueco	mprapara	ausoagríco	olas					
		Café	Maiz	Frijol		Totales	U/medi da	Valor	Costo Total	
Semilla										
AbonoCor	npleto									
Urea										
AbonoFol	iar									
Herbicida	S									
Fungicida	5									
Insecticida	as									
Sub Total										

4.4	¿Cuáles son sus g	íles son sus gastos promedios mensuales por servicios básicos?		
		Mensual	Anual	
Electricidad				
Agua				
Gas				
Combustibles				
Leña				
Escuela (incl. Material)				
Universitaria				
Medicamento				
Ropa				
Costo Total				

4.5	¿Ustedes han comprado algun equipo o herramienta de trabajo para la finca o para la			
	diversión de la familia en el último año? Cuál era el precio?			
Articulos			Precio	
Celular				
TV				
Radio				
Moto				
Bombas				
Motores				
Despulpadoras				
¿Uste	d tiene otros gastos no mencio	onado?	•	
Mejoras en la casa				
Mejoras de Cercas				
Mejoras en el beneficio				
Reparaciones de equipos				
Gastos de productos veterinarios				
Costo Total				

5.1	¿Usted puede decirme si han tenido meses dificiles en el ultimo ano?	□Si □ no	
5.2	¿Cuál meses son?		
5.3	¿Cuenta me que era la problema y como era la situacion en la familia?		
5.4	¿Qué hiceron contra estos meses difíciles?		
5.5	¿Cómo cree usted que sería posible de evitar estes meses dificiles?		

6.1	¿Usted tiene algo más que quieren	
	contarme?	

Comentario del entrevistador				