# Overcoming the Thin Months in Coffee -

# How diversification can generate stable and higher incomes in Marcala (Honduras)


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# Abstract

Yearly recurring months of food insecurity are a common occurrence for many small-scale coffee farmers in Central America. The farmers have even a name for these months: *los meses flacos* (the Thin Months). This thesis identifies causes of the Thin Months and proposes strategies for small-scale coffee farmers in Marcala, Honduras, to overcome them. The two main causes identified through interviews carried out in July and August of 2015 in Marcala, Honduras, and through literature research are insufficient income and insufficient subsistence crop production.

This thesis proposes to tackle the two main causes through income and crop diversification. Both diversification strategies can be realized through an increased vegetable production. On the one hand, farmers can sell vegetables additional to coffee and increase income diversification, on the other hand farmers can increase their level of self-sufficiency. However, the lack of water availability for vegetable production impedes small-scale coffee farmers in Marcala to do so. Therefore, this thesis proposes to increase water availability through water harvesting and restraining and to provide farmers with irrigation systems in order to diversify and stabilize income streams through vegetables production. The three projects described in this thesis carried out by iDE (International Development Enterprises) show, that that the proposed methods lead to more stable and higher incomes and, therefore, contribute to the eradication of *los meses flacos* for coffee farmers in Marcala.

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| | |
|---|---|
| CABRIPEL | Cooperativa Agropecuaria Brisas del Pelón Limitada |
| CEPAL | Comisión Económica para América Latina y el Caribe |
| CEPRIS | Centros Productivos de Innovación Rural Sostenible |
| COMSA | Café Orgánico Marcala S.A |
| DO | *denominación de orgien protegida* |
| FAO | Food and Agricultural organization of the United Nations |
| FLO | Fairtrade Labelling Organization |
| GDP | Gross Domestic Product |
| HNL | Honduran Lempira |
| iDE | International Development Enterprises |
| IHCAE | Honduran Coffee Institute |
| IPCC | Intergovernmental Panel on Climate Change |
| NGO | Non-Governmental Organization |
| OECD | Organization for Cooperation and Development |
| RAOS | Cooperativa Regional de las y los Agricultores (as) Orgánicos de la Sierra |
| US | United States |
| USD | United States Dollar |

# 1 Introduction

In the year 2014, 150'165'000 60 kg bags of coffee were consumed worldwide (International Coffee Organization, 2016b). Many people start their day off with a cup of coffee in the morning, this is part of their daily lives; but few think about where coffee comes from and who grows the coffee.

Coffee is one of the most valuable primary products in world trade; however, many of the 25 million coffee farmers struggle to meet even the most basic human needs with the income generated from coffee sales. The international coffee market is one of the most volatiles. This fact makes coffee farmers around the world vulnerable. (FLO, 2011a)

Especially small-scale coffee producers are exposed to this market volatility. They own only limited land and their incomes often depend completely on their only cash crop - coffee. Small-scale farmer families face major challenges to generate enough income from coffee production in order to build their livelihoods and overcome poverty. In recent years, the situation for many small-scale coffee farmers has deteriorated due to climate change impacts and outbreaks of pests and diseases such as leaf rust, affecting the coffee plants. All this contributes to the vulnerable position coffee famers around the world find themselves in, often leading to the paradoxical situation of farmers not being food secure. In order to overcome the complete dependence on a single cash crop, diversification of income streams seems to be crucial. Through diversification of income streams, the vulnerability of coffee farmers can be reduced and they can eventually lift themselves out of poverty.

This dependency and vulnerability leading to poverty and periods of food insecurity, are exactly what many small-scale coffee farmers in Marcala, Honduras, have experienced. They face regular periods of food insecurity and their income is almost exclusively dependent on coffee as the only cash crop. Droughts and pests affecting the harvest negatively have shown the vulnerability to external shocks of small-scale coffee farmers in Marcala.

In the following chapters of this thesis, background information about the international and Honduran coffee industry and history are given and the Thin Months in Marcala are analyzed. This analysis will lead to possible strategies coffee farming families can undertake in order to combat the Thin Months.

## 1.1 Research Question and Relevance

Farmers in Marcala, Honduras, are specialized in growing different varieties of Arabica coffee plants. However, they also grow other crops for auto-consumption, such as maize and beans. Coffee sales are the major, and sometimes only, income generating source for the households, which makes farmers extremely vulnerable to volatile coffee prices, coffee demand and coffee plant diseases.

In recent years, climate change and weather phenomena like El Niño, leading to scarce rainfalls in the Marcala region, aggravated the small-scale coffee farmers' situation. As a result, the number of months during which income from the cash crop coffee has already been spent and during which subsistence crops were not harvested, increased. This led to longer lasting periods of food insecurity. Pests affecting coffee plants, contributed to an even more challenging situation for the small-scale coffee farmers. All these factors contribute to recurring months of food insecurity for small-scale coffee farming families. In Central America these months are called *los meses flacos*, the Thin Months. *Los meses flacos* are a reality in Central American coffee fields, and several studies have been conducted

in order to understand the causes and effects of these recurring periods of food insecurity (Bacon et al., 2008; Caswell et al., 2012; Morris et al, 2013; Shriar, 2007).

Even though there is recognition in literature that food insecurity is a phenomenon in coffee-producing regions (Bacon, 2004; Caswell et al., 2012; Morris et al., 2013), the interconnection and relation between coffee production and food security is still not understood in its full complexity. This thesis attempts to provide insight into this complex issue by describing and analyzing the situation of small-scale coffee farmers in Marcala, Honduras. At the core of this research are the factors which cause the Thin Months for small-scale coffee farmers in Marcala and possible strategies to avoid these recurring periods of food insecurity.

This thesis provides answers to the following research questions:

- What are the causes of the Thin Months in Marcala?
- What strategy can be applied in order to alleviate months of food insecurity for small-scale coffee farmers in Marcala?
- What can be done in terms of diversification of crops in order to reach a higher level of self-sufficiency and higher income streams? What are the main limitations limiting small-scale coffee farmers in Marcala to diversify crop production and how can they be addressed?

Furthermore, this thesis will investigate when the Thin Months occur in Marcala. This is determined through information from literature and interviews with farmers and technicians. However, it is important to note that all interviewed farmers participated in projects aiming to eradicate food insecurity. Therefore, interviewed farmers did no longer represent the average small-scale coffee farmer in Honduras facing periods of food insecurity.

## 1.2 Methodology

The present thesis consists of four main parts and begins with background information about the coffee industry. Following the background information, a chapter is dedicated to the theoretical concept of food insecurity and its different forms, causes and strategies applied by farmers and suggested by literature to overcome food insecurity in coffee-farming areas. Later, two successful income and crop diversification projects are presented, which were carried out in Marcala, Honduras, by the nonprofit organization International Development Enterprises (iDE). The aim of these two projects was to increase food security of small-scale coffee farming families. This was reached through crop diversification, increasing both income streams and subsistence crop production. Key elements of the successful projects were different irrigation and water harvesting technologies, since drought is an increasing problem in the region and main factor limiting famers to diversify crop production.

The presented analysis is based on different types of sources and information derived from literature. Furthermore, an important part of the data was obtained during a field trip to Marcala, Honduras, in July and August of 2015. The aim of the field trip was to collect information about the impact and key elements of the two projects carried out by iDE and to obtain data about the challenges faced by small-scale coffee farmers. 16 farmer families in Marcala were interviewed and conversations were conducted with leaders of the coffee cooperative CABRIPEL (Cooperativa Agropecuaria Brisas del Pelón Limitada). Additionally, interviews were conducted with technicians involved in the projects implemented by the iDE. In order to gain further insight from one of the projects called *mujeres*

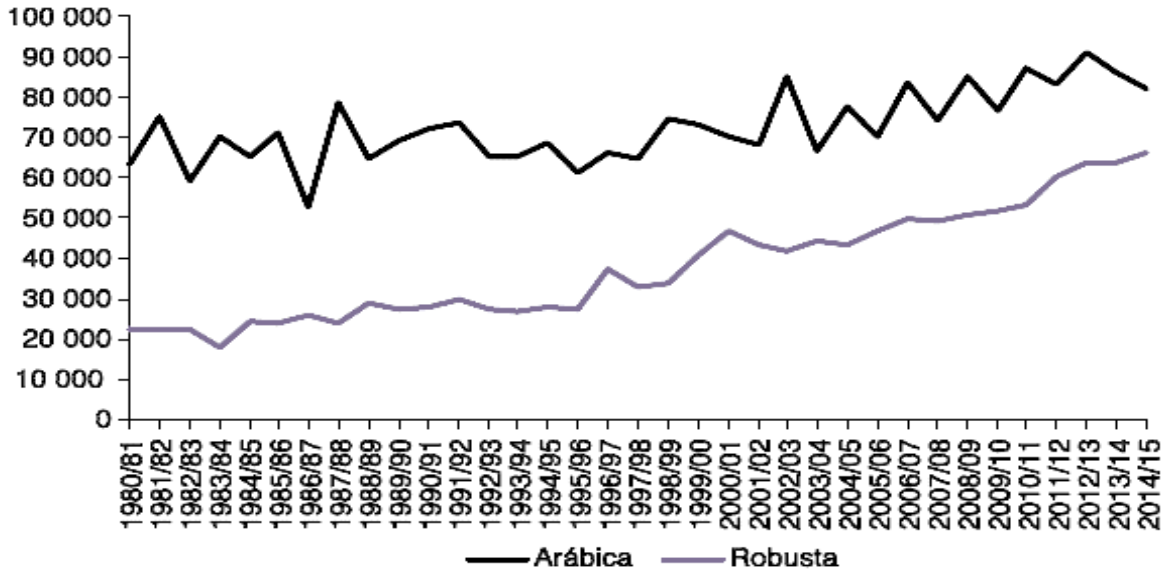
*promotoras*, a focus group interview was carried out with 10 participating women from the cooperative RAOS (Cooperativa Regional de las y los Agricultores (as) Orgánicos de la Sierra).

The data obtained through interviews with coffee farmers turned out to be inconsistent and imprecise. This inconsistency and imprecision might influence the results of this research. Many farmers were unable to answer questions about the quantity of produced crops in recent years and the corresponding income generated. Answers given to several quantitative questions are likely to show a misleading picture about the reality, since farmers themselves did not keep account of their production costs and benefits. Often, only coffee prices were remembered by the farmers. Statements regarding the sale of vegetables or other income sources remained vague and imprecise. Therefore, it was difficult to measure the share of vegetable and coffee sales on the household income. Furthermore, interviewees tend to be subject to a variety of biases, which can result in both exaggerations and understatements. In order to provide a more accurate estimation of household income and to limit bias, several hours were spent with each interviewed family. Questions were not only asked directly, but also indirectly in order to get a deeper insight and increase quality of the data. This is the reasons why, the interviews were carried out in an informal way rather than in a structured interview form.

# 2 Background

## 2.1 International Coffee Industry

According to an estimate of the International Coffee Organization (ICO), 143 million bags containing 60 kg of coffee were produced worldwide in 2014/2015[1] (International Coffee Organization, 2015a). Of these bags, about 60% were Arabica coffee and 40% Robusta coffee (International Coffee Organization, 2016a). Graph 1 shows how much Arabica and Robusta coffee was produced from 1980/81 to 2014/15. These two main coffee species differ in terms of taste and cultivation. Robusta coffee plants are more resistant to difficult growing conditions and diseases like the leaf rust but produce an inferior tasting coffee compared to Arabica coffee plants. Within these two coffee plant species many different varieties exist. (Coffee Research Institute, 2006)




*Graph 1: Coffee production according to coffee variety from 1980 to 2014 in thousands of bags containing 60kg of coffee. Source: Bárcena et al., 2014, p. 46.*

Traditionally, coffee farmers in Latin America and Africa have cultivated Arabica coffee, generally considered to have a higher quality. Due to better quality, Arabica coffee is sold for higher prices in the international coffee market than Robusta coffee. However, the variety of the coffee plant is not the only factor determining the taste and quality of a cup of coffee. The soil, altitude, growing management, climate, post-harvest handling, dry and wet milling, timing of the harvest, roasting, and the preparation of the coffee are all factors influencing the coffee quality. (Bacon, 2004, p. 498).

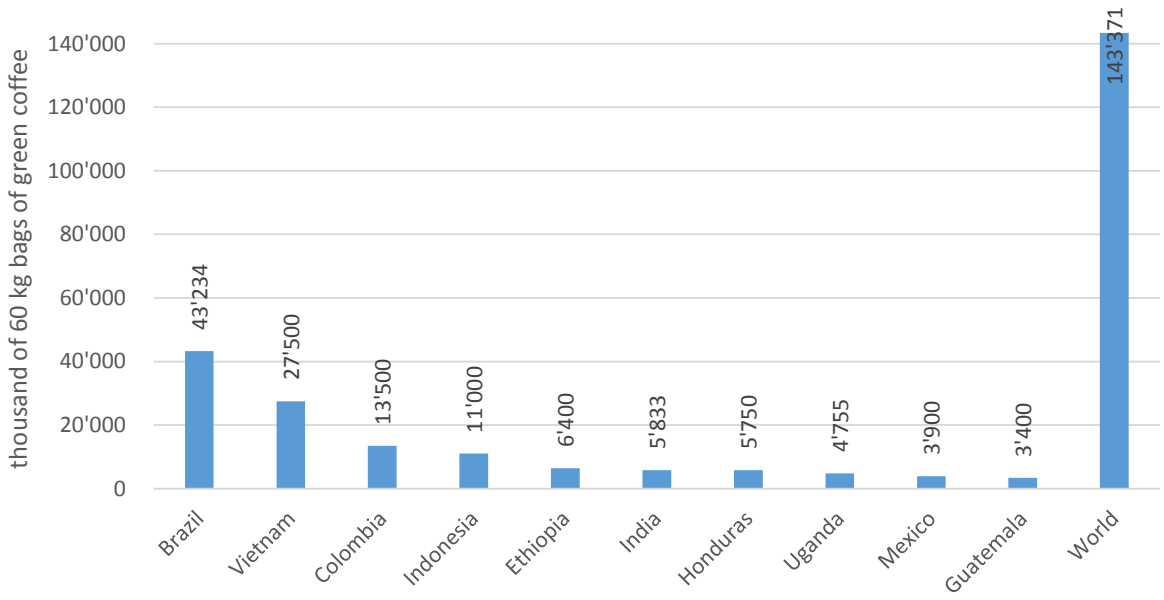
Currently, there are over 80 coffee producing countries, most of which are in the tropics. Graph 2 shows the amount of coffee produced in the 10 major producing countries. With about 43 million 60 kg bags, Brazil was the largest producer of coffee in 2015, followed by Vietnam with a production of 27 million 60 kg bags. Honduras is ranked as number 7 in terms of coffee production in 2015. Even though Asian countries have been on the rise in terms of coffee production, still more than half of the world's coffee is produced in the Americas (ICO, 2016a). In general, the majority of a country's coffee

[1] Coffee is harvested from November until March, therefore production year refers to the harvesting season.

is exported and only a negligible quantity is consumed domestically (Eakin et al., 2006, p. 156). Both consumption and demand of special, high-quality coffee as well as low-quality coffee have been on the rise. The highest coffee consumption can be observed in Brazil, Europe and the United States. However, the growing middle class in Asia has shown an increased demand for coffee in the last few years. (Panhuysen et al., 2014, p. 5)

Small-scale family farmers produce 80% of the worldwide coffee (Root Capital, 2016). Coffee production provides livelihood for 20 – 25 million coffee farming families and gives work to more than 100 million people worldwide (Bárcena et al., 2014, p. 11; Panhuysen et al., 2014, p. 1). Most of the coffee producing families live in poverty (Bacon, 2004, p. 497), they are particularly vulnerable to market fluctuation, economic and environmental changes. Furthermore, small-scale farmers usually have little alternatives and resources to cope with different challenges. (Eakin et al., 2006, p. 156)

### 2.1.1 International Coffee Trade




*Graph 2: Total coffee production of top exporting countries in thousand 60 kg bags in 2015. Source: ICO, 2016.*

Today, the coffee market is dominated by two major transnational corporations, Nestlé and the newly created company Jacobs Douwe Egberts, the later resulted from a merger of Mondelēz and DE Master Blenders 1753 (Mondelēz International, 2015, p. 12). In addition to these two transnational corporations, the top ten coffee roasters such as Smucker's, Strauss, Starbucks and Tchibo influence the international coffee market. The ten largest roasting companies process almost 40% of all consumed coffee. Each of these top ten roasting companies has developed corporate alliances with different international standard initiatives like the Fairtrade Labelling Organization (FLO) or UTZ in order to respond to sustainability demands from customers. Coffee demand and investments in sustainable coffee is largely determined by the two principal coffee traders and the ten largest roasters (Borrella et al., 2015, p. 32; Panhuysen et al., 2014, p. 17).

After a roaster purchases green coffee from coffee traders such as Volcafé, Neumann and ECOM, they roast and sell the coffee under a brand name. Consumer have little to or no information about quality and origin. In such mainstream coffee chains little value remains in the producing countries, as market

actors such as roaster, traders and retailers capture most of the added value. (Borrella et al., 2015, p. 31; Panhuysen et al., 2014, p. 4)

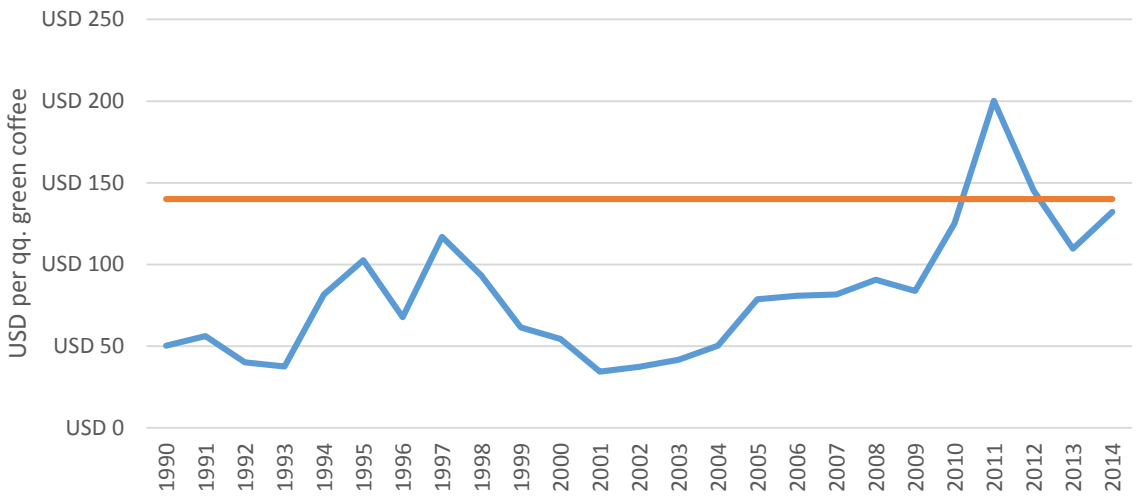
### 2.1.2 Coffee Price and Volatility

Within the two different coffee plant varieties, Arabica and Robusta, there are many different kinds of coffee plant subspecies, which differ in taste, quality, origin and thus also price. The price for coffee is usually determined by the availability and demand of the bean, but not only. Speculative actions, currency exchange rates and expectation of the future market all influence the coffee price. However, in retrospect, it can be said that coffee prices reached a historical minimum in 2001/02 of about 0.25 USD per pound and peaked in the season of 2010/11 at about 2.1 USD per pound (International Coffee Organization, 2015b). After this peak, coffee prices began to decrease subsequently due to an oversupply, reaching 1.6 USD per pound in 2011/12 and 1.2 USD per pound in 2012/13. (Panhuysen et al., 2014, pp. 3–5)

However, coffee producing farmers have different options to sell their coffee for higher than international coffee prices. If coffee producers are certified as Fairtrade farmers, their respective producer organization receives a premium on top of the international coffee price. Further, Fairtrade producer organizations are guaranteed a minimum price (Fairtrade Minimum Price) of 140 USD per quintal. One quintal (qq) equals 45.36 kg (100 lbs.), therefore one qq is equivalent to 0.4536 kg. As graph 3 shows, the Fairtrade minimum price of 140 USD per qq has been paid to Fairtrade farmers from 1990 until 2010, since the international coffee prices were below the established Fairtrade Minimum Price. If the market price is higher than 140 USD per qq, a Fairtrade premium of 20 USD per qq is added. This Fairtrade premium of 20 USD per qq is, however, not paid directly to the farmers but to the farmers' organizations, such as cooperatives and associations. Therefore, in order to receive the Fairtrade premium, farmers must be organized in organizations, such as cooperatives or associations, and must be small-scale producers. Fairtrade International (FLO) considers coffee farmers to be small-scale producers if farm work is mostly done by family members and additional workers are not hired all year round. (FLO, 2011a).

In addition to the Fairtrade certification, coffee farmers can certify their coffee as organic. Farmers producing certified organic coffee receive a premium of 30 USD per qq of exported green coffee. This premium, in contrast to the Fairtrade premium, is paid directly to the producing farmers. Therefore, Fairtrade coffee farmers who produce and export organic coffee can receive up to 50 USD per qq in addition to market prices. However, both Fairtrade and organic premiums are only paid for exported coffee. This means that if market prices are below 140 USD per qq, Fairtrade farmers who export organic coffee are guaranteed a price of at least 170 USD per qq. (FLO, 2011b, p. 8)

With this background information about the international coffee market and prices, the following chapter introduces the Honduran economy and coffee industry.




*Graph 3: Prices paid to conventional coffee producers in Honduras in USD per quintal in blue and Fairtrade price floor of 140 USD per quintal in orange. Source: ICO, 2015b.*

## 2.2 Honduran Coffee Industry

### 2.2.1 Coffee History in Honduras

After the independence of Honduras in 1821, a long political unstable period began that lasted until 1976. During these years, the weak Honduran economy produced mostly timber, cattle and minerals. The lack of infrastructure left Honduras almost isolated from the rest of the world, there was no international trade. It was a period during which Honduras faced various civil wars and foreign invasions. In 1876, the centralistic, liberal government under Marco Aurelio Soto implemented a series of reforming policies; creating a new legislation, founding several education centers, developing industry, trade and agriculture and improving infrastructure. This reform is known as the *Reforma Liberal* in which Honduras opened itself to the world economy and enabled the industrialization of the country. The Honduran reformers tried to copy their neighboring countries Guatemala and El Salvador, which have undergone significant economic changes, becoming agricultural exporters based on coffee. In order to achieve the same, the Honduran government displaced indigenous communities from their territory to extend the coffee production area. Laws encouraging agricultural production of coffee, sugar cane and tobacco were implemented. Coffee production was especially successful in the mountain regions of La Paz, Santa Bárbara, Comayagua, Copán, El Paraíso, Choluteca and Tegucigalpa. Nevertheless, coffee exports accounted for only 0.5% of total exports compared to bananas which accounted for 26% of total exports in 1887/88. The two main reasons for this were the difficult territory in which coffee was grown, making transportation challenging, and the relatively small Honduran population. (Melghem, 2007, pp. 2–22)

Due to a weak central government, poor national markets and a very badly developed transportation infrastructure, development of the Honduran coffee industry and overall agricultural production was relatively slow compared to neighboring countries. Many households grew coffee before the twentieth century, however, only for domestic consumption and local markets. Land suitable for coffee production remained largely in the hand of small-scale farmers; this pattern can be observed until nowadays. The importance of Honduras in the international coffee market did not begin until the 1950s. From 1970 onwards national policy changes contributed to a rise of importance of coffee

production for the Honduran economy. The Honduran Coffee Institute (IHCAFE) was set up by the government in order to promote coffee production. The national development bank, for example, enabled medium-sized producers to obtain loans under attractive conditions. As a further way to encourage high quality coffee production through, the Honduran government established trophy competition. All these policies led to an expansion of the coffee production, resulting in a production growth of 192% between 1989/90 and 1999/00. (Eakin et al., 2006, pp. 160–161)

However, in 1998, Hurricane Mitch destroyed 30% to 40% of poor rural household's crops, compromising their ability to generate income. People in Honduras nowadays say that Hurricane Mitch set back the economic development by 50 years. Especially banana and maize crops were damaged. This affected in particular the poorest households; they had major difficulties to rebuild their lost assets in the following years due to the lack of available resources and the negative effect on their income was of longer duration and stronger than on those of wealthier farmers (Carter et al., 2007, pp. 841, 852). It was then, that coffee displaced banana as the main exporting commodity. (IDB, 2000)

### 2.2.2 Economy

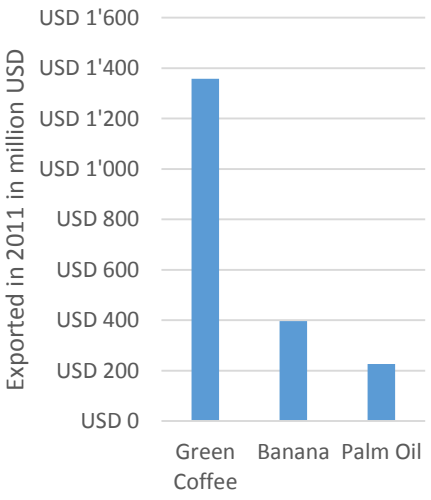
There are currently 8.1 million people living in Honduras and two out of three are considered as poor (62% of population). They are living below the national poverty line identified by the World Bank, making Honduras one of the poorest countries in Latin America. Poverty is especially prevalent in rural communities, where 79.5% of the people are considered to be poor. However, in the year of 2010, the agricultural sector contributed most to national GDP (gross domestic product) with 36%. (CEPAL, 2016; World Bank, 2016a)

Since Honduras is one of the poorest countries in Latin America, various development aid programs have been implemented. In 2013, for example, official aid and development assistance amounted to 628 million USD. (World Bank, 2016b)

According to the FAO (Food and Agricultural Organization of the United Nations), 69% of the Honduran farmers suffer from food insecurity. Average schooling of farmers' amounts to 3 years while having a live expectancy of 47 years. (FAO, 2016b)

It is estimated that about 1 million people in Honduras are either directly or indirectly dependent on the coffee industry. The coffee industry amounts to about 8% of the national GDP and to 38% of the agricultural GDP (IHCAFE, n.d.; Teuber, 2009, p. 132). Almost half of Honduras's economic activities is tied to the United States (US). Exports to the US amount to about 30% of GDP. Further, the remittances, mostly coming from the US, were of 3'370 million USD in 2014, about 17% of total GDP (Index Mundi, 2015; World Bank, 2016b).

The coffee industry is of significant importance for the Honduran economy as illustrated in graph 4. The top export commodity in terms of value is green coffee, 1'358 million USD, followed by bananas, 397 million USD, and palm oil, 226 million USD. (FAO, 2013).




*Graph 4: Top Export Commodities in Honduras in 2011 in million USD. Source: FAO, 2013.*

As in most Central American countries, coffee is an integral part of the landscape, and not only significant in economic and commercial terms, but also for social and cultural reasons. (Bárcena et al., 2014, p. 11)

After this overview of the Honduran economy in general, chapter 2.2.3. describes the importance of coffee in Honduras, and specifically in Marcala.

### 2.2.3 Coffee Growing

As the second largest country of Central America, Honduras covers an area of about 112'500 km$^2$. The Cordillera Centroamericana divides the territory in three regions: Oriental, Central and Occidental. The climates in Honduras are very divers, ranging from tropical at the Caribbean coast in the oriental region, to dry at the Pacific coast. (Red Honduras, n.d.)

According to the Instituto Hondureño del Café (IHCAFE), there are six major coffee growing regions in Honduras: Copán, Opalaca, Montecillos, Comayagua, El Paraíso and Agalta (IHCAFE, n.d., p. 54). The total coffee growing area in Honduras is estimated to be 2'450 km$^2$ (Flores et al., 2002, p. 54). Coffee is produced in 15 out of the 18 Honduran departments (Pineda Meija et al., n.a., p. 214) at altitudes between 500 to 1'600 meters above sea level (FHIA, 2004, p. 3).

According to the United Nation Economic Commission for Latin America and the Caribbean (CEPAL), average coffee yields in Honduras in 2010 were of 15.4 quintals green coffee per manzana[2] (2013, pp. 98–99). However, coffee yields vary largely depending on several factors such as the region of cultivation, size of the producer and used technology. Small-scale farmer generally obtain lower yields due to inferior technology as compared to large-scale coffee farmers. Highest yields achieve farers in the departments of Ocotepeque, Copán and Lempira, located in higher regions. Lower located departments like Atlántida, Yoro and Choluteca produce significantly lower coffee yields. (CLACDS, 1999, p. 2)

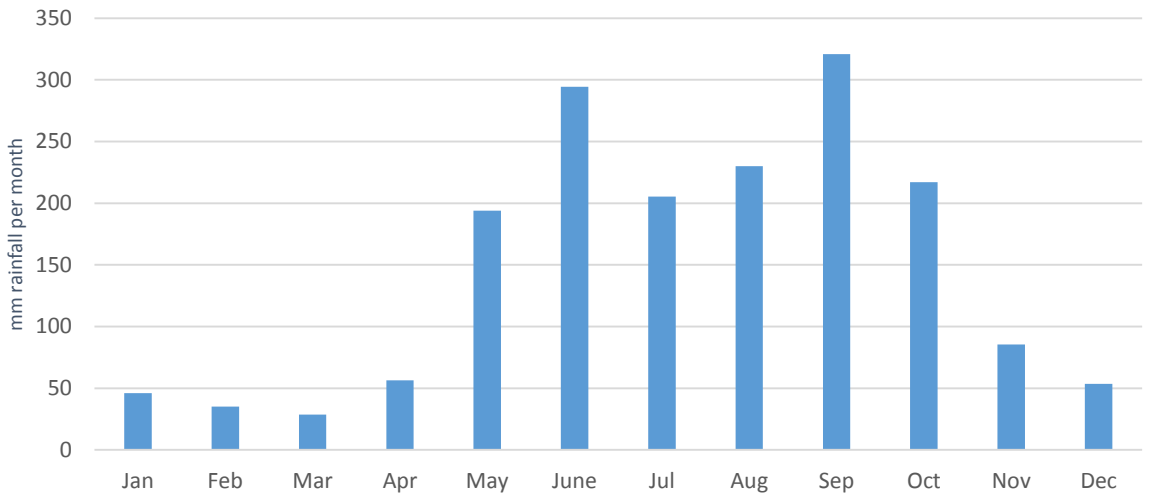
#### *Café de Marcala*

The municipality of Marcala is located in the coffee growing region of Montecillos, department of La Paz in western Honduras (Región Centro-Occidental) as indicated in illustration 1. Marcala is situated at an elevation of 1'240 m above sea level and with a highest point of 1'775 m above sea level. The municipality is surrounded by three mountains belonging to the S*ierra de Montecillos*. The total territory is of 225 km$^2$. (Melghem, 2007, p. 1)


*Illustration 1: Location of Marcala in Honduras. Source: Bass, 2006, p. 53.*

[2] 1 manzana = 0.700 hectare (7000 m$^2$)

The climate in Marcala is subtropical with moderate temperature. Average temperature is 21 degrees Celsius, with lowest temperatures in December. Like other areas in Honduras, Marcala has distinct wet and dry seasons (Melghem, 2007, p. 2). Graph 5 shows the monthly variations in average rainfall in the Montecillo region, where Maracala is located.




*Graph 5: Average rainfall per month in mm in Montecillos. Source: IHCAFE, n.d.*

About 20'000 people live in the municipality of Marcala in various communities. Habitants are mostly indigenous Lenca or Mestizo (European/ indigenous mix). The local economy is traditionally based on the agricultural production of beans, maize, cattle and coffee, with coffee being the dominant economic activity. Coffee in Marcala is mainly produced under the shade of banana, guava and pine trees. (Bass, 2006, pp. 52, 56)

In Marcala, coffee was produced even before the *Reforma Liberal*, but only for auto-consumption. By the end of the 19th century, coffee production in Marcala started to increase coffee production and coffee export was initiated. When Honduras' coffee industry reached a boom in the 1970-80, Marcala had already a history of high-quality coffee known internationally (Melghem, 2007, pp. 23–25). In 2005, the *café de Marcala* was registered as *denominación de orgien protegida* (DO). Illustration 2 shows the logo of the *DO café de Marcala*, which can be used for all coffee producers in the municipalities of Marcala, San José, Opatoro, Chinacla, Santa María, Tutule and Santiago Puringla (Bonilla, 2003). The DO *café de Marcala* was not only the first DO registration undertaken by a region in Honduras, but in all Central America. This registration was of significant importance for coffee producers, since DO coffees sell for higher prices. (Teuber, 2009, p. 135)


*Illustration 2: DO café de Marcala Logo. Source: RedDes, n.d.*

## 2.3 Small-scale Coffee Farmers

### 2.3.1 Central American Small-scale Coffee Farmers

An estimated 85% of all coffee farmers in Central America are small-scale producers. The primary sources of labor in these farms are family members. However, during the most labor intensive time of coffee harvesting, some small-scale farmers employ day laborers in order to support famers. Coffee farmers often also produce maize and beans for auto-consumption and take care of small livestock (Bacon, 2004, p. 502).

Coffee is often the only exported crop and coffee cultivation was seen as an escape out of the poverty trap of subsistence agriculture. Therefore, many farming families have moved away from purely subsistence crop production, expecting to earn more money with coffee production. With income from coffee they hoped to buy more food than they could produce themselves and thereby save some income. (Caswell et al., 2012, p. 6)

However, several authors (Bacon, Méndez, Flores et al, 2008; Beauchelet et al., 2010; Méndez, 2010) have shown that many small-scale coffee producers in Central America are not earning enough from coffee sales in order to ensure food security and other basic human needs for all family members throughout the year. This leads to the widespread phenomenon of recurring, seasonal hunger in Central American coffee fields.

### 2.3.2 Interviewed Small-Scale Coffee Farmers

In the following, a general, average description of the interviewed small-scale farmers in Marcala is given. The information is based on the 16 conducted interviews in July and August 2015. However, there were significant differences between the 16 interviewed households. The following results do not represent the average coffee farmers in Marcala, since most (15 out of 16) of them were provided with irrigation systems and all of them have received assistance from various development projects. This leads to a better performance of the interviewed families in terms of income, used technologies and crop yields, than could be expected from farmers who have not received support from development agencies.

The 16 (12 female, 4 male) coffee farmers interviewed had in average 1.26 manzanas of coffee and 1.07 manzanas of vegetable production, including crops like maize and beans. The smallest interviewed producer owned 0.25 manzanas for coffee production and the smallest amount of land owned for subsistence crop production was 0.625 manzanas. All farmers produced subsistence crops like maize and beans but most of them had to purchase additional food at the market, due to insufficient own production. Nevertheless, most families had experience in selling vegetables, maize and beans at the informal market in Marcala. This economic activity has been undertaken in times of overproduction and generated additional, but irregular, income for the households.

The average household size was composed of 5 family members. All farmers owned animals, mostly chicken, horses, dogs and pigs. They further produced firewood and timber for own consumption and had ornamental and medicinal flowers and plants. Additionally, farmers also produced chayote, different root vegetables such as yucca and malanga and owned various fruit trees such as guava, bananas and mango, all for auto-consumption. Women usually looked after the livestock, household and the family vegetable garden, including the irrigation system they were provided with (see chapter

4.1). Further, women were engaged in food preparation and domestic work. However, four of the interviewed women worked part-time in a small shop at the community, called *pulperias*. Men were often working in their coffee *fincas* (farm in Spanish) or at their crop plantation (maize and bean), which was sometimes not nearby the family residence. During coffee harvest, the entire family engaged in coffee cherry picking and, according to the interviewees, relatives helped each other out during this labor intensive time, starting in November and lasting until the beginning of March, depending on weather conditions and altitude of the coffee fields.

The coffee production volume of green coffee per manzana varied considerably among the interviewees. One possible explanation for this variation could be the leaf rust (*roy*a in Spanish). The leaf rust affected coffee plantations differently; some farmers lost all their coffee plants, some just some parts and other farmers were not affected at all by the leaf rust. During the field research in July and August 2015, the affected coffee plantations were still in the recuperation period. Coffee plants that were affected by leaf rust in the past were cut down in order to heal the plant from the disease. This left the plants with no flowers for the next 2 to 3 years and farmers with no coffee harvest. Further, coffee farmers could neither remember the exact amount of coffee produced in the past, nor determine the size of the planted area when asked directly. Some had coffee fields in different areas, making it difficult for them to estimate the exact size of total coffee and crop fields. Farmer A.G.[3], for example, stated that he produced 5 qq of green coffee on 2 manzanas, farmer J.R.P. stated that he produced 39 qq of coffee on the same amount of land in year of 2014/15. In the same year, three farmers (M.M.A, D.V., C.E.R.) could not export coffee from the harvesting year 2014/15 because the *roya* led to an almost complete shortfall of coffee production.

All farmers who produced enough and belonged to a cooperative, exported at least a part of their coffee as Fairtrade organic coffee through a cooperative. 13 out of the 16 interviewees were members at a coffee cooperative. In the chapter 2.3.3. the two relevant coffee cooperatives for this thesis are presented: CABRIPEL and RAOS.

### 2.3.3 Cooperatives

Most farmers who have been interviewed for this thesis belonged to a coffee cooperative (13 out of 16). The different cooperatives are organized similarly but vary significantly in size and development. Both relevant cooperatives for this thesis, CABRIPEL (Cooperativa Agropecuaria Brisas del Pelón Limitada) and RAOS (Cooperativa Regional de las y los Agricultores (as) Orgánicos de la Sierra) are Fairtrade certified and their members produce mostly organic coffee for export. Cooperative members have already or were in the process of switching from conventional coffee production to organic. The Fairtrade premium is administered by the cooperatives and not paid out to the farmers directly. It is the general assembly who decides how the Fairtrade premium will be spent. This general assembly is composed by all cooperative members all having same voting rights. Contrary to the Fairtrade premium, the organic coffee premium of 30 USD per qq in addition to the conventional coffee price, is paid directly to the farmers. Farmers can therefore decide individually how to spend the organic premium. Both the organic and the Fairtrade premium are only paid for coffee that is exported and not domestically sold in Honduras. Therefore, farmers who produce organic coffee and are Fairtrade

[3] In this thesis, initials are used when referred to a farmer.

certified, receive the organic premium of 30 USD per qq directly and the Fairtrade premium of 20 USD per exported qq is paid to their cooperative.

### *a. CABRIPEL*

The Cooperativa Agropecuaria Brisas del Pelón Limitada (CABRIPEL) is located in the municipality of Marcala. CABRIPEL was founded in 1991 and started exporting coffee in 2008. The cooperative is divided into two communities, one at the Pelón and one at La Estanzuela. With 44 members (7 female, 37 male) CABRIPEL is the smallest coffee cooperative in Marcala. Out of the 16 interviewed farmers, 11 belonged to the CABRIPEL. One interviewed farmer was not a CABRIPEL member but sold the produced coffee to the cooperative.

The cooperative has an executive *junta directiva.* Members of this *junta directiva* are elected every year by the general assembly. Illustration 3 shows a picture of the *junta directiva*, taken in August 2015. The junta meets once a month to discuss different operational issues. Meetings take place either at the community of La Estanzuela or El Pelón. At the Pelón, there is no electricity and at the Estanzuela electricity supply is very limited and unreliable. Therefore, the administration of the cooperative is a difficult task. There are no digital documents or records providing any information such as member information, coffee sold in the past years, coffee plant varieties of members and development of coffee production over time.

*Illustration 3: Members of the junta directiva of the CABRIPEL. Source: own image, 2015.*

The members of CABRIPEL are all small-scale farmers. According to a survey undertaken by the *junta directive* in August 2015*,* smallest producers had 0.25 manzanas and largest had 2 manzanas of coffee plantation. CABRIPEL members had on average 1.4 manzanas of coffee production and produced a

total of 1'165 qq of green coffee beans on 60.5 manzanas in the harvesting year of 2014/15 earning on average 236 USD (5'193 HNL[4]) from coffee sales.

Since 2005, CABRIPEL farmers grow their coffee organically. Further, the coffee was certified as a specialty coffee in the past, reaching a cup quality of 83-85[5] according to the classification of the Specialty Coffee Association of America. In addition, the CABRIPEL coffee was grown at up to 1'700 meters above sea level and certified as Strictly High Grown (SHG)[6] coffee. CABRIPEL farmers grow Arabica coffee of the traditional varieties Bourbon, Catiuaí, Catimor and Paca, which are prone to the leaf rust, in addition to two leaf rust resistant varieties Ihcafé-90 and Lempira, which have become more popular in the recent years.

After harvesting, farmers bring their coffee to the cooperative's wet milling facility, located at La Estanzuela. Due to the small size of the cooperative, the dry milling process is outsourced to the larger Cooperativa Regional de Agricultores Orgánicos de la Sierra (RAOS). RAOS finishes the coffee processing and stores the green bean ready to export (see chapter 2.2.6 b.).

Since the cooperative is Fairtrade certified, it receives 20 USD per qq in addition to the conventional coffee price for exported coffee beans. In the year of 2014, the assembly decided to invest the Fairtrade premium in the maintenance of members' coffee *fincas* and in the own wet milling facility, to improve and build streets and to install water systems. In the past, the Fairtrade premium has also been used for various community projects, such as the construction of a bridge and a school and various investments in private household's improvements, such as building new roofs, floors and sanitary installations. Thereby, the whole community benefitted from the Fairtrade premium.

The overall coffee production of CABRIPEL is likely to increase in the following years since most farmers have been affected by the *roya* in the past, and coffee plants are still recovering and have therefore not reached their maximum production capacity yet. Additionally, CABRIPEL members had combined 26 manzanas of small coffee plants in 2015, which will be planted in 2016. These young plants will bloom for the first time in two to three years after planting and reach their maximum production capacity after about 7 years.

[4] The exchange rate of August 2015 is taken for the entire thesis, which was of 1 HNL (Honduran Lempira) equals 22 USD (US Dollar).

[5] According to the Specialty Coffee Association of America, a coffee is considered a specialty coffee when the quality classification reaches 80 to 100 points, in a scale from 0 (lowest quality) – 100 (highest quality). The points are given according to different component scores such as fragrance, flavor, aftertaste, acidity and body. (SCAA, 2016, n.a.)

[6] Strictly High Grown coffee is a classification for a specialty coffee. It indicates that the coffee was grown at an altitude of at least around 1350 meters above sea level. Coffee beans grown at a high altitude have a higher density, resulting in a better cup. (InterAmerican Coffee, 2016)

### *b. RAOS*

Coffee farmers belonging to the Cooperativa Regional de Agricultores Orgánicos de la Sierra (RAOS) live in 42 different communities in the region of Marcala. In August of 2015, the cooperative counted with 240 members with a growing tendency. The cooperative is composed of small-scale farmers owning up to 5 manzanas for coffee production.

The cooperative was founded in 1998 by 19 coffee farmers after the closure of the cooperative CARMOL which produced conventional coffee. CARMOL was the first cooperative in Honduras to export organic coffee grown by medium- and small-scale farmers. After the closure of CARMOL, coffee prices began to drop in the area due to coffee intermediaries, called c*oyote*s. As a response to the price fall, farmers started to grow coffee using non-conventional organic techniques and organized themselves in a cooperative called RAOS. (RAOS, n.a.)

All coffee produced by RAOS members is processed by the cooperative. RAOS owns a milling facility located in Marcala. In addition to coffee from cooperative members, RAOS also offers to process coffee from other smaller coffee cooperatives such as the CABRIPEL. RAOS coffee was exported in the past to the US, Europe and Japan.

The cooperative has an office in Marcala and, contrary to the CABRIPEL, they employ a director, a secretary and an administration unit, which take care of the business. Just like in other cooperatives, the assembly decides how the Fairtrade premium will be spent and invested. In 2014, a quarter of the Fairtrade premium was invested to increase productivity and quality of the coffee. RAOS employs two technicians, which support, advice and train farmers to develop organic farming capacities. Their salary is also partially plaid with the Fairtrade premium. 10% of the Fairtrade premium was invested in market access. Members of the cooperative, for example, participate in different international coffee expositions and events, representing RAOS coffee in order to find new buyers. Another 10% of the Fairtrade premium was available for a revolving fund, which provided members with one-year loans up to 15’000 HNL (682 USD) at an annual interest rate of 10%. This loan enables producers to invest in their coffee *finca*. After the coffee harvest, borrowers pay back the loan with the income generated from coffee sales. 30% of the Fairtrade premium was used to buy machinery and to invest in the maintenance of cooperative’s wet and dry milling facilities. 5% of the Fairtrade premium was assigned to the education of members’ children; teachers were paid, school material was bought and matriculation was paid for. For the education and agricultural training of the members themselves, another 5% of the premium was used. Further, RAOS has a gender committee which was also financially supported with 2% of the Fairtrade premium in 2014. This contribution to the gender committee enabled them to undertake various activities. For example, a coffee roasting machine was bought by RAOS women in order to sell the coffee directly to the end consumer. The remaining share of the Fairtrade premium was used to help with funerary costs in case of death of a member or a close relative and for the repayment of debts and interest rates of the cooperative.

One interviewed coffee farmer and one focus group with 10 female coffee farmers were RAOS members. Illustration 4 shows 9 of the 10 focus group participants and the researcher during the focus group conversation in July of 2015.

*Illustration 4: Focus group interview with RAOS women. Source: own image, 2015.*

### 2.3.4 Income

Calculating average income of the coffee farmers resulted to be a difficult task. Most farmers were unable to give detailed information about the quantity of their yearly coffee and vegetable production, the exact prices and the costs of production. Most producers did not keep account of their expenses for coffee production and investments they made in their *fincas*. Additionally, income of the farmer families varied significantly. The families had different income streams and only one interviewed farmer family had no other income than coffee sales. However, most of them relied heavily on coffee sales and had just begun to sell vegetables after participating in diversification projects (see chapter 4).

Therefore, it was not easy to determine average annual income for the interviewed farmers. Some farmers had family members who worked outside the family *finca* as day laborers when there was not enough work at the own *finca*. Some women sold their overproduction at the market in Marcala and other women had a part-time job at a little shop in the community.

According to the interviews, average production of the 16 farmers were of 14.4 qq of green coffee in the harvesting year of 2014/15. If all the produced coffee would have been exported and sold as organic coffee, the interviewed families would have made on average 2'670 USD[7] of revenue in the year 2014/15 from coffee sales. However, differences between families varied largely from no income to up to 7'654 USD a year from coffee sales. Taking into account household size[8], average per capita income was of 534 USD, which makes 1.48 USD per day per capita. These average results are reasonable compared with data collected by other authors. For example did Beuchelet et al. (p. 1320, 2010) calculate per capita income a little under 500 USD per year for organic and Fairtrade certified coffee by small-scale coffee producing households in Nicaragua.

[7] Average production: 14.4 quintales, organic coffee price: 196 USD

[8] Average household size of the 16 interviewees and focus group: 5 persons

Coffee production costs were also very difficult to determine through interviews. Farmers were not sure how much work hours they invested in coffee and in crop production. Further, neither depreciation costs nor the family work hours were added to the cost calculation.

Nevertheless, in the following, the costs of production for coffee of the farmer M.S.G. in the harvesting year of 2014/15 are described in order to gain insight in a interviewed coffee farmers costs and revenues. These numbers were the result of an extensive interview with M.S.G. together with a technician who worked with the coffee farmers (J.L.R.)[9].

### *a. Coffee Production of Coffee Farmer M.S.G.*

As a demonstrative case the coffee production costs and income from one farmer (M.S.G.) are described in the following. M.S.G.'s family had 1 manzana of land at the Pelón on which they produced 8 qq of green organic coffee in the harvesting year of 2014/15. Purchased agricultural inputs, such as fertilizer and pesticides and transport accounted for 723 USD (15'904 HNL). His labor force, including the application of fertilizers and pesticides, weed controlling, coffee plant pruning and shadow regulation, summed up to 66 work hours in the year of 2014. Multiplying these 66 hours with the daily wage given to a worker in Marcala of USD 4.55 (100 HNL), this sums up to 300 USD (6'600 HNL) of labor costs. Total costs including labor were therefore of 1'023 USD (22'504 HNL). It is worth noting that this calculation does neither include soil preparation nor depreciation costs. Prices paid to the farmer per quintal of organic green coffee were 196 USD, including the organic coffee premium of 30 USD per qq. This price did not include the Fairtrade premium given to the cooperative of 20 USD per qq. Therefore, total net income of M.S.G. from 1 manzana producing 8 qq of organic coffee, amounted to 545 USD (15'512 HNL) in the harvesting year of 2014/15. It is important to note that 8 qq of green coffee per manzana is relatively low, which might be due to the leaf rust. The average production of interviewed farmers was of 14.4 qq per manzana. This average yield per manzana, is reasonable compared with results from literature. The authors Beauchelet et al. calculated an average of 12 qq of green bean coffee per manzana produced by small-scale farmers in Nicaragua in 2010 (2010, p. 1320) and information provided by the CEPAL (2013, pp. 65–66) is of 15 qq of green coffee bean per manzana in Honduras in 2010.

### *b. Income Scenarios of Interviewed Farmer Households*

Since income composition and amount varied significantly among the interviewed farmer households, two different scenarios are presented in the following. The two scenarios represent interviewed coffee farmers' income under different assumptions. For both scenarios, the average coffee production land is 1.26 manzanas and the average household size is composed of 5 members. The organic green bean coffee price is 196 USD per qq, like in the year of 2014/15. For the cost calculation, data collected from the farmer M.S.G. are taken as a baseline.

1. The first scenario assumes that coffee plants are relatively healthy and that the family has no other income than coffee sales. The family produces maize and beans for auto-consumption and owns some chicken and a pig. On 1.26 manzanas they grow 24 qq of green coffee beans per harvesting year. This is a maximum possible harvest but reasonable if coffee plants are not

[9] Numbers from farmer M.S.G. were taken, since he had some documented figures available.

affected by the leaf rust. Costs for coffee production are of 574 USD (12'628 HNL), not including family labor costs, and coffee revenue from sales is 4'704 USD (103'488 HNL). Therefore, net income in this case accounts to 2'681 USD (55'776 HNL). This amounts to about 11.47 USD a day for an average family household composed by 5 members, resulting in 2.29 USD a day per capita. Table 1 gives an overview of this scenario in terms of plantation size, harvest, costs, revenue annual and per capita income.

*Table 1: Overview of Income Scenario 1*

| | |
|---|---|
| Size of coffee plantation in manzana | 1.26 |
| Harvest of organic green coffee in qq | 24 |
| Costs of coffee production | USD 574 |
| Revenue from coffee sales | USD 4'704 |
| Annual income | USD 4'130 |
| Daily per capita income | USD 2.29 |

2. The second scenario assumes that coffee plants are affected heavily by the leaf rust and that one family member has paid work for 3 months during that year outside the family *finca*, which generates additional income of 273 USD (6'000 HNL)[10]. Coffee production on 1.26 manzanas is of 2 qq of green organic coffee due to the effects of the leaf rust. As maintenance costs do not decrease with lower yields, especially if plants have to be treated to combat the leaf rust, production costs stay the same as in scenario 1. The 2 qq of organic green coffee are sold at 196 USD per qq., including the organic premium. Coffee sale therefore generates income of 211 USD (4'678 HNL). Not including family labor, the family has a net annual income of 91 USD, which makes 0.25 USD a day for this family of 5 resulting in 0.05 USD a day per capita. Table 2 gives an overview of this scenario in terms of plantation size, harvest, costs, revenue annual and per capita income.

*Table 2: Overview of Income Scenario 2*

| | |
|---|---|
| Size of coffee plantation in manzana | 1.26 |
| Harvest of organic green coffee in qq | 2 |
| Costs of coffee production | USD 574 |
| Revenue from coffee sales | USD 392 |
| Income from 3 months of employment | USD 273 |
| Annual income | USD 91 |
| Daily per capita income in USD | USD 0.05 |

These two scenarios are examples of a realistic income situation of the interviewed coffee farmers and show the significant income differences.

It is also important to note that household income varies largely from year to year, depending on the harvest, coffee prices and the labor market. Further, all interviewed families produced maize, beans,

[10] 100 HNL wage x 60 days= 6'000 HNL for three months of work

some vegetables, fruits, eggs and meat for auto-consumption, and are therefore not completely dependent on coffee income.

### 2.3.5 Limitations for Producers

Small-scale coffee farmers face several difficulties in different areas of their daily live. Table 3 lists challenges coffee farmers face according to different authors. These challenges prevent farmers from producing more coffee and other crops. There are four main categories of challenges small-scale coffee farmers have to cope with: environmental, economic, market related and social.

*Table 3: List of challenges and references in the corresponding category. Source: based on Panhuysen et al., 2012, p. 6 completed with Borella et al., 2015, p.29.*

| *Category* | *Challenge* | *Reference* |
|---|---|---|
| Environmental | · Pests, diseases affecting cash crop and subsistence crops | Borella et al., 2015, p.29 |
| | · Alternation of climatic conditions, droughts | Borella et al., 2015, p.29 |
| Economic | · No access to credits | Borella et al., 2015, p.30, Panhuysen et al., 2012, p. 6 |
| | · Opportunity for diversification beyond reach | Borella et al., 2015, p.30 |
| | · No appropriate technology, not enough technical know-how | Borella et al., 2015, p.39 |
| | · No access to water for production | Panhuysen et al., 2012, p. 6 |
| Market | · Coffee price volatility, price uncertainty | Borella et al., 2015, p.29 |
| | · Raising costs of production for coffee, low productivity | Borella et al., 2015, p.30 Panhuysen et al., 2012, p. 6 |
| | · Lack of market information and market access | Panhuysen et al., 2012, p. 6 |
| Social | · Food insecurity, malnutrition | Panhuysen et al., 2012, p. 6 |
| | · Poor access to education and healthcare, poor living conditions | Panhuysen et al., 2012, p. 6 |
| | · Gender inequality, discrimination | Panhuysen et al., 2012, p. 6 |
| | · No access to clean water | Panhuysen et al., 2012, p. 6 |

The biggest problem stated by all interviewed farmers, was the lack of access to water for crop production. In the last two years the droughts had even affected coffee production and not only subsistence crops like beans and maize. Several farmers were not able to plant out coffee seedlings in 2014 and 2015 as planned due to scarce rainfall during the rainy season. Together with pests like the leaf rust, which affects coffee plants, or the *mosca blanca,* which affects for example tomatoes, farmer had difficulties to produce cash and subsistence crops in the past years. Coffee price volatility, uncertain markets and prices contribute to a low income stability thoughtout the year.

Another problem mentioned by the interviewed farmers, was lack of access to credits with low interest rates in order to undertake investments in their *fincas*.

Land availability was only an issue for 2 farmers (D.V., A.G.). All other farmers stated that they had enough land to increase crop production. All farmers would like to produce more of both subsistence

and cash crops, but due to water shortage and lack of monetary resources they were not able to expand agricultural activity.

Considering all these challenges coffee farmer face, the complexity and interrelatedness of the factors becomes clear. Not only are the challenges complex, additionally, every interviewed family faced individual issues, depending where their *finca* was located. Some are fortunate and have a water source nearby or their *finca* had not been affected by pests like the leaf rust. In order to find a solution to these challenges, the individual characteristics of the families and the *finca* location have to be taken into consideration.

### 2.3.6 Coffee Production Process and Supply Chain

#### *a. Plantation and Harvest*

Coffee is an almost perennial crop, providing coffee cherries over many years. However, it requires high levels of initial capital investments resulting in an incentive to continue cultivation once the coffee plants are established. This is due to the fact, that coffee plants bear fruits only after 3 - 4 years of planting. (Caswell et al., 2012, p. 7)

In Marcala, harvesting time for coffee is between December to March, depending on climate conditions and altitude of the coffee plantation. Harvesting is selective, meaning that the cherries are picked by hand as soon as they reach the optimum degree of ripeness. Illustration 5 shows ripe coffee cherries right after being picked. Unripe cherries are left on the plant and picked later on. This labor-intensive procedure ensures a high coffee bean quality. Cherry picking is usually done by the entire family and even children help out during this labor intensive time. Some families even employ day laborers who help them with the labor intensive harvest. (Pineda Meija et al., p. 213)

*Illustration 5: Ripe coffee cherries. Source: own image, 2015.*

#### *b. Coffee Processing*

The harvested cherries can either be wet (*vía húmeda*) or dry (*vía seca*) processed. Wet processed coffee results to be of better quality and taste. The dry process is the oldest method to process coffee and produces natural coffees with lower quality and taste. In the dry process, the harvested coffee cherry is cleaned and then dried under the sun. When the coffee bean is dry, the outer layer of the coffee cherry is removed. After, the coffee is sorted, graded and then ready to export. However, Arabica coffee is usually wet processed, this is also the process which is used by cooperatives in Marcala. It includes two phases: the wet-milling (*beneficiado húmedo*) and the dry-milling (*beneficiado seco*), which are briefly explained in the following. (Pineda Meija et al., p. 213)

##### Wet-milling: *beneficiado húmedo*

The wet-milling (Spanish: *beneficio húmedo*) compromises the several steps. The first step is the pulp removal. In this step the grain is separated from the pulp, which leaves the beans covered with parchment and mucilage. In a second step, the bean in cleaned. In order to do so, coffee beans are

placed in big pools of water. Floating separates low quality from high quality beans. The third step includes the mucilage removal and the fermentation of the coffee beans in tanks. In the last step of the wet-milling process, beans are washed again in order to remove any remaining mucilage. This washing process has to be done at the optimum point of fermentation. (Pineda Meija et al., pp. 214–226)

In Marcala, most farmers sell their coffee after the fourth step to cooperatives or middlemen. These buyers then continue with the dry-milling.

### Dry-milling: *beneficiado seco*

After the wet-milling, coffee beans move on to the dry-milling process (Spanish: *beneficio seco*). In this process, coffee beans are dried to 12% of humidity, which enables storage. This drying is often done in the sun. The dried coffee beans are now called parchment (*pergamino in* Spanish), due to the paper like shell around the green coffee bean. As soon as this shell is removed, the coffee bean becomes green bean (*oro* in Spanish*).* Illustration 6 shows green coffee beans right after the parchment removal. At this final stage the green bean goes through further cleaning and quality checkups. After all these steps, the green bean is ready to be exported and roasted. Green coffee beans are normally exported in 60 kg jute bags and roasted abroad. (Pineda Meija et al., pp. 226–228)


*Illustration 2: Green coffee ready for export. Source: own image, 2015.*

# 3 The Thin Months

According to the Food and Agriculture Organization of the United Nations (FAO), 1 million people were undernourished in Honduras in 2014. Undernourished meaning that a person is not able to acquire enough food to meet the daily minimum of dietary energy requirements over a period of one year. (FAO, 2016a)

Chronic undernourishment is used as a synonym to hunger by the FAO. When talking about chronical undernourishment, the concept of poverty is important due to its close relationship with food insecurity. Poverty is, undoubtedly, a major cause of hunger and malnutrition. A currently widely used definition of poverty introduced by the OECD (Organization for Cooperation and Development) is: "Poverty encompasses different dimensions of deprivation that relate human capabilities including consumption and food security, health, education, rights, voice, security, dignity and decent work" (2001, p. 10). The FAO argued that the best strategy to reduce poverty and hunger is ensuring food security. Illustration 7 shows the relationship between food security, income and poverty. Only through a combination of income growth, direct nutrition interventions and investment in water, health and education, the complex problem of food insecurity can be taken care of according to the FAO. (FAO, 2008)

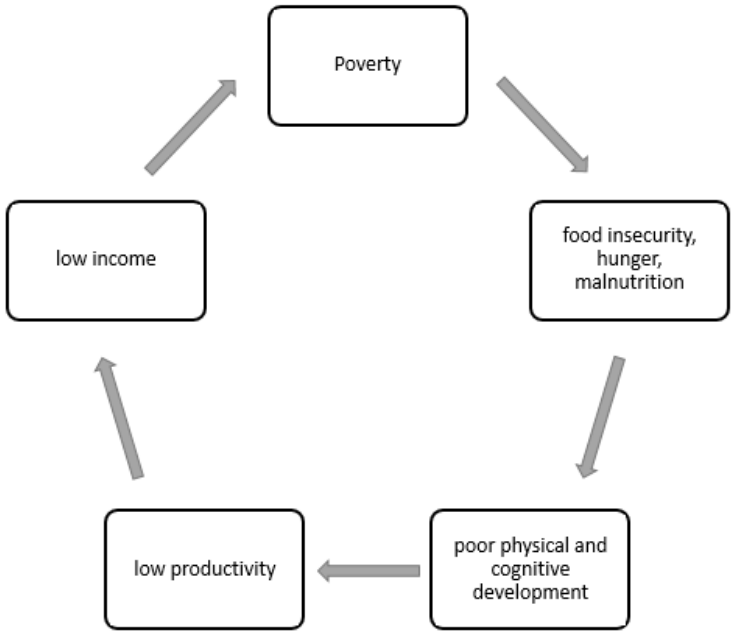



*Illustration 7: Relationship between different factors and effects of poverty. Source: own illustration based on FAO, 2008, p. 3.*

Recurring periods of food insecurity are a phenomenon that affects small-scale coffee farmers around the globe (Morris et al., 2013, p. 476). Small-scale coffee farmers in Honduras are no exception, they also experience reoccurring periods of food insecurity throughout the year. Small-scale coffee producers in Marcala call these months of food insecurity the Thin Months, in Spanish *los meses flacos*. During these months, families have difficulty to meet the basic food needs; farmers have already used up their income from the coffee sales and do not produce enough crops to provide food to all household members, leading to food shortage.

In chapter 3.1 the theoretical concept of food security is discussed and later the Thin Months and its consequences for coffee farmers in Marcala are presented.

## 3.1 Food Security

In its narrowest definition, food security means that enough food is available on different levels: global, national, community or household level. However, the question about how much food is enough remains. Originally, the term food security referred to national food security, meaning that a country could produce enough food for its population's demand. Therefore, food security both at a national and global level is focused on the supply side. It addresses the question if there is enough food available. However, availability does neither ensure access nor a fair distribution nor a healthy diet for all individuals within one country. Food security on a household level must, therefore, be also linked to food access and not only to the availability on a national or global level. This fact was largely recognized by scholars in the 1970's, at a time of global food crisis. (Caswell et al., 2012, p. 2)

At that time, food security was defined as the access of all people to enough food in order to live a healthy and productive life. The FAO then broadened this definition subsequently, including nutritional value and food preferences. (Pinstrup-Andersen, 2009, pp. 2–3)

Today, the FAO recognizes that food security is a somewhat flexible concept and as of 1996 food security was defined as "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" at the World Food Summit (FAO, 1996). This definition is generally considered to be comprehensive because it includes the concepts of food availability, food access and how food is used. Accordingly, there are different types of food insecurity depending on whether food insecurity is related to food availably, access or utilization. (Caswell et al., 2012, pp. 6–7)

At the household level, food security has been used as a measure of welfare. A household is considered to be food secure if it has the ability to acquire all food necessary by its members. At this level, there is a distinction between transitory and permanent food insecurity, where the first describes a periodic food insecurity that briefly pushes the level of food consumption below requirement and the latter referring to a long-term insufficient access to food. (Pinstrup-Andersen, 2009, p. 6)

The concept of seasonal food insecurity lies between permanent and transitory food insecurity. It is similar to permanent food insecurity because it is usually predictable. However, it can also be seen as a transitory food insecurity if it is cyclical and recurring. This can be due to seasonal fluctuations in climate, cropping pattern, disease, and work opportunities. (FAO, 2008, p. 3)

According to the definitions mentioned above, the FAO identified four main dimensions of food insecurity: 1. food availability, 2. economic and physical access to food, 3. food utilization and 4. stability of the other three dimensions over time. In order to be food secure, all four dimensions must be fulfilled simultaneously. Table 4 lists all dimensions of food security and their meaning. (FAO, 2008, p. 1)

*Table 4: The four dimensions of food security and their meaning identified by the FAO. Source: FAO, 2008, p. 1.*

| *Dimensions of the definition of food security* | *Meaning* |
|---|---|
| Physical availability of food | Food availability addresses the supply side of food security. |
| Economic and physical access to food | This dimension addresses the household access to food. |
| Utilization of food | Utilization addresses the way the body makes the most of various nutrients in the food. This dimension determines the nutritional status of individuals. |
| Stability of the other three dimensions over time | A person is only food secure, if the three dimensions above are fulfilled over a period of time. |

Food insecurity is a global phenomenon, however, it is especially prevalent in rural areas where there is little access to food imports. Further, in rural communities, small-scale farmers have to invest their limited resources like land and labor force for both crop production for auto-consumption and for cash crop. Often, subsistence crop production together with income generated by the cash crop, does not guarantee food security for the household. (Caswell et al., 2012, p. 3)

### 3.1.1 Alleviating Food Insecurity

Depending on which of the four dimensions, unavailability of food, insufficient access to food, inappropriate utilization of food or the instability of these three factors over a period of time, causes food insecurity, different approaches to alleviate food insecurity should be taken in order to address the problem of food insecurity. The severity of food insecurity, social, political and environmental conditions of the affected regions are other factors that must be taken into account when intervening in order to ensure food security. Interventions can either address the symptoms, for example emergency food aid, or target the cause, for example reduce inequality in order to ensure fair access to resources and markets. Ideally, both symptoms and causes are addressed. Worldwide governments and NGOs (non-governmental organizations) have financed and carried out several food security initiatives. (Caswell et al., 2012, pp. 3–4)

Caswell et al. (2012, p.3) mention the following measures that have been used in the past to address food insecurity:

- Production of substance crops and small-scale livestock management
- Alternative livelihoods in order to generate additional income and diversify farms
- Increase agricultural yields through enhanced technologies for production
- Nutritional education and diet diversification
- Change food-use patterns such as storage, processing and preservation
- Food assistance to groups facing severe malnutrition

In the following chapter the concept of food security is analyzed in relation to small-scale coffee farmers.

### 3.1.2 Small-scale Coffee Farmers and Food Insecurity

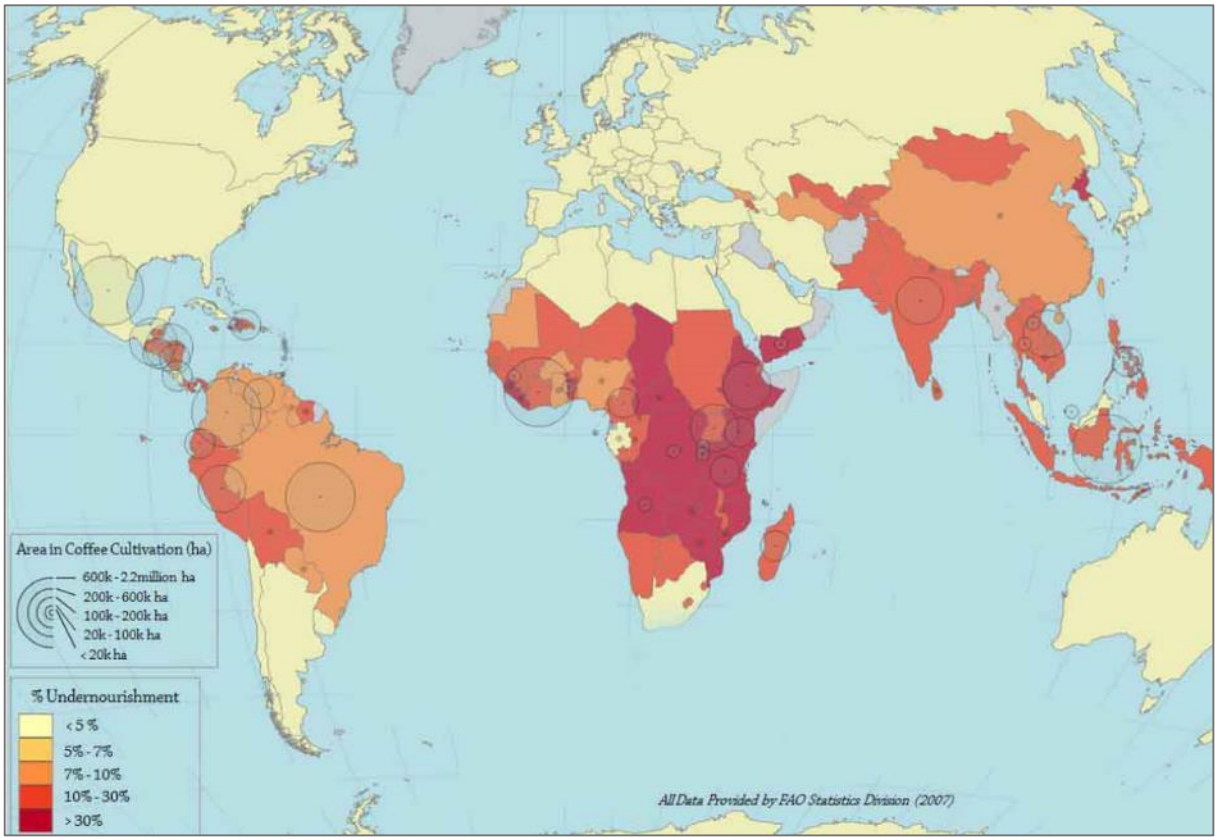



*Illustration 8: Undernourishment in coffee-growing countries. Source: Caswell et al., 2012, p. 4.*

Illustration 8 shows in circles the size and location of coffee cultivation areas and in red world regions where undernourishment is prevalent. According to this illustration, coffee is produced mostly in areas where the population is undernourished. However, most initiatives to increase food security were not focused on coffee producing communities and families in the past. Nevertheless, since 2007 members of the specialty coffee value chain have begun to focus on improvement of food security of small-scale coffee farmers. They recognized that poverty and marginalization is the reality of many small-scale coffee farmers worldwide. Additionally, migration from rural areas to urban areas is a threat to the sustainability of coffee production. Therefore, awareness of food insecurity of coffee producer is growing among the specialty coffee industry. Nevertheless, recommendations on how to best address this problem are still missing. (Caswell et al., 2012, pp. 4–5; Morris et al., 2013, pp. 446–447)

Table 5 was published by Casewell et al. (2012, p. 5) and gives a summary of studies on food security undertaken in coffee growing Central American and Caribbean countries. Food insecurity in these studies were defined differently, ranging from periods when diets are restricted to food staple over risking malnutrition due to insufficient calorie intake, to times when meals are skipped or portion size reduced.

*Table 5: Overview of food security studies undertaken in Central American and Caribbean coffee producing regions. Source: Caswell et al., 2012, p. 5.*

| *Region* | *Study Size in Households* | *Study type* | *% Experiencing Food Insecurity* | *Reference* |
|---|---|---|---|---|
| Nicaragua, Guatemala, El Salvador, Mexico | 469 | Stratified survey, 2004-05 | 63% struggle to meet basic food needs | Méndez et al., 2010 |
| Northern Nicaragua | 177 | 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 | Household level surveys and interviews (unpublished), 2006-07 | 31% in Mexico, 44% in Nicaragua, and 61% in Guatemala, unable to meet food needs at some point | Fujisaka, (CIAT), 2007 |
| Western El Salvador | 29 | Semi-structured interviews, 2008 | 97% Unable to meet basic food needs at some point | Morris et al., 2013 |
| Northern Nicaragua | 256 | 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 | Household surveys and interviews stratified by participation in a food security initiative, 2009. | 100% unable to meet food needs at some point during the year, avg. of 3 months of food insecurity/year | Pino, unpublished |
| Pico Duarte Region, Dominican Republic | 41 | Participatory Action Research, 2011 | 82.9% have trouble covering basic food necessities | Gross, 2011 |

These authors have identified seasons when periods of food insecurity, the Thin Months, occur in specific coffee production regions in Central America and in the Caribbean. Typically food insecurity is linked to the rainy season when travelling and delivery of products is difficult, during the planting season for other food crops when limited resources are directed towards farm inputs and the early months of coffee harvest when the money from the previous year is used and the payment of the current harvest is still due. Another challenge for small-scale coffee farmers is the fact that, due to the high investments cost and long wait for the first blooming of the coffee plants, it is not feasible to switch to other crops during times of low coffee prices and low production. (Caswell et al., 2012, pp. 5–7)

Due to these various possible causes for the Thin Months and their interrelatedness, it is not easy to determine the exact causes for the Thin Months in a specific coffee production area. As Morris et al. (p. 473-474, 2013) stated, many assets contribute to food insecurity for coffee farmers. The authors determined access to income, land, labor, small livestock and a support network as key assets which influence both household livelihoods and food security. They conclude that it is essential to analyze household food security using a combination of data and methods in order to reveal the complexity of

the causes and coping strategies undertaken in coffee farming households. (Morris et al., 2013, pp. 473–474)

### 3.1.3 Production Cycles

In order to understand why and when the Thin Months for coffee farmers in Marcala occur, it is important to know the different production cycles of subsistence and cash crops. However, it is important to note that this thesis does not want to analyze when the Thin Months in Marcala occur, but rather how the farmers can cope with the challenge of food insecurity. Nevertheless, this chapter will, for a better understanding, briefly illustrate when the Thin Months are most likely to occur in Marcala and how they are linked to agricultural production cycles.

#### *a. Maize and Beans – Subsistence Crops*

Maize and beans are the traditional subsistence crops in Honduras. Farmer families normally eat maize tortillas with each meal and have beans for breakfast, dinner, and often for lunch too. Maize and beans are referred to as *granos básicos* and are mostly cultivated by small-scale farmers for family consumption. Traditionally, the *granos básicos* are cultivated with traditional technologies resulting in low yields of about 10 to 11 qq per manzana. (Lardizabal et al., 2013, p. 1)

Most interviewed households did neither produce enough maize nor beans for the yearly family consumption. These basic crops had to be purchased when stock from the last harvest run out and income, from sales of the cash crop coffee or from another economic activity, was no longer available.

Like in all Honduras, coffee farmers in Marcala grow maize two times a year: at the *Primer*a and the *Postrera*. Both planting cycles are highly dependent on weather conditions, in particular rainfall. In Marcala, the planting for the *Primera* starts at the end of May until mid-June, when the rainy season begins. Harvest for the *Primer*a is from October to November, 4 to 5 months after planting. The *Postrera* starts in November and harvest begins in February until the first days of April, depending on weather conditions, planting methods and timing. (Cruz, 2013, pp. 9–10)

Beans, like maize, are planted two times a year. The *Primera* is planted from May to mid-June and harvested in September. The *Postrera* planting begins in September following the *Primer*a harvest, and is harvested in January. Beans can be harvested 3.5 months after planting. (Lardizabal et al., 2013, p. 1)

The *Primera* is the most important harvest of the year for maize, usually providing up to 80 % of annual maize production (MIOA, 2015, p. 3) while the *Postrera* is the most important harvest for beans, providing up to 70 % of annual consumption (El Heraldo, 2015).

Some interviewed farmers had irrigation systems for maize and beans. During the *finca* visits in July and August of 2015, the differences between irrigated and non-irrigated plantations were significant. Maize that were not irrigated, for example, were only about 40 cm high and already blooming, leading to a poor harvest since harvest of the *Primera* starts in October. Maize plantations with irrigation systems were over 150 cm high and in good conditions, these farmers expected to have a good *Primera* harvest. Farmers commented that in this year the rain did not fall as usually, therefore the great differences in irrigated and non-irrigated plantations. As a consequence, farmers who did not have an irrigation system lost almost all of their *Primera* harvest due to the unusual little rainfall in the months of June, July and August. Their only hope was the *Postrera* harvest in February and March of 2016. As a consequence of the shortfall in production of *granos básicos*, farmers were forced to purchase maize

and beans at the local market. According to farmers, the year of 2014 was similar; there was unusual little rainfall and also losses in production of maize and beans.

The droughts in 2014 and 2015 affected most of Honduras and the government saw itself forced to import *granos básicos* in order to make up for the shortfall in production in 2014 and 2015 (La Prensa, 15.9.2015; La Tribuna, 2.7.2015). In an interview carried out by the Honduran newspaper La Prensa, the former minister of Agriculture and Animal Husbandry, German Pérez Destephen, mentioned that 50% of the *Primer*a harvest of *granos básicos* was lost by August 2015 (Barrera, 4.8.2015).

These droughts aggravate the situation of farmers and contribute to longer lasting Thin Months, since the important production cycle of the *Primera* falls short or is completely lost due to insufficient rainfall.

#### *b. Coffee – Cash Crop*

Coffee has relatively high initial investment costs (Caswell et al., 2012, pp. 5–7) because coffee plants can only be harvested three to four years after planting (FHIA, 2004, p. 17). (See chapter 2.2.9)

During the year, coffee plantation does not produce a large amount of work for farmers compared with other crops like for example lettuce or tomatoes. In the first few years of planting, regularly weeding and shadow regulation is essential for a good production. Further, coffee plants have to be pruned once a year in March and April in order to ensure a healthy development and to reduce pests and diseases. The pruning also helps to maintain an even production level throughout the years, thereby avoiding having good harvest one year and a bad harvest the next year. Coffee plants should be fertilized during the months of rainfall, usually May to September. (FHIA, 2004, pp. 7–137)

In Marcala, coffee is harvested from end of November until the beginning of March and it is also then that farmers are paid and generate income from this cash crop.

### 3.1.4 The Thin Months in Marcala

As Morris (p. 469, 2013) found out in San Salvador, farmers usually have a period of food insecurity during the months of June to September and from December to February. Looking at the production cycles presented in chapter 3.1.3, in combination with findings by the authors Morris et al. (2013) in San Salvador, Caswell et al. (2012) in Mexico, Nicaragua and Guatemala, and Shriar (2007) in Honduras, a period of food insecurity in Marcala is most likely to occur during the rainy season. Findings by the FAO also mention a state of food insecurity for small-scale farmers in Honduras during the months of May to August (2016b). Illustration 9 shows when the different seasons described in chapter 3.1.3 occur in Marcala, when which crop is planted and harvested, and concludes during which months farmers are most likely to suffer from food insecurity.

During the rainy season, the *Primera* is planted and income from coffee sales is most likely already spent. When coffee farmers harvest the *Primera* in September to November, the households have enough subsistence crops in order to be food secure. However, in years like 2014 and 2015 when the harvest from the *Primera* was lost, the Thin Months are likely to continue until January. In January the *Postrera* is harvested and income from coffee sales enables families to purchase food. Illustration 8 shows this extension of the Thin Months during years when the *Primera* is lost.

This also corresponds with a statement from the farmer M.S.G. He stated that from December until February his family lived from coffee income, from March until November from vegetables sales. He was only capable of producing vegetables because he had irrigation systems and water for crop irrigation available from a water reservoir (see chapter 4.2.1). Without this water, vegetable production would have been impossible, and the Thin Months a reality for his family. In the last years, coffee harvest alone would not have generated enough income to ensure food security for his family due to the effects of the leaf rust on coffee production volumes.

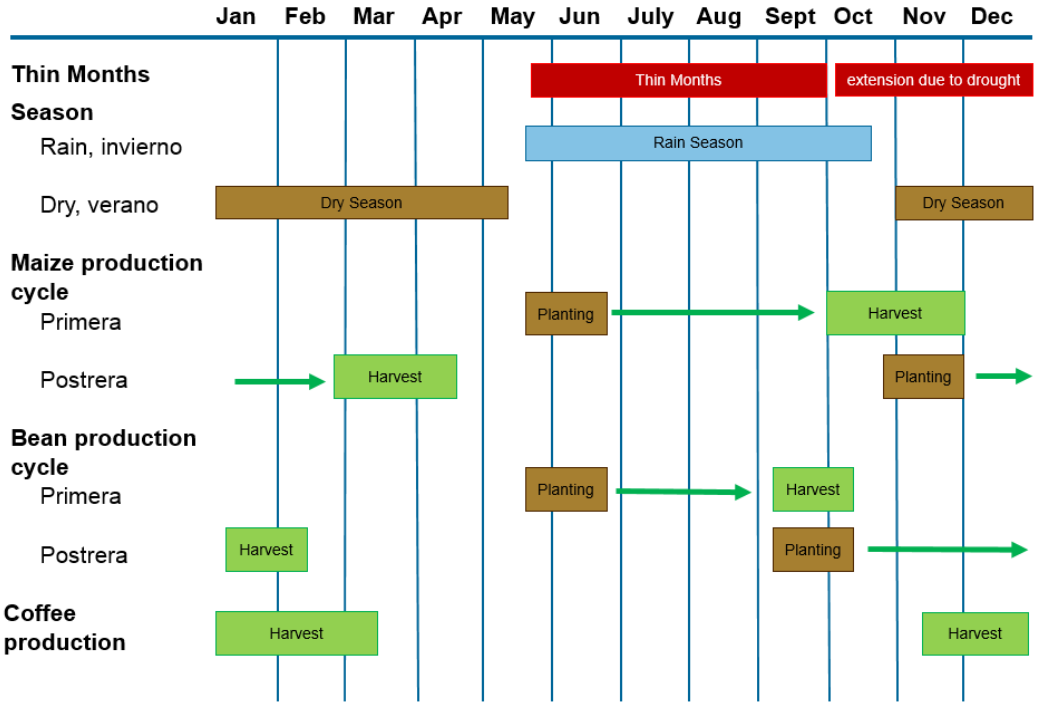



*Illustration 9: Overview of cash crop and subsistence crop production periods, seasons and the Thin Months for coffee farmers in Marcala. Source: own table.*

## 3.2 Factors Causing the Thin Months in Marcala

As interviews with the farmers during the field trip in July and August of 2015 in Marcala have shown, a variety of causes contribute to the occurrence of periods of food insecurity for coffee farmers. These causes can be summed up in two categories: neither do farmers have enough income, nor do they produce enough food for auto-consumption during certain months of the year. Different factors lead to these two causes, which are presented in illustration 10. In the following the causes of the Thin Months and their occurrence in Marcala are described and in chapter 3.3 possible strategies to avoid these months of food scarcity are presented.

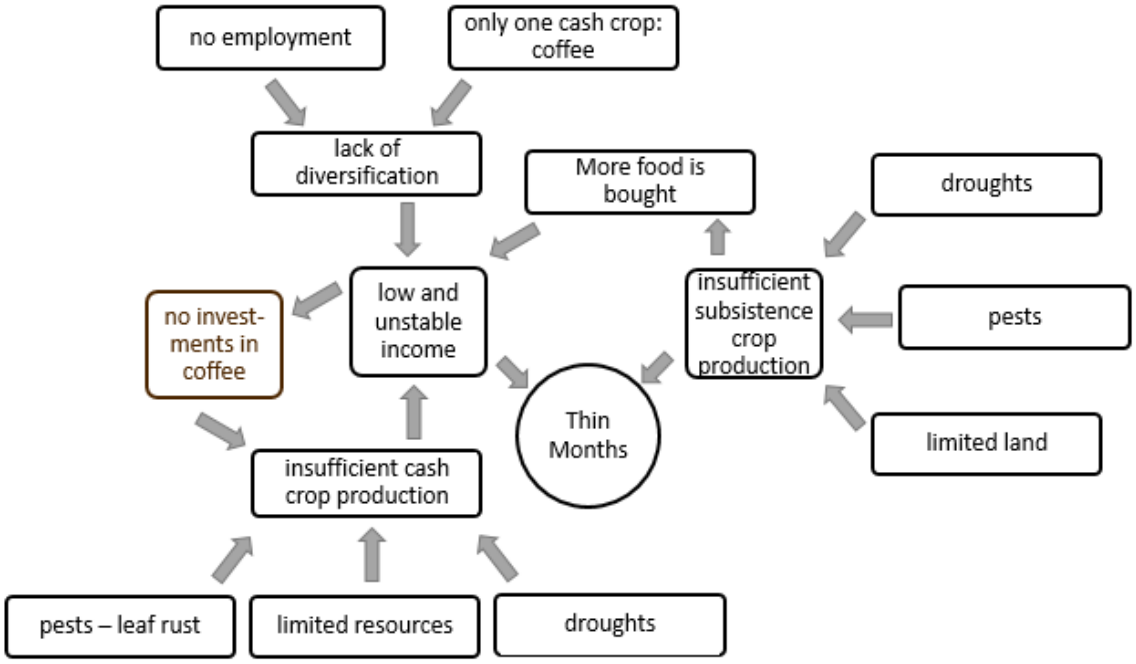



*Illustration 10: Overview of the identified causes of the Thin Months. The arrow means x is cause of y. Source: own illustration.*

### 3.2.1 Insufficient and Unstable Income

Having low and unstable income leads to two main problems for the affected small-scale coffee farmers: first, farmers are not able to invest the optimum amount in the maintenance of their coffee *fincas*, leading to a lower yield in the following years and second, farmers do not have enough financial resources available throughout the year to ensure household food security, leading to the occurrence of the Thin Months.

Some interviewed farmers mentioned that they could not afford to buy sufficient pesticides and fertilizers. This made coffee plants more susceptible to diseases as the leaf rust and decreased harvest yields. Therefore, an interrelatedness of income and volume of coffee production exists, as shown in illustration 11.

Two main causes leading to insufficient and unstable income are identified: a lack of diversification and a low harvesting yield of the cash crop coffee. These two main causes and the factors leading to them are explained in the following.

#### *a. Lack of Income Diversification*

Small-scale coffee farmers' lack of income diversification causes a very low level of adaptability to cope with new challenges (Bárcena et al., 2014, p. 19). Additionally, the reliance on a single export crop additionally increases vulnerability of coffee farmers (Caswell et al., 2012, p. 6). Most coffee produced in Marcala is exported, and therefore, the dynamics of the international coffee markets influence coffee farmers' income. The dependency on only one cash crop and only one income stream leads to an unstable income throughout the year, since coffee is only harvested once a year. Further, future incomes from coffee sales are unpredictable, since external shocks such as pests and weather

conditions can affect farmers' income significantly. One potential solution to cope with this insecurity is diversification in income streams as proposed by the authors Morris et al. (2013, p. 460).

The lack of diversification is therefore twofold: on one side there is no other income stream than coffee sales, as for example a paid employment outside the family *finca*, and on the other side, there is a lack of diversification in terms of cash crop, coffee farmers sell often exclusively coffee. Illustration 11 shows these two factors leading to a lack of diversification, which further leads to insufficient and unstable income levels. This lack of income leads to both low investments in the coffee *finca*, and to the occurrence of the Thin Months.

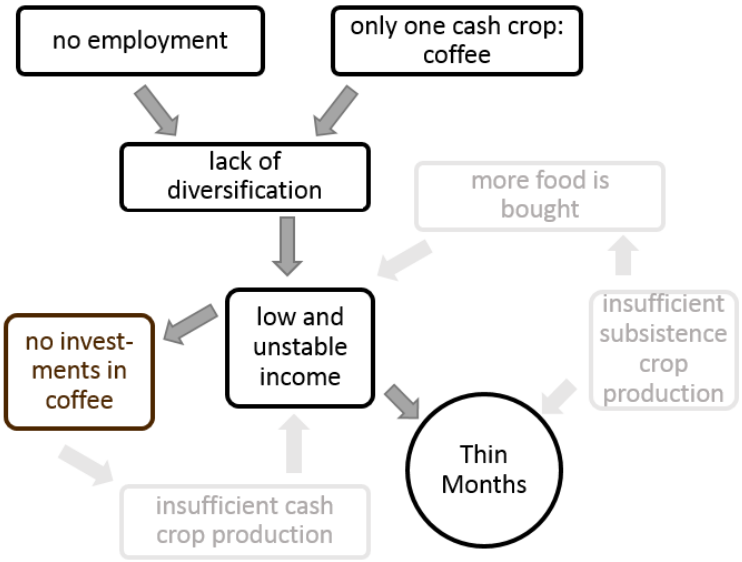



*Illustration 11: Lack of diversification as a cause of low income levels, which cause the Thin Months and low investments in the coffee fincas. Source: own illustration.*

### *b. Low Volumes of the Cash Crop Coffee*

The average volumes of coffee sold by each interviewed household are relatively low. According to interviewees, maximum amount of coffee produced in the harvesting year of 2014/15 was of 39 qq and minimum production was none. Even though most of the produced coffee by the farmers is certified as Fairtrade and organic coffee, the limited volumes and low prices do not enable coffee farmers to ensure food security for the household. This has been confirmed by the author Méndez (2010, p. 247) in the case of small-scale coffee farmers in other regions. Illustration 12 presents the three possible causes mentioned by the interviewees leading to low coffee harvest yields: *La roya,* limited available resources, and droughts. However, these causes may vary from year to year and also varied across different producers.

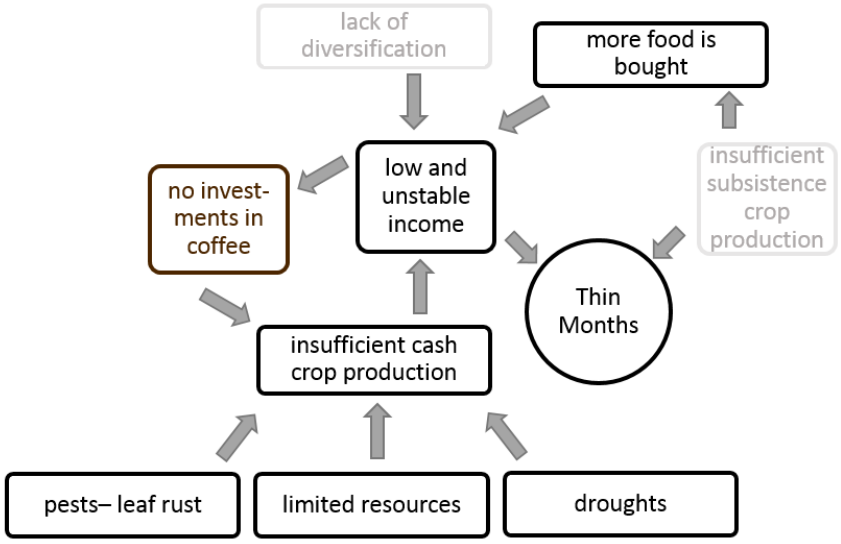



*Illustration 3: Low volumes of coffee production as cause for low income levels, which cause the Thin Months and low investments in coffee production. Source: own illustration.*

1. *La roya*: One possible cause leading to low coffee harvesting yields, mentioned by many interviewed farmers is the leaf rust. The coffee leaf rust, in Spanish *roya*, is a fungus that affects coffee crops in a devastating way. It has been known known since the 19th century. The fungus can be avoided through the plantations of non-susceptible coffee plant varieties, such as Ihcafé-90 and Lempira. These Arabica coffee varieties are increasingly planted in Marcala. For a long time, specialty coffee, usually grown in higher and cooler regions, were spared from the leaf rust, but due to climatic changes the leaf rust has reached even the highest regions in Central America like Marcala. (Bladyka, 2015)

   The leaf rust develops in humid environments. The disease is manifested at the plants leaves, where little yellow spots appear. These spots slowly spread throughout the whole plant. In severe cases the rust leads to defoliation and to a decrease in the photosynthetic capacity of the plant resulting in lower yields of the affected coffee plant. (FHIA, 2004, p. 16)

   In Honduras, the coffee leaf rust reduced harvest by 55% in the year of 2012/13 compared to the previous harvest. This affected coffee producer's income significantly and they were the first to face higher costs in order to control and fight the disease. One method to avoid further spreading of the leaf rust it to cut back the coffee plant completely. This has been done in many *fincas* in Marcala. However, this method influences future harvest yields, since coffee plants will not bloom in the following years after being cut down. (Bárcena et al., 2014, p. 12)

   Three interviewed farmer families (D.V., M.M.A., C.E.R.) had to cut back their coffee plants. As a result, they had no income from coffee sales in the year of 2014/15, and for the coming year of 2015/16 they did not expect enough coffee production in order to be able export, but maybe enough for family consumption. 11 other interviewed families have been affected by the leaf rust either "very hard" or said that they produced 50% or less compared to the years before the leaf rust. The remaining two producers said that the leaf rust has not been a big problem and production did not decrease due to the leaf rust.

However, all farmers confirmed that the organic production increases coffee plants' resistance to diseases, droughts and makes them less prone to the leaf rust. Farmers were convinced that an organic production is better for the soil and coffee quality, even though it means more work and higher costs. Further, many farmers were thinking or already started to plant Arabica coffee varieties that are not susceptible to the leaf rust. However, these varieties have a lower quality bean. This might have an impact in future coffee sales.

2. Limited resources: Even without any pest affecting the coffee plants, the average land for coffee production owned by the interviewed coffee farmers was of only 1.26 manzanas. However, all but two (D.V., A.G.) farmers explained, that it would be possible for them to increase coffee production area. For them, the lack of resources in order to invest in more coffee seedling and soil preparation is the constraint, not land availability or human resources. All 16 farmers said that they would have enough time to grow more coffee, since coffee is not very labor intensive compared to other crops (see chapter 2.2.9). Another possible cause of low coffee production could be insufficient investments in the coffee plantations, meaning that too little was invested in the maintenance of the coffee *finca*. The insufficient investments in coffee plantations reduces productivity and therefore income generated from the coffee sales. This lowers financial resources available to invest in coffee plantation. In order to break out of this circle, other measures must be taken to increase income of coffee farmers in order for them to invest in their coffee *fincas* and increase coffee sales.

3. Droughts: Another possible cause for low coffee harvest yields mentioned by some interviewed farmers are droughts. Especially the scarce rainfall in the years of 2014 and 2015 during the rainy season was seen as a problem for coffee production. According to farmers, they could not plant out coffee seedlings, since it did not rain when expected. Those seedlings were lost, and will not replace older plants or plants affected by the leaf rust. The impact of the drought in the past years will only be evident in terms of coffee harvesting yields in the longer run.

### 3.2.2 Insufficient Subsistence Crop Production

Insufficient subsistence crop production grown by the coffee farmers is another cause together with low incomes, which leads to the occurrence of the Thin Months. Three main causes of insufficient subsistence crop production have been identified: droughts, pests and limited resources. Illustration 13 shows the causes leading to low subsistence crop production. Further, insufficient subsistence crop production does not only lead to the Thin Months, but also income has to be spent to buy food. This decreases income availability for other activities such as investments in the coffee *finca.*

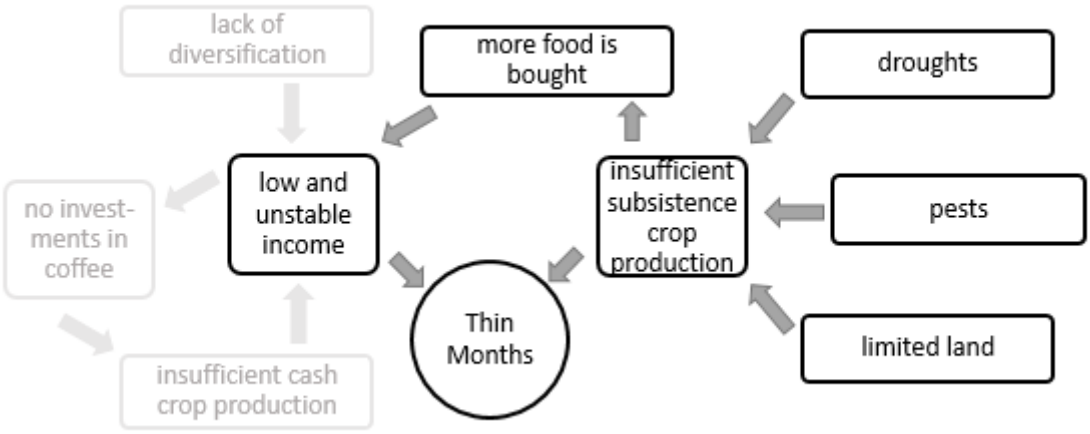



*Illustration 13: Causes of low production of subsistence crops, which lead to periods of food insecurity for coffee farmers and force farmers to purchase more food. Source: own illustration.*

### *a. Droughts*

2015 has been the second consecutive year of severe droughts in Honduras. These droughts led to a low yield of subsistence crop produced by the coffee farmers. 270'000 Honduran households were affected and the droughts which led to an increase in price of *granos básicos,* maize and beans (WFP, 2015, p. 1). Specially affected was the zone of the *corredor seco* (dry corridor) in which Marcala is located. The *corredor seco* is a region, in which El Niño regularly causes extensive droughts. This effect could be observed in the years of 2014 and 2015. (Bárcena et al., 2014, pp. 12, 36)

According to the Global Climate Risk Index of 2015, Honduras together with Myanmar and Haiti have been identified as the most affected countries by climate change from 1994-2013 (Kreft et al., 2015, p. 5). Further, according to the fifth Intergovernmental Panel on Climate Change (2013, p. 22), Honduras will on average have 20% to 30% less rain by the end of this century. Therefore, it is estimated that maize production will decrease by 22% in 2070 relatively to the year of 2014 (IPCC, 2013, p. 22). Further, coffee production will decrease by at least 26% by the end of the century due to climate change relatively to the year of 2014 (Bárcena et al., 2014, pp. 33–36). It can therefore be expected that Honduran farmers will have to deal with difficult weather conditions due to climatic changes in the future.

Droughts in the *corredor seco* cause farmer families to struggle to meet economic and dietary needs. Illustration 14 shows the geographical location of the *corridor seco* in orange. Water scarcity is not only a problem for agricultural productivity but often also for direct consumption and sanitation. Ineffective water management and use, further complicate the situation for these families. (Chemonics International Inc., 2015)

All interviewed farmers mentioned the lack of water for irrigation as a limiting factor which makes an increase in subsistence crop production impossible.

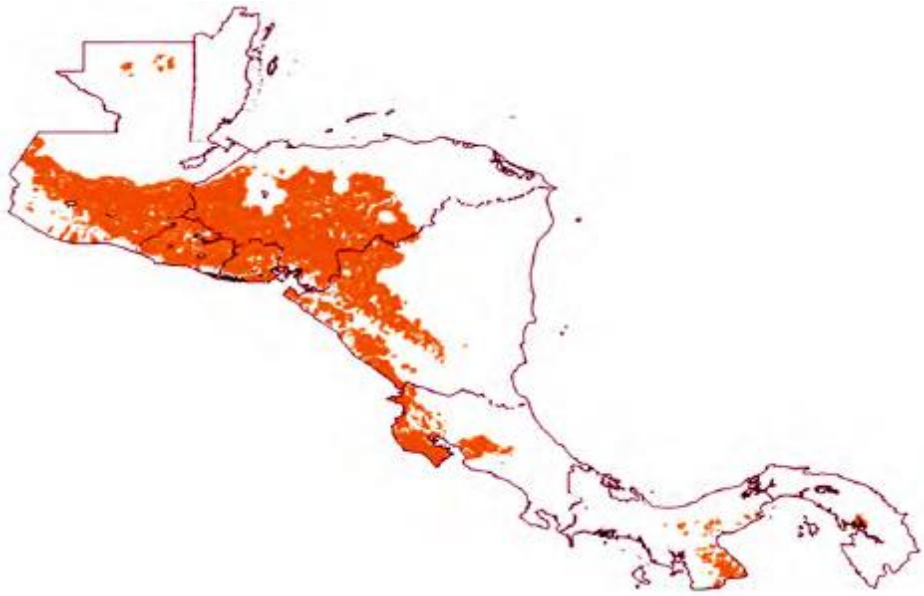


*Illustration 44: In orange the areas at the corredor seco centroamericano. Source: Bárcena et al., 2014, p. 35.*

### *b. Limited Land*

In addition to the lack of water, two farmers (D.V., A.G.) mentioned that they had no more land available in order to increase subsistence crop production. The other 14 interviewed farmers said they had enough land, and that an increase in subsidence crop production would not be limited by available land resources. The constraint in terms of land was rather soil quality and resources needed in order to prepare and upgrade the soil for subsistence crop production. Most interviewed members of the cooperative CABRIPEL said that they had enough land but that the soil was poor. Its preparation would be resource intensive due to the topography and stony consistency of the land.

### *c. Pests*

Another reason mentioned by the interviewed farmers, why they did not produce more subsistence crops, were different pests affecting the plants. The most frequently mentioned pest was the white fly, in Spanish *mosca blanca.* The white fly is an insect, which affects susceptible plants like tomatoes. The insects use their mouthparts to suck sap from the food-conduction tissues of the plant stems and leaves. Large infestation can lead to yellowing of the leaves, leading leaves to dry out and fall off the plant. As a consequence affected plants die or harvest results turn out low. (Flint, 2015)

Producer J.R.P., for instance, lost almost all of his tomato production in the year of 2014 due to the *mosca blanca*. He would like to produce tomatoes and bell peppers, since they have a better yield compared to lettuce and other vegetables. However, because of the *mosca blanca* it is almost impossible to produce those vegetables without the use of green houses. Green houses would make pest control more effective and cheaper.

*d. Volume of Purchased Food Increases*

As a consequence of insufficient subsistence crop production for household consumption, farmers are forced to purchase food during several months of each year. Due to the droughts of 2014 and 2015, food prices for *granos básicos* increased at unprecedented rates (WFP, 2015, p. 1). Between December 2014 and February 2015 prices of maize increased by 35.7% due to low production in 2014. (MIOA, 2015, p. 3). It is often in times when farmers themselves cannot produce enough food for own consumption when prices for foods is highest. This because all farmers face similar challenges concerning weather conditions and water availability. Therefore, purchased food is more expensive in times when farmers themselves have run out of stock of subsistence crops. This expense represents a burden to the already limited household budget.

## 3.3 Strategies to Avoid the Thin Months

In order to combat the Thin Months successfully in a sustainable way, the various causes must be addressed. As analyzed in chapter 3.2, there are two main causes for the occurrence of periods of food insecurity for coffee farmers in Marcala: low and unstable income and insufficient subsistence crop production. Therefore, either income must be increased and stabilized throughout the year, or crop production for auto-consumption must be increased in order reach food security at all times of the year.

In this chapter, strategies to combat the Thin Months that are presented in literature are discussed. Furthermore, strategies that the interviewed coffee farmers and their cooperatives undertook in order to alleviate farmers from the Thin Months are integrated in the given proposition.

### 3.3.1 Diversification

This chapter illustrates possible measures to address the lack of diversification causing low and unstable incomes and, therefore, leading to the occurrence of the Thin Months for samall-scale coffee farmers in Marcala. In order to cope with the challenge of dependency on the only cash crop coffee, farmers can undertake diversification at two different levels, horizontal and vertical diversification. Horizontal diversification involves alternative income streams from sources such as other cash crops than coffee, or from other economic activities, including non-agricultural activities. Vertical diversification aims at developing new forms of coffee products, either through Fairtrade certifications or organic coffee production. Through this vertical diversification, higher prices can be asked for by coffee producers, thereby increasing their income. (ICO, n.d.)

Therefore, three possible strategies to increase diversification have been identified which are presented in illustration 15. These are:

a) Vertical diversification: find new forms of coffee products
b) Horizontal diversification: production of other cash crops in addition to coffee
c) Horizontal diversification: find employment outside the family *finca*

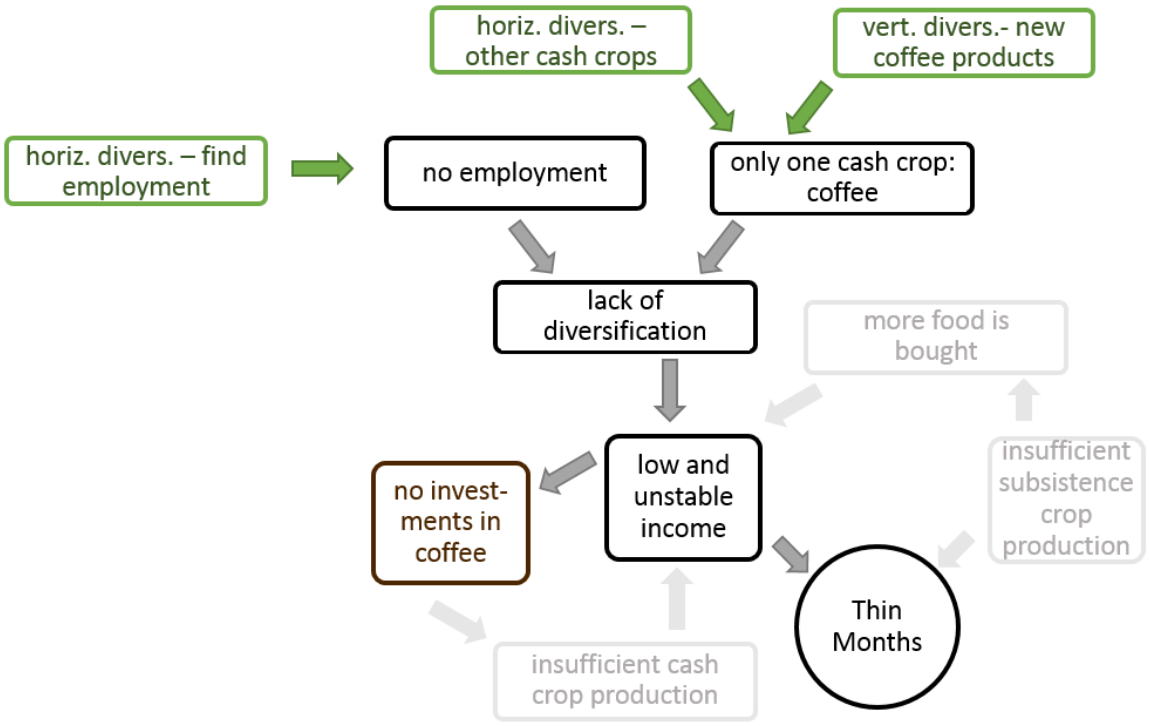



*Illustration 15: In green the identified possible solutions for small-scale coffee farmers to diversify in order to increase and stabilize income. Source: own illustration.*

### *a. Vertical Diversification in Marcala: New Forms of Coffee Products*

Vertical diversification in coffee production means to innovate new forms of coffee products. Innovation in coffee production has been described as anything new that has been successfully applied to economic and/or social processes. The value of innovation in coffee production must be measured not only with regard to its potential monetary benefit but also in social and sustainability terms. (Hartwich et al., 2010, p. 240)

Cooperatives in Marcala have already diversified on a vertical level. Both cooperatives considered in this thesis, RAOS and CABRIPEL, sell organic and Fairtrade coffee. Further, most coffee produced by their members is Strictly High Grown (SHG) and is, therefore, considered to be a specialty coffee. Certifications like organic coffee production, SHG coffee or Fairtrade, ensure that farmers are paid higher coffee prices, with Fairtrade certification even guaranteeing a minimum price floor. These certifications, therefore, reduce vulnerability to market fluctuations. (Morris et al., 2013, p. 460)

Additionally, selling SHG, organic or Fairtrade coffee enables producers to enter niche markets. As most coffee is sold through large roasting companies (see chapter 2.1) where customers have no knowledge about the origins of the bean, the single origin of Marcala coffee could be a further opportunity for coffee farmers. Single origin coffee would add value for customers which can be translated into higher prices for the producing farmers. This is one possible vertical diversification that

has not been implemented yet by the coffee cooperatives and can therefore be one possible solution to increase income through vertical diversification[11].

However, even though Fairtrade and other certifications have generated significant gains for coffee producers in the past (Caswell et al, 2012, p. 9), most small-scale farmers still struggle to meet their needs (see chapter 2.2.7). Therefore, certifications alone will probably not lift small-scale coffee farmers out of poverty and ensure food security throughout the year. As Beauchet et al. found out in their study, only 45% of organic and Fairtrade certified coffee producers have per capita income above the extreme poverty line in Nicaragua (2010, p. 1321). They and other scholars concluded that certifications do not resolve the challenges of food security and poverty faced by small-scale coffee farmers (Bacon et al., 2008, pp. 269–270; Beauchelet et al., 2010, p. 1323; Caswell et al., 2012; Méndez, 2010, pp. 247–248). As an explanation to this, Casewell et al. (2012, p. 9) proposed to abolish onetime payments to farmers after the coffee harvest, and to introduce payments that are broken up throughout the year. Vertical diversification alone did not resolve the problem of low and unstable income for small-scale coffee farmers; therefore, it can be expected that further vertical diversification will not be the solution. Specifically, as long as the onetime payment of coffee sales remains, the problem of unstable income throughout the year will not be resolved.

Therefore, farmers must find strategies other than vertical diversification through Fairtrade, organic certification, SHG and single origin coffee in order to increase income sufficiently to eradicate the Thin Months.

#### *b. Horizontal Diversification: Production of other Cash Crops Additionally to Coffee*

Since vertical diversification to Fairtrade, organic and SHG coffee did not resolve the problem of insufficient and stable income in order to ensure food security of coffee farmers throughout the year, livelihood and agricultural diversifications is recommended by for example the author Méndez (2010, p. 248). According to this author, diversification should "be related to but separate from coffee" (Méndez, 2010, p. 248). He recommends that donors and development organizations should focus on helping cooperatives to not only acquire Fairtrade and organic certifications and markets, but also to invest in diversification knowledge and strategies. In order to undertake a successful diversification project, investments must be local at household levels. (Méndez, 2010, p.248)

Livelihood diversification is also one of the recommended strategies to overcome the Thin Months and poverty by Caswell et al. (2012). They mention that it is important for coffee farmers to have multiple sources of income, not just coffee sales. This makes farmers less risk sensitive and better prepared for possible price and demand fluctuations. Income diversification can be a way for small-scale coffee farmers to obtain a certain income stability. The authors also note that if food security for coffee farmers is the main goal, diversification projects should include food production for consumption and not just for income generation. Therefore, Caswell et al. believe, in contrast to many in the rural development community, that emphasis should not only be placed on market access and income

[11] However, there is one buyer who buys a small amount of coffee from the CABRIPEL and sells the coffee in Switzerland under the name *café campesino* as single origin coffee with a story about the coffee origin. (Yocafé, 2016)

generating options, but also on food production for auto-consumption. This makes farmers less dependent of food prices fluctuations and lowers vulnerability. (Caswell et al., 2012, p. 9)

This strategy of horizontal diversification leads to several positive aspects: first, farmers generate income outside of the coffee season, second, the prices of vegetables are not in direct relation to coffee prices and third, vegetables can be harvested after a relatively short growing period throughout the year. Horizontal diversification, therefore, has the potential to both increase and stabilize income streams of coffee farmers.

In contrast to vertical diversification, only a few farmers in Marcala undertook horizontal diversification in terms of production of other cash crops. Some farmers in Marcala were in the process of producing other cash crops; however, they faced several challenges like droughts, high investment costs, lack of technical knowledge and also market access. This strategy to increase and stabilize income has been undertaken by the NGO iDE with the interviewed farmer and is described in chapter 4 in more detail.

The main constraint limiting farmers in Marcala to produce more vegetables for sale was water availability for irrigation and irrigation systems. This problem was mentioned by all interviewed coffee farmers. All of the interviewed farmers would like to produce other cash crops, but water availability limits them to the production of coffee. As the author Bárcena (2014, p.121) proposes, this problem of water availability and access could be solved by restraining rain water in reservoirs.

Furthermore, market demand for vegetables is another problem mentioned by the interviewed farmers. Farmers can either offer their products at the local informal market, or at the formal market in cities. According to the interviewed farmers, prices between the informal, local market in Marcala and the formal market in cities, such as Tegucigalpa, vary significantly. For example, the farmer, M.S.G., sold a box containing a dozen heads of lettuce for 50 HNL at the informal market in Marcala, while, simultaneously selling a box of lettuce for 72 HNL at the formal market in Tegucigalpa. Therefore, farmers stated that they would like to sell their products at the formal market on a regular basis. However, if farmers decided to offer their vegetable production at the formal market in larger cities, a certain quantity and quality of the product must be guaranteed. In order to do so, farmers face the additional constraint of technical and administrative know-how and limited financial resources. Once more, water and irrigation system availability limits farmers to produce larger amounts of vegetables in order to offer them in formal markets.

#### *c. Horizontal Diversification: Find Employment Outside the Family Finca*

Another identified strategy for coffee farmers to diversify horizontally is to find employment outside the family *finca*. The problem with this strategy is, however, that there was no employment available in the past according to interviewed farmers. This was especially true during the months in which coffee farmers had no work at their *fincas*. Some interviewed households had family members working as day labors (C.E.R., B.C.M.), but they stated that it was difficult to find work outside the family *finca*. In the Marcala region, a daily wage is 100 HNL (4.55 USD). Therefore, the problem was not only that there was no work, but also that wages were low. Most employment is available during coffee harvesting season, but it is precisely then when all farmers do have enough work at their own *fincas*. Four women interviewed (A.G., J. R., J. G., M.M.A.) had a part time work during the entire year at little

convenience stores, called *puplerias*. However, since most farmers do not have much income, the convenience store does not sell much, especially during the months in which income is already limited.

Therefore, finding employment is not a feasible option for many farmers. During the coffee harvest, they already work full time at their coffee *finca* and during the other months there are not sufficient employment opportunities.

Thus, horizontal diversification into production of other crops is a more feasible option to increase employment. It is also a solution that is consistent with coffee production: vegetable production would not limit a farmer's ability to produce coffee together with vegetables as a cash crop. The main limit to this solution is water access and availability for irrigation.

### 3.3.2 Increase Volume of Cash Crop Production

Another strategy to increase coffee farmer's income is to produce more of the cash crop coffee. Illustration 16 shows possible solutions to the problems causing insufficient cash crop production which lead to low and unstable incomes, eventually leading to periods of food insecurity.

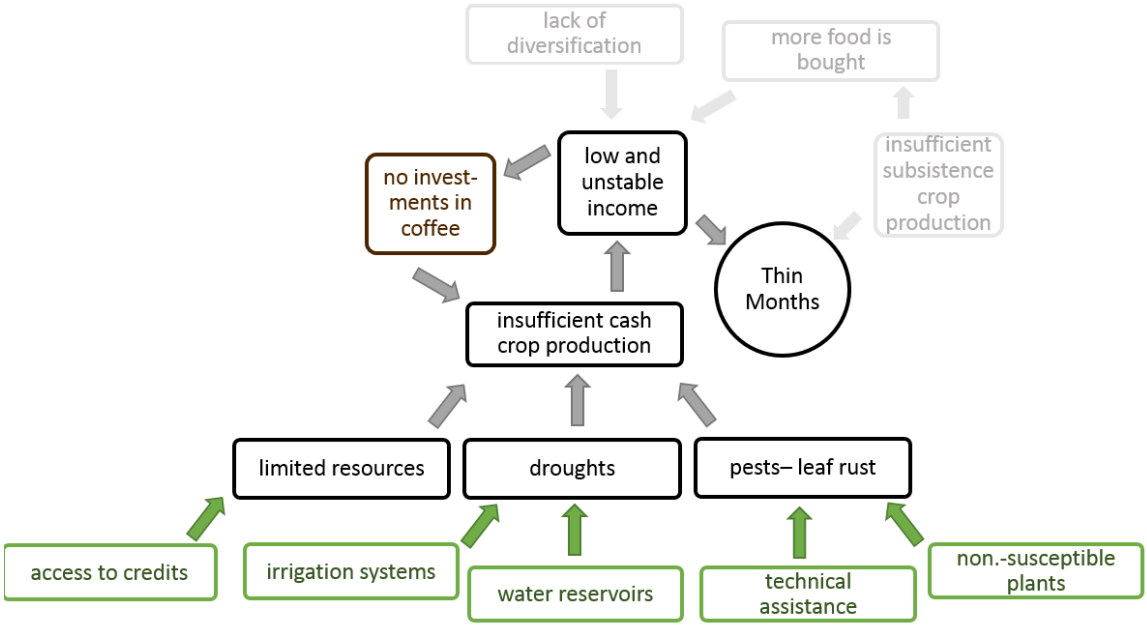



*Illustration 16: In green the identified possible solutions for coffee farmers to increase coffee production in order to increase and stabilize income. Source: own illustration.*

As mentioned in chapter 3.2.1. b., there are different possible causes for the low coffee production: the leaf rust, droughts and limited available resources.

In order to combat the leaf rust, technical assistance to the farmers could be provided. Some farmers mentioned, that it is possible to handle the leaf rust if right plants are treated accordingly. Another option to increase coffee production would be to plant non-susceptible coffee varieties. However, the disadvantages of this strategy are twofold: first, coffee plants do not produce cherries for the first few years and farmers might not have sufficient resources to wait, and second, these non-susceptible coffee plant varieties produce lower quality beans and are not traditional planted varieties in the Marcala region. Despite the lower coffee quality of non-susceptible coffee plant varieties, some interviewed farmers did start to plant them. The problem in 2014 and 2015 was, however, that due to

little rainfall during the rainy season, seedlings could not be planted and eventually many of these seedlings died. It is for this reason, that droughts decrease the capacity for farmers to produce higher volumes of coffee. A possible solution to this problem could be retention of rain water in order to irrigate coffee seedlings through irrigation systems.

The last possible cause, for insufficient coffee production, is limited access to the financial resources to prepare land for agricultural production and to invest in already existing coffee plantations. One possible solution to this constraint could be access to credits at attractive and affordable conditions. With these credits, farmers could acquire adequate equipment or employ workers to prepare the soil. The second solution to this problem is to generate more income in order to pay for these investments. This problem can be solved by applying measures presented in chapter 3.2.1.

In conclusion, it can be said that low and unstable incomes are not only a cause of the Thin Months, but also of the low investments in coffee plantations. Therefore, finding a solution which increases and stabilizes coffee farmers' income is not only crucial for their food security but also for their future work as coffee farmers.

### 3.3.3 Increase Volume of Subsistence Crop Production

For coffee farmers, there are different strategies to combat food insecurity. One strategy is to increase production of crops destined for household consumption, such as maize, beans and vegetables. If farmers could increase their crop production, less food would have to be bought and therefore income would be saved. Saved income can be used to buy crops that are not produced at the own *finca* and therefore contribute to a more diverse alimentation. Saved income could also be in invested in, for example, the coffee plantation. Illustration 17 shows possible solutions to the causes of an insufficient subsistence crop production by the coffee farmers in Marcala, which are explained in this chapter.

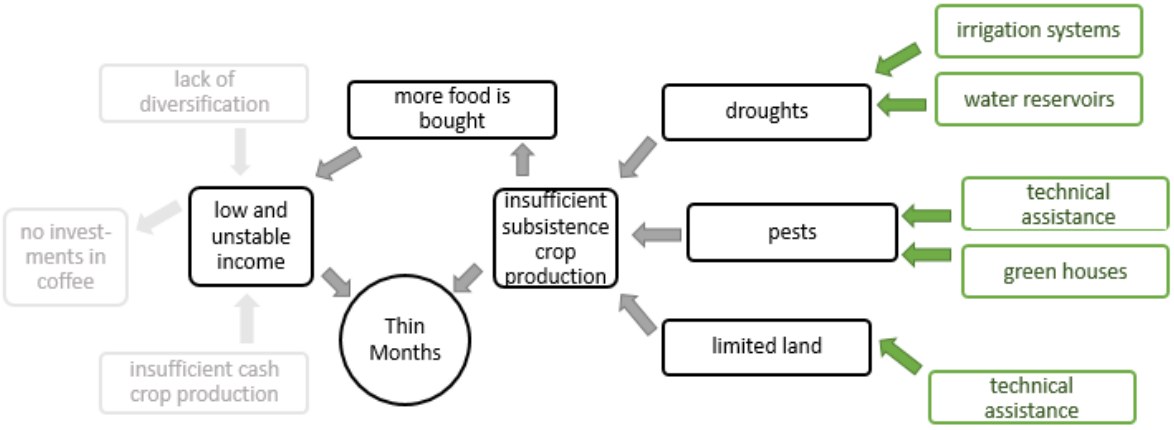



*Illustration 17: In green the identified possible solutions for coffee farmers to increase subsistence crop production in order to overcome insufficient subsistence crop production as a cause of the Thins Months. Source: own illustration.*

One important constraint that was mentioned by all interviewed farmers, is the access to water for crop production. Access to irrigation water would significantly increase their production of crops. Therefore, rain water harvest during the rainy season and the implementation of irrigation systems would have important impact in the volume of produced crops and vegetables for subsistence. Water reservoirs and irrigation system would increase vegetable, beans and maize production. Many women

interviewed would have liked to sell overproduction at the local market in Marcala, but the drought limited their production capacity. Vegetable production, in the past, was barely enough for family consumption. Therefore, irrigation water for vegetable production would not only increase the households' subsistence crop stock but also their income if they manage to sell the overproduction.

Another strategy to increase crop production is to support farmers with technical assistance. Farmers could be taught to buy better seeds or to manage inputs more efficiently. Casewell et al. (2012, p. 7) and Morris et al. (2013, p. 466) suggest the use genetically modified seeds in order to increase crop production. Most interviewed farmers buy genetically modified seeds in order to obtain higher yields and also use non organic fertilizers and pesticides. Therefore, even though all interviewees have or are in the process of switching from conventional coffee production to organic, many still continue to use chemical fertilizers and pesticides for their maize, beans and other vegetables. Additionally, the majority of the farmers interviewed have not received technical assistance for vegetable production in the past. For example, the two technicians employed by RAOS are only in charge of coffee production. Technical assistance would probably increase the crop production of coffee farmers. Technical assistance could also be used to teach farmer how to manage the different soil conditions in order to make the soil apt for vegetable production while using less resources.

Another way to increase subsistence crop availability is to fight pests and diseases which reduce production yields. For example, green houses could be used for vegetable production. In green houses, pests and diseases are much more easily controlled and managed. However, such greenhouses would demand an initial investment from the farmers which they are unable to realize according to interviews. Furthermore, farmers should be trained to manage storage, post-harvest practices and decrease food waste as proposed by Caswell et al. (2012, p. 9).

# 4 Vegetable Production in Marcala – Diversification

In this chapter two different approaches undertaken in Marcala with the aim of achieving income and crop diversification of coffee farmers are described. All projects were carried out by the organization iDE in cooperation with coffee cooperatives in different communities in Marcala.

The first project is a small family garden initiative which specifically targets women and, through them, the entire household. Increasing the production of subsistence crops were the priority in this project. The second presented and third projects focuse on water harvesting in order to scale up vegetable production of coffee farmers. In this project, vegetables are not only produced for household but also to sell at the informal and formal markets in order to generate additional income and increase income diversification. All projects tackled the core problem mentioned by interviewed farmers of insufficient water for crop production.

## 4.1 Project *mujeres promotoras* – Subsistence Crop Production

The project called *mujeres promotoras* was established as a pilot project and carried out by iDE Honduras. The target group was coffee farming women in the municipalities of Marcala and in San Marcos de Colón. In total, 120 women from five different coffee cooperatives (CABRIPEL: 28, RAOS: 15, COMSA: 25, CARUCHIL: 24, and CONCASAM: 28) participated in the project. The project, *mujeres promotoras*, started in May of 2013 and was completed in April 2014. (iDE Honduras, 2014, pp. 1–2)

Overall costs of the project for the participating women from COMSA, CABRIPEL, CONCASAM and CARUCHIL were budgeted at 27’000 USD. The project for the 15 RAOS women was implemented at a later stage and was not budgeted from the beginning. (iDE Honduras, 2013, p. 6)

### 4.1.1 Objectives

The general objective of the project *mujeres promotoras* was to combat the Thin Months faced by coffee farmers by providing them with irrigation systems and technical know-how about vegetable production. Produced vegetables were primarily destined for auto-consumption by the farming family and extra products could be sold at the local market in order to generate additional income.

In order to reach this goal, women’s participation was strengthened through the development of personal capacities. Further, vegetables production at the family *fincas* was increased and the extra products were incorporated in markets. This objective should be reached by increasing technical capacities of the participating women and by providing them with low pressure irrigation systems. The irrigation systems provided were for 20 $m^2$, 50 $m^2$ and 100 $m^2$ crop production.

Even though family vegetable gardens were established primarily for auto-consumption, women were encouragee to sell the excess production at local markets in order to increase the women’s income and to lower their dependency on their husband’s income (which mostly derive from coffee sales). The 120 participating women should become agents of change in their community and transfer the acquired knowledge to other community members. These vegetable gardens should also increase alimentary diversification of the households. Furthermore, the project supported women to develop market strategies and to increase their entrepreneurial capacities and at the end some women were expected to be advocates and sellers of irrigation technologies distributed by iDE Honduras. (iDE Honduras, 2014, pp. 2–5)

In conclusion, the project should help reduce the monetary spending of the families for crops that the families can produce themselves. This makes them less dependent on volatile crop prices and availability. The saved income can then be spent otherwise: the family can invest in their coffee *finca,* purchase inputs to combat the leaf rust, invest in education or health or food which cannot be produced by the farmers can be purchased.

### 4.1.2 Method

According to iDE's technician (J.L.R) who carried out and accompanied the women throughout the project, cooperation with the different coffee cooperatives was crucial for success. Some cooperatives' work was more successful and effective than others. The work of the 28 CABRIPEL women was especially intensive and productive, since the CABRIPEL does not have an own technical team supporting the farmers as the other cooperatives do. Therefore, iDE technicians worked very closely with those farmers.

The project consisted of different stages. The first stage was the familiarization with the project's objectives and strategy. Women could inform themselves about the project and the partners involved. After they agreed to participate, women were invited to participate in field visits with leading producers and technology at the CEPRIS (Centros Productivos de Innovación Rural Sostenible), which are demonstrative *fincas*. At the CEPRIS different technologies of low pressure irrigation systems and water management were introduced to participants in order to give the women an idea which technology could suit their *fincas* best. These field visits turned out to be essential for motivation, credibility and feasibility of the project. After the field visits different trainings were carried out for the women but also for technicians of the cooperatives and leading producers. After women had installed the irrigation systems and family vegetable garden, they were provided with technical support and advice from iDE technicians. Additionally, they were provided with the initial seed capital in order to start the vegetable garden. Technical assistance from iDE included soil preparation, use and management of irrigation technologies, development of the crops, harvesting and commercialization of the end product. The last step was the entrepreneurial aspect of the project. Crops that would not be consumed by the family should be sold at the local market in order to generate family income. Women were trained to manage and operate their capital. (iDE Honduras, 5.2014, pp. 2–7)

Participating women were provided with irrigation systems in different sizes. 80 irrigation systems for 20 $m^{2,}$ 37 systems for 50 $m^2$, 5 systems for 100 $m^2$ and one irrigation system for 200 $m^2$ of vegetable production were distributed. Some women were provided with several irrigation systems of different production capacities. Additionally, three pedal pumps were installed, one at a *finca* belonging to a CABRIPEL member in La Estanzuela (J.C.), one at a *finca* belonging to a COMSA member in Chusmuy (J.M.) and one at the *finca* of B.C.M. (iDE Honduras, 5.2014, pp. 6–7)

### 4.1.3 Irrigation Technology

The traditional method to water vegetable plantation fields is flood irrigation, farmers in Marcala usually do this with the use of buckets. This did not only require a great amount of water, but it was also time consuming. Additionally, a significant amount of water was wasted using this method. A method which addresses both of these problems is a low pressure drip irrigation system, as developed by iDE. This technology is called iDEal. While using this method, not only will less labor be required for irrigation, but it also decreases the labor associated with weeding and fertilizer application. Fertilizer for example could be introduced directly to the water source and would not have to be applied plant by plant. This is due to the fact that only the crop's root is irrigated, weeds are not watered and their amount reduced. In addition, a considerable amount of wasted water can be saved using drip irrigation. iDE provided the participating women in the project *mujeres promotoras* with low pressure drip irrigation systems in different sizes (for 20 $m^2$, 50 $m^2$, 100 $m^2$), fitting the family *fincas* and circumstances. Illustration 18 shows J.M., a participant of the project *mujeres promotoras*, in her vegetable garden, and in the background the iDEal irrigation system. Additionally, low pressure systems are cheaper than conventional high pressure irrigation systems and equally effective (IICA, 2013, p. 1). The systems were provided with a user friendly manual and adequate trainings were carried out by iDE technicians.


*Illustration 18: J.M. in her vegetable garden. Source: iDE Honduras, 2013.*

In the following paragraph, the iDEal low drip irrigation system are briefly described. Illustration 19 gives a schematic overview of the components of an iDEal irrigation system.

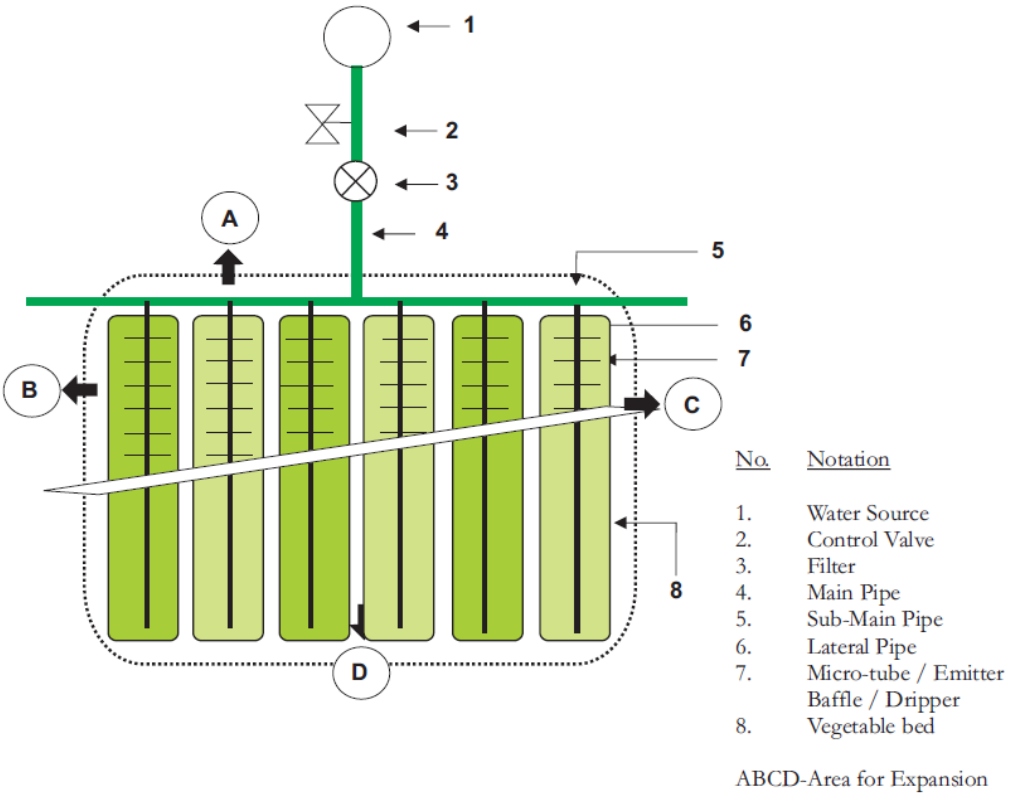



*Illustration 19: Basic components of iDEal drip irrigation system. Source: iDE, n.a.*

The water source (1.) can be an overhead tank or a plastic bag placed at a minimum of one meter above the ground in order to use gravity to increase water pressure. Women participating in the project *mujeres promotoras* were all provided with plastic bags as a water source, which were either filled up with buckets of water carried from a water source or through a pedal pump, bringing water from small lagoons or creeks. The larger the watered area, the higher the water tank should be placed. The control valve (2.) regulates the pressure and quantity of water in the system. The filter (3.) ensures that the water entering the irrigation system is clean and does not clog the pipes or micro tubes. The main pipeline (4.) leads the water from the water source to the sub-main (5.) pipes, which supply water to the lateral pipes (6.). These lateral pipes are connected to the sub-main pipes at regular intervals and have a diameter of 16 mm. Finally, the micro tubes (7.) emit water to the root zone of the plant. Micro tubes have a diameter of 1.2 mm and are 25 cm long. (iDE, n.a., pp. 3–5; IICA, 2013, pp. 4–5).

Three women were also provided with one pedal pump each. With these pumps, water was pumped to the tanks of the irrigation systems from a small lagoon or creek. Illustration 20 shows a small lagoon and a plastic bag filled up with water. J.C. was one of the women provided with a pedal pump. Illustration 21 shows her pedal pump and in the background the water tanks. She had several small lagoons at her *finca*, which were built in order to harvest rain water from where the two water tanks are filled up, each one having a capacity to store 9'450 liters of water (size of 1.8 m x 3.5 m x 1.5 m). The water tanks were situated at a height of about 3 m above the ground. From these tanks, the different plastic bags were filled through gravity using pipes. Additionally, she cultivates tilapia fish in those lagoons for auto-consumption. J.C. is very grateful for the pedal pump; according to her, pumping for one hour a day is enough to fill up one water tank. This is easy and can be done by all family members. When the water tank is full, she opens the control valve and regulates how much and which plot she wants to be irrigated. While the plants are being watered by the systems, she can undertake other activities. It saves her, therefore, a lot of time and physical effort. Before having this system, she spent hours carrying buckets full of water to her vegetables fields. The work required a great amount of time, labor force and water. Another participating farmer, J.M., stresses another advantage of the iDEal technology. Sometimes, she forgets to close the valve, but even then the maximum amount of water used is limited to the size of the tank. If one would forget to close the valve in a high pressure irrigation system, much more water would be lost.

*Illustration 20: Lagoon with Tilapia fish and plastic water bag from the drip irrigation system at the finca of Doña J.C. Source: own image, 2015.*

*Illustration 21: The pedal pup at the finca of Doña J.C. and the water tanks in the background. Source: own image, 2015.*

### 4.1.4 Impact

The 120 women participating in the project gained about 3'850 $m^2$ additional vegetable production through the project. Illustration 22 shows an irrigation system installed in a lettuce and bean bed. 15 different vegetables were planted, including carrots, bell peppers, onions and lettuce. IDE estimates that 70% of the production from the family gardens were used for auto-consumption and 30% was sold at the local market. In addition to the family gardens, 4 distribution centers at the women's houses were established. The purpose of these distribution centers was to allow the women, themselves, to become sellers of the irrigation technologies and of replacement parts. This also generated an additional income stream to these four families and made the irrigation systems more sustainable since spare parts and know-how on how to use and install the irrigation systems were locally available. (iDE Honduras, 5.2014, p. 12)

*Illustration 22: Installed irrigation system in a lettuce bed at the finca of Doña J.C. Source: own image, 2015.*

In August of 2015, some interviewed households had bought additional irrigation systems from these distribution centers in order to grow vegetables for both sale and auto-consumption.

#### *a. Sales*

Vegetables that were not consumed by the producing family were sold at different locations. Women participating in the COMSA cooperative could sell their vegetables at a cooperative-organized market in Marcala every second Sunday. The CABRIPEL women organized a market to sell their vegetables. Illustration 23 shows participating CABRIPEL women at the market selling their vegetables in 2014. The CARUCHIL and COCASAM participants sold their vegetables at community level. Women from RAOS sold their vegetables both at the market in Marcala and at the community level to neighbors and friends. (iDE Honduras, 2014, p. 9)

*Illustration 23: CABRIPEL women selling their vegetables. Source: iDE Honduras, 2014.*

The iDE technician (J.L.R.), who accompanied women throughout the project, estimated that, on average, each women sold vegetables produced through this project for 80 USD during one year, making a total of 9'601 USD for the 120 women. However, income differences between women were significant, since they were not all provided with the same irrigation system kit and the *finca* conditions were very diverse. Some had irrigation kits for 20 $m^2$, some for 50 $m^2$ or 100 $m^2$ or some even had several kits combined, as in the case of the CEPRIS (Centros Productivos de Innovación Rural Sostenible). RAOS women, for example, were all provided with 20 $m^2$ irrigation kits, therefore, they produced few vegetables for sales and the extra income generated was, if anything, quite small.

Income from vegetable sales also depended largely on the commercialization platform available. COMSA women clearly had an advantage due to the organized market comparted to RAOS women. For example, some women (J.R., J.M., J.C.) were able to sell up to 6'000 HNL (273 USD) worth of vegetables during one year, while other women gave surplus vegetables to relatives for free or sold it for very little to their neighbors in their communities.

Another important advantage of vegetable plantation, mentioned by the RAOS women participating in the focus group, is that vegetables can be harvested after only 1.5 to 3 months. This is in direct contrast to coffee production, which takes several years until the coffee cherries can be harvested for the first time and can only be sold one a year. Therefore, it is an adequate complement to coffee income for the remaining months of the year where coffee is not harvested.

### *b. Savings*

Most interviewed families produced only maize and beans for auto-consumption and coffee for sale before participating in the project *mujeres promotoras.* Income, therefore, depended almost exclusively on coffee sales and other foods had to be bought with coffee income. Due to this project, women did not have to spend as much money on other vegetables. Furthermore, producing their own vegetables not only saved money, but also time, as women sometimes had to walk more than an hour in order to reach the market in Marcala to purchase food. The 10 women participating in the RAOS focus group all stressed the fact that they saved a considerable amount of time travelling to the market in Marcala. They all live in communities outside of Marcala and roads are in bad condition. During the rainy season, it was very difficult for them to reach the Marcala market, therefore, growing their own vegetables was a great improvement in their daily lives.

### *c. Social impact*

The project had also an important social aspect. Many women did not have the initiative or courage to go to the market and sell home produced vegetables or crops before the project began. As B.C.M. puts it, it was due to this project that she left the house. Before this, she stayed at home, cooked for the family and helped her husband at the coffee plantation. The participating group of women encouraged her to take part in different trainings. After the project, she not only sold vegetables that were not consumed at home, but also overproduced maize and beans. Even her husband, who was not very convinced at the beginning, began to help her produce vegetables after he saw the benefit of an increased vegetable porudction. Vegetable production at their *finca* involves the entire family, and is no longer considered to be a useless women activity.

The project *mujeres promotoras* raised the women's self-esteem; many could for the first time generate their own income by selling vegetables and they could contribute to a better alimentation of their families by planting different vegetables, as mentioned by several women of the RAOS focus group. Furthermore, it was very important that the women met periodically throughout the project in order to exchange views and knowledge; they motivated each other when someone was about to quit the project due to a bad harvest or family problems.

When talking to the RAOS focus group, this social dynamic was especially visible. Leader women encouraged shyer participants to continue to produce vegetables. All 10 women were very content with the results of the project and would not hesitate to participate again.

It is also important to mention that the irrigation system is easy to manage. As producer J.M. puts it: to her, the project should not be called *mujeres promotoras* but rather *familias promotoras* (promoter families), because it involves and benefits all family members, not exclusively women. The irrigation systems is so easy to handle that even children can help the parents out installing the system, pumping and irrigating. Illustration 24 shows J.R. son installing an irrigation system at their family *finca*.

*Illustration 24: The son of Doña J.R. is installing an irrigation system at their finca. Source: own image, 2015*

### *d. Alimentary Improvement*

According to the iDE final report (2014, p. 13) and testimonies of the participants, the project also contributed significantly to a more diverse diet for the farmer families. Participating families used to have an unbalanced and one-sided diet, mostly based on: maize, beans, dairy products, rice, rarely meat and a narrow range of vegetables.

The aspect of alimentary improvement of the participating families was a very important factor according to most interviewees. The focus group of RAOS participating women all agreed that the project led to a major improvement in their family's diet and health and that they appreciated the large vegetables variety they had thanks to the project. The fact that they produced the vegetables themselves and knew the amounts of pesticides the vegetables were treated with, made the women more confident, knowing they were preparing good quality food for their family.

IDE technicians also stressed the different nutritional benefits of various vegetables and of a diverse diet. Participating women have a better understanding of nutrition than before the project and share this knowledge with their families and communities.

### *e. Constraints*

Women participating in the project were content with the results. However, many women were lacking a water source in order to fill up the plastic bags. Some *fincas* are located close to a stream, but some are far away from any water source. Even though all participating households obtained an irrigation system, not all of them could continue to use them during the dry season. In order to have all women producing vegetables, a reliable and constant water source was needed in order to fill up the plastic

bags. As a solution, women proposed to build more water reservoirs as they have seen at the Pelón mountain. The water harvesting projects addressing this issue of the lack of water availability throughout the year are presented in the following chapter.

## 4.2 Water Harvesting Project – Cash Crop Production

In this chapter, the two water harvesting projects implemented by iDE in Marcala are described. First, the water harvesting project at the community of el Pelón is presented and then the water harvesting project implemented at the *finca* of D.M. and B.C.M. is described.

### 4.2.1 Water Reservoir at the Pelón

The community of el Pelón is located about 10 km from the center of Marcala, just above the community of La Estanzuela. The name comes from the community mountain, el Pelón. The majority of people living there are coffee farmers and belong to the CABRIPEL. The community has a small elementary school, but the teacher is not able to get there daily. The teacher is supposed to travel every day from La Paz, but the road from la Estanzuela to el Pelón is not in good conditions, which makes access to the Pelón community difficult. Furthermore, there is neither electricity nor cell phone reception. Some families have solar panel which provides them with electricity, but the panels are often not working properly and are not a reliable source for electricity.

Farmers living at the Pelón do not only produce coffee, but also subsistence crops such as maize and beans. Some of the women at the Pelón community were participants of the iDE project *mujeres promotoras* (see chapter 4.1) and grow, since the implementation of the project in 2013, vegetables mainly for auto-consumption. After the project *mujeres promotoras* was completed in 2014, members of the Pelón community approached iDE technicians with the idea to harvest rainwater in order to grow more vegetables during the dry season. Usually, it rained enough during the winter (May until September), the problem was that they had no possibility to store the rainwater in order to use it during the dry months of the year. iDE agreed to build a water reservoir at the top of the Pelón mountain in order to use gravity and irrigate vegetable fields through low pressure irrigation systems of iDEal. Thus, water would be harvested during the rainy months and used during the dry months for vegetables production.

#### *a. Objective*

The aim of this project was to harvest water at the reservoir at the Pelón mountain in order to use it for the irrigation of vegetable fields. The water reservoir should have a capacity that is big enough for farmer families to sell a considerable amount of vegetables at the local informal market and if possible at the formal market in Tegucigalpa, and not only for auto-consumption. Therefore, the project not only increased subsistence crop production, but aimed at increasing farmers' income and diversified income streams in order to make them both less dependent on coffee sales and have an income during the coffee off-season. A reservoir would enable producers to grow vegetables during the dry season, meaning that production throughout the year would be possible. This has several advantages according to iDE technician R.A., who was in charge of the reservoir: during the dry season there are fewer pests affecting the plants and prices for vegetables are higher, access to water throughout the entire year would make them more independent from weather conditions and season and farmers could also increase crop diversification, which would allow them to grow the crop with the highest market price.

### *b. Construction of the Reservoir*

In a first step, iDE technicians and 15 farmers (including the president of the CABRIPEL W.G.) joined together in order to map out the process and determine competences and responsibilities of each actor taking part in the construction of the Pelón water reservoir. In the beginning, few farmers were convinced that a reservoir could be built at the Pelón mountain. There were no roads and access with machinery was impossible. iDE technicians proposed to build the reservoir with the use of oxen, a very unusual approach. The animals were able to walk up the mountain and were also less expensive than renting machinery from La Paz or even Tegucigalpa and brining the machinery all the way to El Pelón. Oxen, however, were available locally. Even though farmers were not completely convinced that it would work, 15 men started together with iDE technicians to build the reservoir in September 2014 under the lead technician R.A. Illustration 25 shows two farmers working with a team of oxen in order to build the reservoir. During the construction process, farmers became more and more convinced that it would eventually work. The initial plan was to build a reservoir with a size of 30 m x 20 m and 0.9 m deep, able to hold 540 $m^3$ of water (540'000 liters). This intended size could not be realized because it began to rain in November 2014 before the construction could be completed. Illustration 26 shows the Pelón reservoir in August 2015. Two pairs of oxen were used to excavate with two different shovels, one made out of metal and one made out of wood. The whole process was a trial, both for the technicians and the group of farmers who had never worked with oxen to build a reservoir before. The expectations of the farmers grew higher as the project advanced and farmers were full of hope that they will be able to grow vegetables year around and that this will lift them out of poverty. The construction was stopped by the end of October, when it was filled with the first rainfalls. The reservoir turned out to retain water without using a plastic foil due the clay soil. Water loss due to filtration was therefore very low. (iDE Honduras, 2015)

Construction costs of the reservoir are presented in the table 6. Labor costs of the 15 producers and of the technicians are not included. The information was provided by iDE.

*Table 6: Construction costs of the water reservoir at the Pelón mountain. Source: iDE, 2015.*

| *Material* | *Amount* | *Unit costs* | *Costs* |
|---|---|---|---|
| Team of oxen | 34 days | 23 USD a day | 782 USD |
| Metal shovel | 1 | 173 USD | 173 USD |
| Wooden shovel | 1 | 28 USD | 28 USD |
| Other inputs | | 45 USD | 45 USD |
| *Total* | | | *1'025 USD* |

*Illustration 25: Farmers working at the construction of the Pelón reservoir. Source: R.A., iDE Honduras, 2014.*

*Illustration 26: The Pelón reservoir in August 2015. Source: own image, 2015.*

### *c. Impact*

Three farmers used the water from the Pelón reservoir from November 2014 until August 2015.

Farmer J.R.P. planted in November 2014 1.5 tareas[12] (656 $m^2$) lettuce, tomatoes on 0.5 tarea (219 $m^2$), and twice string beans on 0.5 tareas (219 $m^2$). He harvested 4'000 unit of lettuce which he sold at the informal market in Marcala making about 4'100 HNL (186 USD). The tomatoes were affected by a pest called *mosca blanca* and, therefore, the harvest did not go well according to J.R.P. He only harvested some tomatoes for family consumption but was not able to sell any. He thinks that the only way to grow tomatoes and bell peppers at the Pelón would be in green houses, called *casa mayas*, in order to ensure a better pest control. Tomatoes and bell peppers are both vegetables that always sell for a good price according to J.R.P., and he would like to produce more of these crops. However, greenhouses are expensive, and he did not have the needed monetary resources available at the moment to invest. The 0.5 tarea of string bean generated about 6'100 HNL (270 USD) at the local market. In a second cycle of production in mid-January of 2015, he planted 2.5 tareas (1'094 $m^2$) of string beans and sold them for about 30'600 HNL (1'390 USD) at the local market in Marcala. Overall, he generated 40'813 HNL (1'855 USD) selling vegetables watered with the water retained at the Pelón from November until August 2015.

Pelón farmer M.S.G. planted on 1.5 tareas (656 $m^2$) 3'000 units of lettuce in November 2014. Out of the 3'000 units of lettuce, he sold 2'664 to the formal market in Tegucigalpa for 6 HNL a unit, generating 15'984 HNL (727 USD). 300 units of lettuce were sold at the local informal market in Marcala for 4 HNL a unit, generating additional 1'250 HNL (57 USD). The remaining 36 units of lettuce were used for own household consumption. In mid-January he planted 0.5 tarea of string beans which were sold at the informal market for 3'885 HNL (177 USD) together with 1 tarea of lettuce which was also sold at the informal market for 5'136 HNL (234 USD). In March, he planted 0.5 tarea of string beans again and also 0.5 tarea of lettuce generating 3'885 HNL (177 USD) and 2'419 HNL (110 USD) respectively at the local market in Marcala.

Farmer M.R. also produced lettuce on 150 $m^2$, using the water from the Pelón reservoir for irrigation in November 2014. In December, the farmer harvested 1'000 units of lettuce, of which, 900 were sold as a price of 0.36 USD a unit at the local market in Marcala. Total revenues for the sale were therefore 324 USD. M.R. stated that the year 2014 has been the most successful in terms of income and that he was able to buy clothing and to provide his family with a balanced nutrition.

Overall, these three farmers generated about 3'600 USD during the months of November 2014 until August 2015 with vegetables sales watered with the retained water at the Pelón reservoir and using drip irrigation systems. According to the iDE technician J.L.R., farmers will probably learn how to manage water better and which vegetables have highest yields over the next few months. Therefore, it can be expected that more income will be generated with the same amount of water in the future. It is, however, important to notice that water retained depends on rainfall and other water sources that fill the reservoir. If there is more rainfall, farmers will be able to produce more. Furthermore,

[12] 16 tareas fit in one manzana, therefore 1 tarea equals 437.5 $m^2$.

generated income also depends on pests, weather conditions other than rain, market prices and demand.

*Illustration 27: W.G. in a lettuce field of M.S.G., irrigated through an irrigation system with water from the Pelón reservoir. Source: own image, 2015.*

### *d. Farmers Responses*

The initial plan was to build a 90 cm deep reservoir. This could not be realized due to insufficient faith of the farmers in the success of the project from the beginning. In November 2014, when the project was completed, it was, on average, 70 cm deep according to technician R.A., having a capacity to retain 420'000 liters of water. Farmers who constructed the reservoir and also the leading technician R.A. believed that it would have been possible to complete a 90 cm deep reservoir in the same time; however, since farmers were not fully convinced that the project would be successful, they did not put sufficient effort from the beginning of the construction work. During the interviews farmers mentioned that they regret this and during the dry season of 2015, they tried to amplify the reservoir by themselves. However, this could again not be completed because it started to rain after two days of work and the reservoir started to fill, the water reservoir had still not reached the initially planned size of 540'000 liters by August 2015.

Farmers living in the Pelón community and also farmers from the Estanzuela were convinced that building more reservoirs is important in order to generate more income through vegetables sales after they have seen the benefits of irrigation water availability. Most households at both communities had already family gardens with a drop irrigation system because they participated at the project *mujeres promotoras* (see chapter 4.1). In 2015 they stated that they would like to produce more in order to sell vegetables regularly at the market and generate income in addition to coffee sales. All farmers interviewed living in the communities of el Pelón and la Estanzuela were eager to work and they all possessed enough land to increase agricultural production. The main problem mentioned by the farmers was insufficient access to water in order to irrigate their plantations and the lack of drip

irrigation systems. According to the leading technician of the project R.A., the farmers who worked with him during the construction of the reservoir are now qualified to build reservoirs on their own with the help of local available oxen and the already bought wooden and metal shovels.

### 4.2.2 Reservoir at the *finca* of D.M. and B.C.M.

#### *a. Objective*

The reservoir at the *finca* of D.M. and his wife B.C.M. was constructed in September of 2014. The aim of this reservoir was to retain rain water in order to use it for vegetables production. These vegetables were not only used for family consumption but also generated additional income for the family and made them less dependent on coffee sales, thereby increasing income and alimentary diversification. Water availability for crop production enables the family to produce throughout the year and therefore generate income not only during the months of coffee harvest and rain, but throughout the year, independent of seasons.

#### *b. Method*

According to the leading technician of the project, R.A., it was not easy to convince D.M. of the merits of the diversification project. D.M. is described as a traditional coffee grower by iDE technician R.A. He always cultivated the traditional crops from this region: coffee, maize and beans. However, his wife B.C.M. was one of the women who participated in the project *mujeres promotoras* (see chapter 4.1). During this project, D.M. had a critical attitude towards iDE's plan to implement vegetable gardens at the family *fincas* with the use of a drip irrigation technology. According to D.M., he at first thought that the irrigation system was a useless toy, only apt for women and children. Whenever technicians came to visit B.C.M., D.M. left to work on his maize, beans or coffee plantation in order to avoid an encounter with them. During the project of *mujeres promotoras*, it was his wife and daughter who started vegetable production on a small scale in their *finca*. In the beginning, his wife and daughter planted potatoes and the harvest turned out to be excellent. After this, they planted radish and cucumber. After some time, D.M. acknowledged the benefits of the irrigation project and became increasingly more interested in the irrigation system and in vegetable production. His wife and daughter were successfully selling vegetables and the family could benefit from a more balanced nutrition. The importance of growing crops other than coffee, maize and beans became evident to D.M. Eventually, D.M., together with his whole family, became involved in vegetable production and learned how to manage the irrigation system provided by iDE. The whole process took about one year according to R.A. After this experience, D.M. believed that crop diversification can contribute significantly to the family income. After this year had passed, he began to take part in trainings to learn about drip irrigation systems, water management, soil preparation and terrace construction in order to prevent soil erosion. He introduced new crops on his farm in addition to the traditional crops coffee, maize and beans. It was then when iDE proposed to D.M. and his family to build a water reservoir at his *finca* in order to be able to produce more vegetables throughout the year.

The water reservoir was built at a low point on D.M.'s *finca* in order to both capture rainwater and draw in water from a nearby stream which dries out during the dry months. The reservoir was built with the use of a team of oxen and was filled with a plastic foil at the bottom in order to prevent water loss through filtration. Water restrained in the reservoir could be distributed to different plastic bags at the production plots with the use of a pedal pump. Once the bags were filled up with water, the producers could control when and how much the plot was watered. This is the same technology that was implemented for the *mujeres promotoras* project (see chapter 4.1.), but on a larger scale.

*Illustration 28: Water reservoir at the finca of D.M. Source: R.A., iDE Honduras.*

### *c. Impact*

After two years of working with the family, the rust leaf affected D.M.'s coffee plantation significantly. According to D.M., this would have had a considerable impact on the family's livelihood if they had no other source of income other than coffee sales. Due to crop diversification undertaken in their *finca*, his family was able to cope with the leaf rust affecting coffee plants. When asked what would have happened to the family if there had been no vegetable production, D.M. responded that they would have suffered a lot. Vegetable production saved them and their coffee plants. With sales from vegetables, his family was able to buy necessary inputs in order to combat the rust leaf and to ensure food security for the family.

Before vegetables were cultivated at D.M.'s *finca*, he only had work for the few months when coffee was harvested or during the planting seasons of maize and beans. During several months each year, he and his family did not have enough work. However, the construction of the water reservoir enabled the family to plant maize, beans and a variety of vegetables during the coffee off-season and during the dry season. Therefore, the work load is now distributed more evenly throughout the year, and instead of only two cycles of maize and beans production, his family is able to produce these crops three times a year. This is only possible due to the water available in the reservoir for irrigation of the plantation, which makes them independent from rainfall.

After the project, D.M. and his entire family became ambassadors of the technologies used at their *finca*, the water reservoir, the drip irrigation systems and the pedal pump. They believe that vegetables production is complementary to coffee production and consider both to be essential in order to cope with different challenges and to ensure a stable income throughout the year. The access to water makes them independent from rainfall and, with the pedal pump, he can control where and for how long he waters the different plots. The irrigation systems are easy to manage, and it is important to both B.C.M. and D.M.that the entire family knows how to work with all technologies installed at their *finca*.

Even though D.M. and his family began to increasingly produce more vegetables as a cash crop and not only for household consumption, coffee production still remains the main farming activity and he still sees himself primarily as a coffee producer.

## 4.3 Lessons Learned from the Projects

As the project *mujeres promotoras* and the two water reservoirs projects described in chapters 4.2 and 4.1 show, water availability is crucial for vegetable production. Without water, farmers in Marcala are not able to diversify and stabilize their income through vegetables sales, and an increase of subsistence crop production not possible. Without water, farmers are highly dependent on weather conditions and the rainy season, while remaining vulnerable all year. Illustration 29 shows which effects water and irrigation systems for both subsistence and cash crop production have on income, coffee investments and the Thin Months.

By enabling farmers access to water for irrigation of vegetable plantations, the issue of recurring periods of food insecurity is tackled in two ways. First, farmers are able to produce more vegetables for household consumption. Therefore, food security increases, since farmers guarantee access and availability of self-produced food themselves. Crops would not be dependent on the rainy season, but could be produced independently from rainfall throughout the year. Second, water access and irrigation systems enables farmers to produce vegetables as a cash crop which allows farmers to have an additional income stream to coffee sales. This ensures a more stable income throughout the year and makes farmers more resistant to shocks in the coffee market or pests which affect coffee plants. Furthermore, income generated through vegetables sales could also enable farmers to invest more in their coffee *finca*, ensuring future coffee harvests. Further, water and irrigation technologies can also be used for coffee seedlings, this however, has not been done by the interviewed coffee farmers yet. Watering coffee seedlings through an irrigation system would most likely increase the production of coffee, leading to a higher income for the farming families in the future. However, as irrigation for coffee has not been used by the interviewed coffee farmers in Marcala, its effects could not be analyzed. Nevertheless, the two main causes identified in chapter 3.2 leading to the Thin Months, first, low and unstable income and second, insufficient crop production, are both addressed when ensuring farmers have access to water and irrigation technologies.

The method of water harvesting combined with low pressure drip irrigation systems has shown to be a suitable technology for coffee farmers in Marcala. Women participating in the project *mujeres promotoras* considered the project to be relevant and useful. It increased food security, generated some income, or at least saved money and time, increased diversity of the daily diet and empowered women. The two water harvesting projects were also seen as a success by the farmers who benefitted from them. They were able to increase their incomes through vegetable sales and use produced vegetables for auto-consumption.

However, it should be noted that diversification undertaken by coffee farmers to vegetable production as additional cash crops has similar as coffee since they are also an agricultural product. Pests could affect vegetables production, market demand and prices could also vary significantly. Nevertheless, diversifying income streams in order to increase income and its stability throughout the year, seems to be a feasible and effective measure in order to combat the Thin Months for coffee farmers in Marcala.

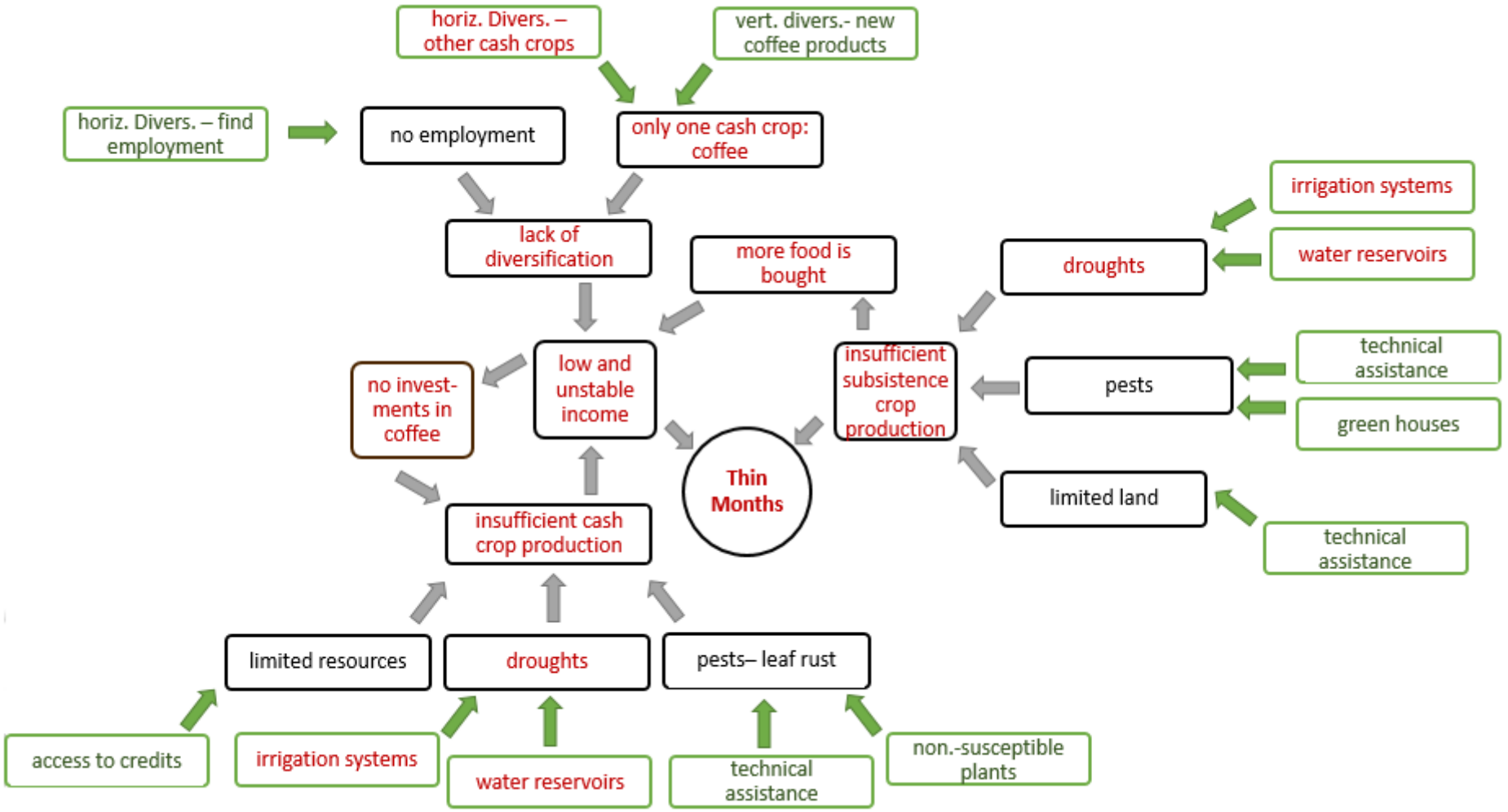



*Illustration 29: Effects of water availability and irrigation systems for vegetables and coffee production in red. In green boxes the possible solutions to the causes leading to the Thin Months. Source: own illustration.*

# 5 Conclusion

This thesis identified two main causes which lead to yearly recurring periods of food insecurity, called Thin Months, for small-scale coffee farmers in Marcala: first, low and unstable income and second, insufficient subsistence crop production. In order to eradicate the Thin Months, the various factors leading to these two causes need to be tackled. After considering different measures which influence these factors, the diversification of income streams through cash crop diversification and an increase in subsistence crop production were identified as the most feasible strategies for small-scale coffee farmers in Marcala. Therefore, the Thin Months have to be addressed in two ways: first, farmers must diversify income streams in order to be more independent from coffee sales and second, they must increase subsistence crop production in order to purchase less food. As the project *mujeres promotoras* and the two water restraining projects showed, water and irrigation technology are the key factors enabling farmers to produce other crops than coffee for sale and increase production of vegetables for household consumption. Therefore, the solutions to the Thin Months proposed in this thesis are to ensure access to water and irrigation technologies for small-scale coffee farmers in order to produce more vegetables.

However, many farmers lack the initially needed resources in order to invest in irrigation technologies. Therefore, how farmers get access to water reservoirs and irrigation systems is a question that has to be further investigated. Furthermore, once this question is answered, commercialization of their vegetables has to be further analyzed and adequate markets must be found.

In conclusion, this thesis has shown that diversification can be a powerful strategy to combat the Thin Months. Vegetable production for sale and auto-consumption is an efficient complement to coffee production for small-scale coffee farmers in Marcala. However, once the vegetables are produced, farmers may face several challenges such as vegetable market demand, market price and market access, which have not been addressed in this thesis.

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16.05.2016 Fabiana Margadant

# Annex

Individual and family interviewees:

| *Nr.* | *Name, Initials* | *Gender* | *Household size* |
|---|---|---|---|
| 1 | M.S.G. | m | 5 |
| 2 | C.E.R. | m | 3 |
| 3 | M.M.A. | f | 6 |
| 4 | C.E.R. | f | 2 |
| 5 | I.M. | f | 6 |
| 6 | E.G.H. | f | 5 |
| 7 | A.G. | f | 3 |
| 8 | J.C. | f | 4 |
| 9 | J.R. | f | 5 |
| 10 | B.C.M. | f | 8 |
| 11 | M.A. | f | 5 |
| 12 | M.R. | m | 7 |
| 13 | M.A.D. | f | 5 |
| 14 | J.R.P. | m | 5 |
| 15 | D.V. | f | 4 |
| 16 | J.M. | f | 4 |

RAOS focus group:

| *Nr.* | *Name, Initials* | *Age* | *Household size* |
|---|---|---|---|
| 1 | A.E.P. | 39 | 6 |
| 2 | M.M.G. | 53 | 7 |
| 3 | I.L.C. | 28 | 3 |
| 4 | R.A. | 32 | 6 |
| 5 | C.L. | 54 | 3 |
| 6 | M.E.D. | 45 | 11 |
| 7 | A.A.S. | 39 | 5 |
| 8 | C.I. | 51 | 7 |
| 9 | J.S. | 60 | 5 |
| 10 | D.V. | 38 | 4 |

Technicians:

| *Name, Initials* | *Organisation* |
|---|---|
| R. A. | iDE Honduras |
| J.R. | iDE Honduras |