Gender and the lived experiences of climate change:

Vulnerabilities, adaptation capacities, and resilience of smallholder farms in Costa Rica.

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ABSTRACT

Title: Gender and the Lived Experiences of Climate Change: Vulnerabilities, Adaptation Capacities and Resilience of Smallholder Farmers in Costa Rica.

The purpose of this research is to explore how climate change is experienced in the everyday lives of men and women dedicated to smallholder farming in Costa Rica, with a particular focus upon the role of gender in structuring differences in vulnerabilities, adaptation capacities, and resilience. The questions that the research seeks to answer are the following: How does the gender structure at the individual, interactional and institutional levels influence intra-household dynamics in smallholder farms managed by men compared to those managed by women, including the distribution of productive and reproductive labor? How do intra-household dynamics in smallholder farms managed by men and by women produce different climate change experiences and perceptions, as well as social constructions of vulnerabilities, adaptive capacities, and resilience to climate change?

The empirical basis of this research is an in-depth case study of smallholder farms/households located in three localities in Costa Rica: Tierra Blanca and Llano Grande in northern Cartago, where they produce potatoes and onions; San Luis and San Miguel in Grecia, where they produce coffee and vegetables; and Cóbano in Puntarenas, where they produce vegetables. In each of these localities, small holder farms/households managed by men and by women are the main unit of analysis to grasp intra-household dynamics such as gender power relations, bargaining processes, and decision-making, that take place within the members of the household. I used in-depth semi-structured interviews to gather information from family members of different ages, occupations,

and marital status and I also did participant observations in two farms managed by women (one in Tierra Blanca and one in San Miguel) and one farm managed by a man (in Tierra Blanca).

Through the analysis of intrahousehold dynamics, in this research I argue that households´ vulnerabilities, adaptations capacities, and resilience, as well as that of its members, are constructed differently, but relationally, because of gender and how it intersects with other structures. First, I show that male, female and co-managed farms display different power configurations that result in a distinct division of labor, which is best observed in the allocation of agricultural rights and responsibilities. Although most farms are owned and managed by men due to gender-neutral policies and gender norms, land tenure provides women with a greater fallback position and stronger bargaining power to negotiate their land user rights and assume the farm´s management. So, they become the main decision-makers and, consequently, challenge the gender order.

Due to these farms´ distinct power configuration, I sustain that member´s vulnerabilities within these households are constructed differently. For instance, male and female managers are the least vulnerable to climate change because of their decision-making power and control of the farm. They also have the last word in the adaptations used, so the adaptations implemented in male, female and co-managed farms tend to vary. Shaped by the external resources available to them in their locality, their adaptations reflect the situatedness and subjectivity of the farm manager(s).

As for other household members, their vulnerabilities may increase when they face an inability to take to part in negotiations and decision-making (Katz, 1997) because they are unable to share their needs and opinions through which to influence climate change related choices. In turn, it also limits the farm´s adaptation capacity and possibility to build resilience. On the contrary, households in which all members take part in negotiations and practice an egalitarian style of decision-making, reduce each member´s vulnerabilities, while also increasing these farms adaptation capacities and their possibility to build resilience.

ACKNOWLEDGEMENT AND DEDICATION

I dedicate this thesis to all smallholder farms that, despite the socioeconomic and climatic challenges they face, continue their hard labor every day to ensure our food security. I especially dedicate it to those men and women farm managers and their families who took part in this research. I am deeply thankful to them for sharing their stories with me, but also for opening the doors of their farms and households.

I also want to express my profound gratitude to my two supervisors for their guidance and support during this process. I always felt comprehended and respected, so thank you for your assertiveness and compromise. I consider this is the product of a team effort because your perspectives and suggestions were essential.

Finally, I want to thank my family for their support. To my husband, I want to express my special gratitude for always having the right words of encouragement when needed and for his kind patience all the time, and to my parents for being my example and inspiration.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASHORI	Irazú Association of Horticulture
CNP	Center for Production
ENSO	El Niño-Southern Oscillation phenomenon
FONAFIFO	National Forestry Financing Fund
ICAFE	Coffee Institute
IDA	Institute of Agrarian Development
IMAS	Institute of Mixed Social Aid
IMF	International Monetary Fund
INA	National Institute for Learning
INAMU	National Institute for Women
INDER	National Institute of Rural Development
IPCC	Intergovernmental Panel on Climate Change
ITCO	Institute of Land and Colonization
MAG	Ministry of Agriculture
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.
PES	Payment for Environmental Services
SENARA	Drainage and Underwater Service
SES	Social-Ecological System

CHAPTER 1- INTRODUCTION

On a February morning, I met Nora, a middle-aged woman, who is a landowner and farm manager. During our conversation, Nora shared that the last time she planted peas, the drought caused them to wither and die. “It was my favorite crop to plant, but I stopped because of the drought. The last harvest was lost due to lack of water”, she explained (personal communication, 27-02-2018). She said that the drought lasted about 7 years. Climate alterations such as this, which she has seen occur in Llano Grande of northern Cartago in the past 19 years since she has had the farm, are the reason why she is working towards her dream of building a farming project that provides her family with food security in a context in which climate change is increasing the difficulties to produce certain crops. She has been experimenting with different plants and trees to see which ones are more resistant to dry conditions. Just like Nora, other smallholder farmers throughout the country are facing similar struggles because of these changes. But unlike her, many men and women within farms lack the power to decide how to cope and adapt, and some don´t even have the right to take part in how those decisions are made.

This research explores how global climate change is perceived and experienced in the everyday lives of men and women who rely on smallholder farming in Costa Rica, with a particular focus upon the role of gender in structuring social differences in vulnerabilities, adaptation capacities, and resilience.

Over the last few decades research on climate change has increased and expanded over diverse fields of study providing stronger evidence of how human activities are causing changes in the Earth´s climate and its economic, social, and political implications (IPCC, 2014). According to the fifth report by the Intergovernmental Panel on Climate Change (IPCC), climate change is “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes

in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer" (2014, p.120).

This phenomenon has become a threat to the livelihoods of many smallholder farms around the world and it poses new challenges. According to Thomas & Twyman (2005), agriculture is the activity most likely to suffer the negative impacts of climate change in tropical and subtropical regions, which is where Costa Rica is located. This country has two climate regimes with distinct climate patterns: one on the Pacific and one on the Caribbean side. The El Niño-Southern Oscillation phenomenon (ENSO), which is responsible for climate variability in the region, is becoming much more intense and frequent with climate change, producing more extreme climate events in both regimes of the country (Alfaro & Amador, 1997; Guzman, 2009). In Costa Rica, 40% of the rural population over 15 years old is dedicated to agricultural production and it constitutes the main source of income for the less educated section of the population (Bouroncle et al, 2014). These are the social sectors that face a greater risk of an economic setback due to an increasingly variable climate that affects their crops and impacts their livelihoods (Chacón, 2014). Also, climate change repercussions in the production of basic crops, such as rice, beans, and corn, put strains on food security at a household and national level (Ministerio de Ambiente y Energía. Instituto Meteorológico Nacional, 2014). Thus, with climate change, the peasant sector sees enhanced their already existing social and economic vulnerabilities, reducing their capacity to adapt.

Most of the farms in this country are smallholder, family-owned farms, that rely on agriculture to subsist (Ruben & Sáenz, 2008). In these farms, productive and reproductive labor[1] converge in the same space and they tend to be organized based on gender (Ravazi, 2009). Gender understood as a "constitutive element of social relationships based on perceived differences between the sexes,

[1] Ravazi (2009) refers to productive labor as "commodity-producing labor" (p.205) and reproductive labor as unpaid work, comprising of domestic and care work.

and … a primary way of signifying relationships of power" (Scott, 1986, pág. 1067), influences how labors, particularly agricultural rights and responsibilities, are allocated and negotiated between members (Rocheleau, Thomas-Slayter, & Wangari, 1996). As a result of their power relations, members are bound to perform distinct embodied practices and differ on their right to take part in decision-making processes, which produces their differentiated climate change experiences. In this research, I explore men's and women´s lived experiences of climate change, particularly how vulnerabilities, adaptation capacities, and resilience are constructed differently and relationally in farms managed by men compared to those managed by women. Also, gender viewed as a structure that operates at the individual, interactional and institutional scales, allows to grasp how these scales influence each other and how gender intersects with other structures such as class, age, and disability (Risman, 2017).

The questions that this research seeks to answer are the following: How does the gender structure at the individual, interactional and institutional levels influence intra-household dynamics in smallholder farms managed by men compared to those managed by women, including the distribution of productive and reproductive labor? How do intra-household dynamics in smallholder farms managed by men and by women produce different climate change perceptions, as well as social constructions of vulnerabilities, adaptive capacities, and resilience to climate change?

Through the analysis of intrahousehold dynamics, in this research, I argue that households´ vulnerabilities, adaptation capacities, and resilience, as well as that of its members, are constructed differently, but relationally, because of gender and how it intersects with other structures. First, I show that male, female and co-managed farms display different power configurations that result in a distinct division of labor, which is best observed in the allocation of agricultural rights and

responsibilities. Although most farms are owned and managed by men due to gender-neutral policies and gender norms, land tenure provides women with a greater fallback position and stronger bargaining power to negotiate their land user rights and assume the farm´s management. So, they become the main decision-makers and, consequently, challenge the gender order on the farm.

Due to these distinct power configurations, I sustain that member´s vulnerabilities within these households are constructed differently. For instance, male and female managers are the least vulnerable to climate change because of their decision-making power and control of the farm. They also have the last word in the adaptations used, so the adaptations implemented in male, female and co-managed farms tend to vary. Shaped by the external resources available to them in their locality, their adaptations reflect the situatedness and subjectivity of the farm manager(s).

As for other household members, their vulnerabilities may increase when they face an inability to take to part in negotiations and decision-making (Katz, 1997) because they are unable to share their needs and opinions through which to influence climate change-related choices. In turn, it also limits the farm´s adaptation capacity and possibility to build resilience. On the contrary, households in which all members take part in negotiations and practice an egalitarian style of decision-making, reduce each member´s vulnerabilities, while also increasing these farm's adaptation capacities and their possibility to build resilience.

1. Global climate change and Costa Rica´s climate governance

1.1 Global climate change and its local manifestations

The fifth IPCC report highlights that Latin America has been experiencing rare extreme weather events; an increase in precipitation in certain regions, while in others there has been a decrease; warming temperatures, and acceleration of sea-level rise (Marengo et al, 2014). In Cen-

tral America particularly there has been a trend in decreasing annual rainfalls and warmer temperatures (Marengo et al, 2014). Future projections estimate that temperatures will continue to rise, as well as the frequency of rainfall anomalies in this tropical region (Marengo et al, 2014). However, the magnitude of the effects not only depend on these climate stressors but other non-climatic stressors as well, like socioeconomic conditions and natural resource management; thus, the conjunction of these different factors may increase the vulnerability of some countries and social groups due to the unequal access to resources and their low capacity to cope with changes (Marengo et al, 2014).

Costa Rica, along with the rest of Central America, has been deemed as the climate change "hot spot" of the tropical region, because of the reduction in rainfall patterns during the dry season (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012). However, historical data shows that the country´s climate is not homogenous, so while in some parts there is less rainfall, in others there can be an increase (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012). Higher-resolution projections show with more precision than in the Caribbean side there is likely to be an increase in rainfall, especially in the South, while in the Pacific and the Central Valley there will be a decrease (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012). Also, it shows that despite what global projections see as a generalized trend towards a decrease in rainfall patterns during the dry season, in the Caribbean there will be an increase in precipitation during the summer (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012). Henceforth, the climate variability of the country restricts climate projections from being able to establish with certainty future rainfall trends (Ministerio de Ambiente,

Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012). In what global and country projections coincide is that temperatures will increase even more in the future, but country projections show that the Pacific will experience a higher rise than the Caribbean side (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012).

1.2 Agriculture and peasants in the context of climate change

One of the economic activities that are said to experience more negative impacts due to climate change in agriculture and, consequently, resource-dependent societies (Tol, Downing, Kuik, & Smith, 2004; Thomas & Twyman, 2005; Carr & Thompson, 2014; Howden et al, 2007) as well as social groups who are dependent directly on natural resources for their livelihoods. Peasants, for example, are said to have a greater vulnerability because agriculture is highly sensitive to climate variations (Morton, 2007; Gutierrez & Espinoza, 2010). Eakin (2005) argues that agriculture in countries located in tropical and subtropical regions, like those in Central America, is more vulnerable. Hanna et al (2017) and Donnati et al (2019) concur that Central America will suffer due to the consequences of rising temperatures on crops and it is mainly smallholder farms that are the most vulnerable because of their high dependence on food systems for their survival. I consider that Costa Rica is an example of a natural resource-dependent society because agriculture constitutes an important economic activity and there is still a large sector of the rural population that depends on this means of production to sustain their livelihoods (Chacón, 2014). Costa Rica´s farmers, especially those who work in smallholder farms and rely on their production for economic stability, may be more vulnerable as their crops can falter with climatic variability.

1.3 Costa Rica´s climate governance

Due to the increasing menace that climate change represents, Costa Rica has taken the opportunity to promote its image of a green economy and sustain its environmental leadership

through its climate governance. Focused mainly on mitigation, rather than adaptation, the environmental agenda follows the neoliberal orientation that the country, in general, has been following since the 1980s (Herrera-Rodriguez, 2013), by tackling climate change through market-based mechanisms to achieve carbon neutrality (Fletcher, 2013).

Not always considered an environmental leader, Costa Rica before the 1990s faced accelerated deforestation due to agricultural expansion that left less than 25% of the forest in the country (Fletcher, 2013). However, in the mid-1980s inspired by the sustainable development framework proposed by the World Commission on Environment and Development of the United Nations (Herrera-Rodriguez, 2013), but also due to the external influence from the United Sate´s World Wildlife Fund (Isla, 2016), the country took a turn towards the implementation of a neoliberal sustainable development agenda (Herrera-Rodriguez, 2013). Thus, converting Costa Rica into "the first green project of neoliberalism" (Isla, 2016, p.22). Since then, sustainability has been used as a banner to impulse economic growth with the promotion of a new image of environmental friendliness and conservation that has helped to market the country to investors and tourism (Herrera-Rodriguez, 2013). Costa Rica has sought to position itself internationally as a model and leader in environmental sustainability. Among its achievements are the creation of an extensive National Park Service and the implementation of a Payment for Environmental Services (PSA) program, which has been successful at recovering and protecting forests (Fletcher, 2013); yet, the reality is that the country still faces many environmental, social and political problems and challenges, that doesn´t add up to its reputation and that holds it back from effectively concretizing the image it seeks to project (Herrera-Rodriguez, 2013).

The country´s climate change governance has followed this same neoliberal logic. Since 2007 under the leadership of Oscar Arias, Costa Rica vouched to achieve carbon neutrality by

2021 (Fletcher, 2013). Since then, the country´s efforts and resources have been directed at climate change mitigation[2] through market-led solutions to solve the climate crisis, such as PES, REDD+, the carbon-neutral brand, among other initiatives (Fletcher, 2013). Once again, Costa Rica has managed to get international recognition for its efforts on mitigation, which has also helped conceal its slower progress on climate adaptation. Relegated to a secondary level of importance, adaptation has been given less attention and consideration by past governments (Vignola, Otárola, & Trevejo, 2014; CGIAR/CCAFS, 2014; Álvarez-Vergnani, 2015). The agricultural sector serves as an example because although agriculture has been pointed out as one of the activities vulnerable to climate change in several official documents and the necessity for its adaptation has been recognized (Ministerio de Ambiente y Energía, 2000; Ministerio de Ambiente y Energía, 2014; Ministerio de Ambiente, Energía y Telecomunicaciones, 2009), less progress has been made compared to mitigation efforts (CGIAR/CCAFS, 2014). As for gender, it has barely been mentioned in climate change official documents before the first National Adaptation Policy drafted for the period 2018- 2030 under the present government of President Carlos Alvarado (Gobierno de Costa Rica, 2018). In this document, gender is mentioned as one of the main theoretical stances and how it can shape climate change vulnerabilities. Thus, it promotes climate change adaptations that take into consideration gender equity. However, it is still too early to assess the impacts and reach of this policy.

2. Feminist political ecology and climate change

Feminist political ecology is concerned with how environmental rights, responsibilities, knowledge, and movements are structured by interrelations of gender, class, race, ethnicity, and

[2] "A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)" (IPCC, 2014, pág. 125)

sexuality (Rocheleau & Nirmal, 2015). It constitutes a field of research that surged in the 1990s, that integrated scholars from diverse fields of study, theoretical approaches, and different interests ranging from the environment, development, agriculture, and gender (Rocheleau & Nirmal, 2015). As a branch of political ecology, which focuses on how issues of justice and power mediate the relations of humans with their environment and other species, feminist political ecology is particularly concerned with power relations, especially focused on gender, and how these relations structure the use and control of environmental resources (Rocheleau & Nirmal, 2015). By also drawing from feminist epistemologies and theories, feminist political ecology seeks to understand the relations, experiences, and knowledge that different men and women have of their environment (Rocheleau & Nirmal, 2015), but also how these relations are changed in the context of environmental changes (Elmhirst & Resurrección, 2008). The interaction between social and environmental systems are studied through the links of local issues with broader economic and political contextual conditions; it seeks to connect various analytical scales as a means to explain how gender structures different levels of environmental governance and management, such as institutions, policies and household relations (Elmhirst & Resurrección, 2008).

There has been a growing body of literature that calls for the use of feminist political ecology to study how climate change impacts and responses are structured by the intersections of gender, race, class, and other categories, as well as how these power structures operate at different interconnected scales configuring different experiences of climate change (Tschakert, 2012; Gonda, 2016; Gurung, Bhushan, & Larrington-Spencer, 2019; Hackfort & Burchardt, 2016; Mukoni, 2013; Perez et al, 2015; Resurreccion, 2017; Sultana, 2014, Rocheleau & Nirmal, 2015). Positioned within this theoretical approach, in this research I conduct a feminist political ecology that seeks to connect different scales in which the gender structure operates, inflecting the construction

of gendered climate change vulnerabilities, adaptation capacities, and resilience. I focus mainly on how the gender structure inflects intrahousehold dynamics that shape the gendered construction of vulnerabilities, adaptive capacities, and resilience. I also recognize how these smallholder farms are embedded in broader political, social, and economic contexts, where institutional practices and policies that are also shaped by the gender structure, influence the gendered lived experiences of climate change within these farms.

3. The country´s agrarian background and its present welfare-neoliberal governance

Costa Rica has often been described as a story of success and exceptionalism compared to other countries of Central America (Sandbrook, Edelman, Heller, & Teichman, 2006; Lehoucq, 2010; Marois, 2005; Botella, 2012). A combination of historical particularities and a strong welfare state in the XX century led this country to achieve social and economic progress that enabled positive indicators of social equality (Sojo, 2010) and its classification as a high development country (UNDP, 2020). However, Costa Rica´s success is a legacy of the past, since recently its longtime achievements have been declining and social inequality has been increasing since the turn to neoliberalism[3] in the 1980s (Sojo, 2010). Nonetheless, some reformed expressions of the welfare state have managed to linger and adapt to neoliberalism (Sandbrook, Edelman, Heller, & Teichman, 2006), as neoliberal restructuring has been pursued without sacrificing social welfare institutions at the rate or extent of other countries (Botella, 2012) (Fletcher, 2013), but still, public institutions and social solidarity have been deteriorating.

[3] Marois (2005) explains that neoliberalism has often been defined as "a core set of ahistorical neoclassical economic policies that are often cited as the Washington consensus" (p. 2), but the author proposes a more complex definition: "a historical, class-based ideology that proposes all social, political, and ecological problems can be resolved through more direct free market exposure, which has become an increasingly structural aspect of capitalism" (p.2).

The country´s exceptionalism has historical roots, part of which goes back to its beginning as an agrarian economy. After Costa Rica´s independence from Spain in the 19th century, coffee production became the main economic activity. This activity was highly concentrated in the Central Valley, where powerful elites and poorer sectors coexisted (Edelman, 2019). At that time, land in the central valley was vast and accessible, and the population was rather small; hence, a large sector was able to engage in coffee production and benefit from its revenues (Fernandez, 1989) (Edelman, 2019). Both rich and poor shared their hopes on coffee export (Edelman, 2019). Although political power was disputed among the groups that made up the oligarchy (Cob, 1996), there was a sense of commonality among the Central Valley peasants that became a precedent for the establishment of democracy years before its formal constitution (Edelman, 2019). Formal democracy is said to have begun in 1889 when Costa Rica´s leaders began to be chosen in election processes, which helped to institutionalize democracy and keep social stability (Edelman, 2019).

During the first decades of the XXth century, the state assumed a significant role in the appropriation and distribution of land for production purposes, marking the start of the state´s intervention in economic affairs that continued to deepen in the upcoming decades (Edelman, 2019). By the middle of the XXth century, a series of social policies were instituted, which became the pillars of the welfare state that lasted around 30 years giving way to what is known as the "golden age" (Sandbrook, Edelman, Heller, & Teichman, 2006). Universal access to health, education, and social security were among the first policies (Vunderink, 1989). The state continued to expand its role in the economy and social policies, creating a diversity of public institutions, among which it is important to mention the creation of the Institute of Land and Colonization (ITCO)[4],

[4] ITCO later transformed into the Institute of Agrarian Development (IDA) in 1982 (Alonzo, Saenz, & Le Coq, 2011) and more recently into the National Institute of Rural Development (INDER).

the National Institute for Learning (INA), and the current Ministry of Agriculture[5] in the 1960s (Edelman, 2019; Alonzo, Saenz, & Le Coq, 2011). In the agricultural sector, the state promoted rural development by seeking to strengthen family agriculture through land distribution, the offer of credits, the founding of cooperatives, and modernization of agriculture (Mora, 1989); (Mora, 1997). For example, between 1963 and 1984 the number of small farms doubled thanks to the state land distribution policies (Mora, 1997).

The model of Import Substitution Industrialization the country adopted in the 60s and 70s, characterized for its high state intervention and focused on the Central American Common Market, led to rapid economic growth (Botella, 2012). With it, the agricultural sector further developed by becoming more dynamic and complex (Mora, 1997). Edelman (2019) points out that by the late 1970s agricultural producers had access to land, subsidized financial resources, low-cost inputs, and technical assistance thanks to governmental institutions. Plus, they were able to sell their produce at high prices from the Center for Production (CNP), while also being able to buy low-priced food to the same institution. Although these services were not exempt from problems, agricultural producers and society, in general, benefited from these welfare institutions and programs. Because of them, alongside economic growth, Costa Rica was able to improve the quality of life of its population, including the peasantry (Vunderink, 1989).

However, these idyllic conditions came to an end due to the external debt crisis at the end of the 70s, which destabilized the country's economy (Edelman, 2019). It caused high levels of inflation, a decrease in the GDP, monetary devaluation, higher levels of unemployment, and export reductions, all of which obliged the country to accept international loans by the United States and later the International Monetary Fund (IMF) to face the crisis, but at the cost of promising to adopt

[5] In 1942 the Secretary of Agriculture was founded and in 1949, with the new constitution, it became the Ministry of Agriculture and Industry (Alonzo, Saenz y Le Coq, 2011)

certain restructurings (Cob, 1996; Marois, 2005). These restructurings are considered the start of a new era centered on neoliberal policies that sought to reduce the state´s economic and social interventions based on the ideology that the market can solve all economic, social, and environmental problems (Marois, 2005). This transformation implied reducing the state´s size, cutting back on programs, diminishing or transferring responsibilities, privatization, among other conditions (Cob, 1996; Marois, 2005). For agriculture, it meant reducing agricultural policies, the offer of credits, technical assistance, and state-led commercialization (Angulo, 2008). For example, the expenses of the Ministry of Agriculture were cut by 65% between 1979 and 1988 (Botella, 2012). Also, within this new policy framework, producers were incentivized to move away from the production of traditional goods for internal consumption (corn, rice, beans) to products for export and, at the same time, diversify these to include other non-traditional exporting goods (pineapple, heart of palm, ornamental plants, etc) besides the traditional ones (coffee, bananas, sugar cane and others), to adjust to the international demand and contribute to Costa Rica´s economic openness (Mora,1989; Botella, 2012). For this reason, the state removed subsidies and incentives to all traditional products, those for export and local consumption, while also allowing the import of these products with lower taxes (Botella, 2012; Angulo, 2008). Plus, it created incentives and tax reductions for those willing to produce non-traditional exporting goods (Mora, 1989). Meanwhile, during this same period, the organic agricultural movement started to emerge (Aistara, 2018; Sáenz, Le Coq, & Bonin, 2017), becoming a resistance movement and placing "agroecology as an alternative to free trade" and conventional agriculture (Aistara, 2018, pág. 32).

Pursuing the neoliberal agenda had negative consequences for the peasantry. Smallholder producers, especially those that produce traditional products, have seen their living conditions worsen in recent decades as they have not been able to successfully adjust to the new economic model,

while larger agricultural producers have been able to benefit from the open market (Angulo, 2008; Botella, 2012). Large sectors of the peasantry experienced an important deterioration of their living standards, as well as political exclusion (Vunderink, 1989). They are considered "losers" in this new development model as they have not been able to benefit from neoliberal policies (Programa Estado de la Nación, 2009). Among smallholder producers, women are likely to be the most disadvantaged, because they always faced greater restrictions to access land, credits, technical assistance, and other resources (Fundación Arias para la Paz y el Progreso Humano, 1992).

Despite the consequences, neoliberal policies had for this and other social sectors, Sandbrook et al (2007) argue that Costa Rica´s shift to neoliberalism has been more gradual and less conflictive than in other countries, partly because of the state's historical role in welfare. They sustain that Costa Rica has managed to keep part of the welfare state through reforms that fit the neoliberal agenda; thus, the result is a hybrid development model that is reflective of the constant tensions between the welfare state and market forces (Sandbrook, Edelman, Heller, & Teichman, 2006). For the agricultural sector, Sáenz, Le Coq, & Bonin (2017) argue that the welfare state disappeared when neoliberal policies were instituted; yet I concur with Babin (2020) that for some agricultural sectors the state´s ongoing interventions are vital to helping them survive neoliberalism. Thus, some sectors and places continue to have the state´s support, while others are left on their own or at the mercy of other actors. For this reason, I sustain that the different expressions of governance within the agricultural sector are a good example of the "hybrid neoliberal-welfare state structure" (Fletcher, 2013, p. 156) the country has at present. Along with the present research, readers will become aware of how the neoliberal-welfare state structure is expressed differently in each locality, which has implications on how gendered vulnerabilities, adaptation capacities, and resilience are constructed in each place.

3.1 An agrarian history that omitted women and gender:

It is important to highlight that the official history of Costa Rica´s peasantry has an important gender gap. Research on women´s participation in agriculture and their role within family smallholder farms during the XIX and first half of the XX century is nonexistent. The oldest information found refers to the 1970s and it asserts that statistics show very limited participation of women (Ramirez, 1985), which is congruent with Deere & León´s (2004) claim that agricultural labor was considered a male occupation in Latin America. The same agrarian census and statistical records throughout the region have contributed to sustaining this notion by not adequately capturing sex-disaggregated information (Deere, 2012). Even now there is an important gap around land tenure and control (Deere, 2012). In Costa Rica, Martín, Román, & Lara (1996) and Guzman (1991) argue that statistics don´t truly reflect the participation of women in agriculture, which means that there might have always been an under-reporting of women´s participation in this activity.

The lack of information from different periods restricts knowing if women have always participated in this labor and if so, how this participation has changed over the years. I can only suppose that the creation of the Law "Igualdad Real" (Real Equality) in 1990 represents a tipping point that led to an increase in women as landowners and farm managers because this law stopped assigning men automatically as the head of the family production unit (as it was done previously) and began recognizing women as co-owners when they were married or cohabitating; thus acquiring legally the rights to 50% of the land (Fuentes, Medina, & Coronado, 2010). At present there are statistics from the last agricultural census of 2014 that showed that 84.4% of producers are men and 15.6% are women (Instituto de Estadística y Censo, 2015), yet it is unclear what the category of producers means and if it can be equated to farm management and decision making. For this reason, it becomes important to explore how land tenure and farm management are currently allocated according to gender and compare the intrahousehold dynamics of male and female-headed

farms to acknowledge the different labors and responsibilities that women, as well as men, perform in these farms.

4. Dissertation Outline

The thesis is organized into eight subsequent chapters. In the next chapter, I review the main discussions in the literature on climate change, feminist household economics, and family farms and I propose a theoretical framework that combines elements of these three bodies of literature to fill the gap that exists for research on vulnerabilities, adaptation, and resilience that takes into consideration intrahousehold power dynamics (Djoudi et al, 2016). In chapter three I explain the research methodology, which is based on qualitative methods and data gathering techniques.

Starting with the fourth chapter, I present the results and analysis of my fieldwork. Chapter four shows that the gender order in farming can be challenged due to land tenure as it is a significant resource that allows women to undertake the management of the farm. For this reason, male, female and co-managed farms present a different division of labor, particularly evident in the distribution of environmental rights and responsibilities; yet the gender order is not completely challenged because women in all farms continue to assume domestic and care labors. In chapter five I focus on climate change perceptions. I expose participants´ observations of climate change manifestations, which revolve around temperature changes, imprecise seasons, and erratic rainfall patterns, as well as the different impacts these manifestations have on agricultural labor and crops. Chapter six reveals that these climate stressors, together with other non-climatic stressors, produce smallholder farms´ climate change vulnerabilities. Also, it explores how vulnerabilities are constructed differently and relationally for household members due to institutional resources and intrahousehold power dynamics which enable or restrict members from taking part in negotiations on how to respond to climate change. Chapter seven delves into smallholder farms´ adaptation

capacities, exposing that adaptations tend to be different among male, female, and co-managed farms because they reflect on the subjectivity and situatedness of the manager, who has the last word in those decisions. In chapter eight I argue that resilience is about adaptation strategies that manage to strengthen socio-ecological systems in face of climate change. I sustain that only sustainable adaptations that simultaneously seek environmental integrity and social justice can foster resilience, so the chapter draws from the stories of those farms/households that have managed to develop resilience through their sustainable adaptations. Finally, in chapter nine I develop the concluding remarks where I reflect upon how broader political, economic, and social contexts, particularly institutional practices and resources, contribute to the gendered construction of vulnerabilities, adaptation capacities, and resilience in each locality. I also return to the importance of land tenure as a key resource that reduces male and female managers´ vulnerabilities and how power relations can increase or diminish other member´s vulnerabilities depending on their right to take part in negotiations, which also has implications for the adaptation capacities of farms and their resilience.

CHAPTER 2 - LITERATURE REVIEW AND THEORETICAL FRAMEWORK

1. Introduction

This research locates in the intersection of three bodies of literature: 1) the literature that addresses the social implications of climate change by studying vulnerabilities, resilience, and adaptation, 2) literature on feminist intra-household economics, 3) rural and agrarian literature on farming and family farms viewed from a gendered lens. In the first part of this chapter, I will briefly go over these three fields of study. First, I will focus on the literature on climate change vulnerabilities, adaptation, and resilience, particularly the one centered on farming and gender. These studies delve into the social dimensions of climate change because vulnerability studies try to focus on the reasons behind the uneven distribution of climate change impacts and how populations are differently affected. Yet, resilience studies evidence that in many cases, despite their vulnerabilities, people have other strengths that enable them to adapt successfully to changes. Studies on adaptation focus on what shapes people´s capacities to adapt and the adaptations they implement to adjust to these changes. In the next sub-section, I review some of the literature on feminist household economics, especially bargaining approaches that help comprehend decision making and gender inequalities within the household. Lastly, I discuss the rural and agrarian literature on farming and family farms from a gender lens. This literature shows through bargaining approaches that men or women´s ownership of assets can strengthen their bargaining power, producing different outcomes, as well as how hegemonic femininities and masculinities operate through the different roles men and women perform within the farm/household, especially evidencing women's involvement in the production process, and the different gender identities that are performed in the rural setting.

Given that research shows that climate change is not gender neutral (MacGregor, 2010; Sultana, 2014), in the second part of this chapter I develop my theoretical approach that draws on feminist epistemologies like feminist phenomenology and situated knowledge, plus feminist theories such as feminist political ecology and bargaining approaches from feminist economics, to comprehend how gender intersects with other categories, such as class, place, and age in the construction of climate change vulnerabilities, adaptation, and resilience in smallholder farms.

Feminist political ecology sustains that power relations and a gendered division of labor produce differences in the way the environment is experienced by men and women, as well as in the responsibilities and interests towards it, which depend on the social constructions of gender that tend to vary depending on class, culture, race, and place (Rocheleau, Thomas-Slayter, & Wangari, 1996; Elmhirst, 2015; Mollet & Faria, 2013). Along this line, I will argue that to understand the gendered division of labor in a farm, particularly the allocation of environmental rights and responsibilities, it is important to analyze the power relations of individuals who are situated differently along with gender and other structures. Consequently, the rights and responsibilities allocated to each member shape their climate change experience, as it is grounded on their socially situated bodies and everyday practices (Qvotrup & Elg, 2010; Kaijser & Kronsell, 2014; Tschakert & Machado, 2012). As Sultana (2014) points out "Men and women experience, understand and adapt to climate change in different ways…" (p. 373) so they "have differentiated vulnerabilities and therefore respond to and cope with vulnerabilities in different ways across social categories" (Sultana, 2014, p. 377). Consequently, there are gender differences in how we experience and relate to the climate and its changes and how we respond to it (Sultana, 2014; MacGregor, 2010), resulting in gendered lived experiences of climate change.

I draw from Abbot and Wilson´s (2015) concept of lived experience, which gives rise to "experiential knowledge" that surges from "a social process which evolves over time arising from the specific historical, economic and social context of which we are creatures" (p. 32). By analyzing the lived experiences of climate change we can understand this phenomenon from the point of view of individuals; one that enables us to connect the interplay between societal power structures and agency in shaping individuals´ climate change understandings. I agree with Abbot and Wilson (2015) when they argue that "subject expertise provides different angles and perspectives, different understandings if you like, of climate change" (p. 58). Thus, by studying lived experiences it is possible to grasp commonalities that speak about larger social structures and how they configure individual action, and also how they are challenged by it (Abbott & Wilson, 2015). Lived experiences don´t occur in isolation, rather making sense of this phenomenon is done in engagement with others. How people react in response to what they observe, and how they prepare in face of what they believe are future climate change risks, are molded by their social relations, while being embedded in broader political and economic contexts that shape their lived experience (Abbott & Wilson, 2015).

2. Literature review

2.1 Climate change vulnerabilities, resilience, and adaptation

Scholars have shown that environmental problems, such as climate change, are simultaneously social problems because they raise social and political questions on environmental justice and equity at global and local scales (Beck, 2010; Terry, 2009; Denton, 2002; Thomas & Twyman, 2005; Marino & Ribot, 2012). In this sense, climate change impacts might be felt globally, yet the most negatively impacted are likely going to be the marginalized and poorer social groups (Adger et al,

2003; Tol, Downing, Kuik, & Smith, 2004; Otto et al, 2017), further increasing global and local social inequalities (Beck, 2010).

Vulnerability studies have become an important area of research that address the distribution and experience of climate change impacts among ecological systems and social groups (Adger, 2006; Ford et al, 2010; O´Brien et al, 2007; Smit & Wandel, 2006; Füssel & Klein, 2006; Otto et al, 2017). In the fifth report from the IPCC, vulnerability to climate change is defined as "The propensity or predisposition to be adversely affected" (2014, p. 128). A broader definition is given by Ford et al (2010) who explain that vulnerability is the "susceptibility to harm in a system in response to a stimulus or stimuli" (p.4) which in the case of climate change "the stimulus or stimuli are environmental-related risks and the system can range from an individual or household unit to the nation-state" (p. 4). Hence, vulnerability research seeks to understand "who and what is at risk to climate change, and why…" (Ford et al, 2010, p.4). For O´Brien et al (2007) there are two different ways in which vulnerability has been framed. On one hand, the "outcome vulnerability" perspective "is considered a linear result of the projected impacts of climate change on a particular exposure unit" (p. 75). This can be considered the scientific framing since the main interest is to measure by quantifiable means the negative impact climate change has over an exposure unit and how the outcome is the creation of vulnerability. While these studies are important to understand climate variability and the biophysical aspects of it, they are criticized because they leave out human dimensions (Ford et al, 2010). On the other hand, "contextual vulnerability" is "based on a processual and multidimensional view of climate-society interactions" (O´Brien et al, 2007, p. 76). This perspective is considered the human security framing since vulnerability is seen as the starting point, which is not only determined by biophysical conditions but also by social conditions.

Research on climate change vulnerabilities highlights how natural resource-dependent societies, as well as social groups who directly depend on natural resources for their livelihoods, such as peasants, are more likely to suffer its negative impacts (Tol, Downing, Kuik, & Smith, 2004; Thomas & Twyman, 2005; Carr & Thompson, 2014; Howden et al, 2007; Morton, 2007; Gutierrez & Espinoza, 2010; Carazo, 2013; Eakin, 2005). For example, research done on the vulnerability of farmers in Australia (Nelson et al, 2010), Madagascar (Harvey et al, 2014), Ghana (Kwadwo & Asantewaa, 2016), and Mexico (Eakin, 2005) provides evidence of the diverse climate-related risks faced by farmers. These studies seek to identify how vulnerability is constructed for farmers by showing how non-climatic stressors (such as poverty, lack of resources or access to credit, difficult market access, and others) combined with climatic stresses and low adaptive capacity develops into a greater vulnerability to climate change. In Costa Rica, there are also a few studies that researched climate change vulnerability from a social perspective by focusing on individuals or communities and their social capitals and livelihoods (Chalapuente, 2012; Martín, 2016; Guallpa, 2015; Leguía, Rapidel, Somarriba, & Ordoñez, 2014; Warner, Kuzdas, Yglesias, & Childers, 2015; Warner, Childers, Kuzdas, & Stocks, 2018; Soto, 2016; Crowe, van Wendel, & Wesseling, 2009).

Another important area of research within the climate change literature is the one focused on adaptation. According to Ford et al (2010) adaptation comprises "the actions taken to reduce or moderate or adjust to the expected or actual negative effects of climate change and take advantage of new opportunities" (p. 2). It can take many forms, so it is classified according to "timing relative to stimulus (anticipatory, concurrent, reactive), intent (autonomous, planned), spatial scope (local, widespread) and form (technological, behavioral, financial, institutional, informational)" (Smit and Wandel, 2006, p. 288).

A more comprehensive view of climate adaptation is provided by Eriksen et al (2015) who argue that adaptation is a political and contested process "wherein social and political relations shape the simultaneous management of diverse changes, many of which are not driven directly or consciously by climate change" (p. 524). Hence, adaptation is not only about technical measures or strategies, nor only about environmental change, it is also about the social and political dynamics that shape the adaptation process. From this perspective, adaptation must deal with power relations, resource distribution, governance, knowledge, and subjectivities since empirical evidence has shown that what constitutes beneficial adaption for some, might have negative consequences for others. So, adaptation and maladaptation can be simultaneous processes for different groups (Eriksen, Nightingale, & Eakin, 2015). Within a similar line of thought, Adger et al (2003) point out that adaptation involves decision making, so it is important to ask who is making those decisions, who are the different stakeholders involved, and what are their interests since these decisions "are embedded in social processes that reflect the relationship between individuals, their networks, capabilities and social capital, and the state" (p. 186).

Related to adaptation is the notion of adaptation capacity, which is "a vector of resources and assets that represents the asset base from which adaptation actions and investments can be made" (Vincent, 2007, p.13). Like vulnerability, adaptive capacity can be influenced by diverse factors that interact with each other. According to Smit and Wandel (2006), some of these factors can be "managerial ability, access to financial, technological and information resources, infrastructure, the institutional environment within which adaptations occur, political influence, kinship networks, etc" (p. 287). Access to these resources and assets is likely to result in a higher adaptive capacity.

Empirical research on adaptation carried in European farms (Reidsma et al, 2010), Senegal (Mertz et al, 2009), Ethiopia (Gebrehiwot & van der Veen, 2013), Uganda (Berman, Quinn, & Paavola, 2014), the Himalayas (Macchi, Manandhar, & Hoermann, 2015), Burkina Faso (Zámpaligre, Hippolyte, & Schlecht, 2014) and Central America (Harvey et al, 2017), for example, expose how climate-related risks create new adaptation needs between farmers and, in some cases, how farmer´s adaptive capacity is used to implement adaptation measures to manage risks. In Costa Rica, the studies by Soto (2016), Guallpa (2015), Martín (2016), Warner, Childers, Kuzdas, and Stocks (2018), Warner, Kuzdas, Yglesias and Childers (2015), Montero, Araya, Rojas, and Rueda (2016), Guerra (2014) and Leguía, Rapidel, Somarriba and Ordoñez (2014) researched the adaptation strategies being implemented by different farmers and communities throughout the country, evidencing that adaptation not only relies on the crops but also on the capacities individuals have to respond, their socio-economic conditions, institutional resources, and other factors.

That last significant body of literature on climate change is the one that revolves around resilience. There is an ongoing debate about the definition and applicability of the term resilience to social systems because it has been used in different fields ranging from the natural sciences to psychology (Adger,2000; Cote & Nightingale, 2012; Brown, 2016; Lorenz, 2013). Among its original definitions, in the field of engineering it was understood as the ability of a system to bounce back after a disturbance and in the field of ecology as the capacity to absorb changes without transforming its identity (Cretney, 2014; Joakim, Mortsch, & Oulahen, 2015). However, these notions have been criticized for not fitting social systems, because the complexity of these systems constrains the possibility of returning to an original or stable state, and in some cases, the previous state might be unfavorable or negative (Cretney, 2014; Lorenz, 2013). Because of these difficul-

ties, the resilience framework evolved to consider the integration of society and ecology as a unified system (SES) (Keck & Sakdapolrak, 2013). From this perspective, resilience is referred to as a process through which a (social-ecological) system is able to absorb disturbances and evolve to endure them, while it continues to function (Ingalls & Stedman, 2016; Folke et al, 2010). Resilience is not about returning to a previous state, but it is based on the capacity of a system to change and adjust in the face of adversity without completely changing; hence, within the climate change literature adaptation and the capacity to adapt became an integral part of resilience (Keck & Sakdapolrak, 2013). Along these lines, the IPCC defines it as "The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation" (2014, p. 127). Recent studies carried out in Zimbabwe (Jiri, Mafongoya, & Chivenge, 2017), Pakistan (Asif Ali Naqvi et al, 2020), Jamaica (Campbell, 2020), Iran (Keshavarz & Soltani, 2021), for example, take into consideration a variety of socio-economic characteristics of smallholder farms, as well as farming practices that inflect resilience to climate change.

Despite the growing acceptance of the SES approach to resilience, some authors have focused particularly on the social dimensions of resilience arguing that original frameworks have tended to neglect issues of power and agency (Keck & Sakdapolrak, 2013; Lorenz, 2013; Cote & Nightingale, 2012; Bunce & Ford, 2015; Olsson, Galaz, & Boonstra, 2014; Ingalls & Stedman, 2016; Leap, 2018), especially because there are systems whose functions might become stronger by sustaining inequalities and domination or by being harmful to others through maladaptive practices (Folke et al, 2010; Brown, 2016). New approaches seek to address the questions: resilience to what? and for whom? by capturing how the governance of environmental changes may sustain

power structures that favor the knowledge and agency of certain individuals over others (Cote & Nightingale, 2012; Cutter, 2016). To deal with power, Cote and Nightingale (2013) propose to think in terms of a "situated resilience", which means paying attention to how certain knowledge that stems from everyday experiences are the ones that guide decision making and action. These knowledges are rooted in particular standpoints, shaped by power structures and relations. Leap (2018) and Chaplin, Twigg, & Lovell (2019) suggest using an intersectional approach to comprehend the complexities behind resilience building, as it is the result of the intersection of different power structures that can empower and disempower simultaneously. As for agency, Davidson (2010) highlights that ecological approaches to resilience don´t consider the role of human agency, but from an SES approach, agency is a central component of how the social-ecological relations are shaped. He argues that, in crisis response, human agency is relevant because, among other things, it is unequally distributed due to power differences; it can be motivated by imagination and humans can act in anticipation of risks. Therefore, agency is fundamental to comprehend how resilience is built and who is able to effectively respond and adapt to climate change.

2.1.1. Gender and climate change

Empirical studies carried out in different places around the world have evidenced how gender influences the construction of vulnerabilities, resilience, and adaptation capacities (Djoudi & Brockhouse, 2011; Jabeen, 2014; Gonda, 2016; Buechler, 2009; Caretta & Börjeson, 2014; Murray et al, 2016; Ravera et al, 2016; Dowsley et al, 2010; Cohen et al, 2016; Bee, 2013; Gurung, Bhushan, & Larrington-Spencer, 2019; Azong, Kelso, & Naidoo, 2018; Assefa Mersha & Van Laerhoven, 2016; Ngigi, Mueller, & Birner, 2017; Perez et al, 2015). Research on climate change places gender as another social factor that may increase the susceptibility of certain groups to

suffer its impacts and that explain differences in how they respond and adapt (Huyer, 2016; Mujere, 2016; Agarwal, 2013). Most of this research has been centered on vulnerabilities and adaptation, while resilience has been scarcely addressed from a gendered perspective (Bunce & Ford, 2015; Ravera et al, 2016).

Along with the evolution of this body of literature that links climate change to gender, significant gaps and weaknesses have been identified. First of all, some generalize women´s vulnerability, particularly in poorer countries where women typically have less access to resources and constitute the poorer of the poor (Terry, 2009; Denton, 2002; Dankelman, 2002; Eastin, 2018; Gupta, 2015). I share Arora-Jonsoon´s (2011) argument that assuming that all women from the Global South are vulnerable, as some reports and documents assert, may be problematic, both because there is still insufficient empirical evidence to support this, and because it fails to fully acknowledge that women are a socially heterogeneous group that can have very different experiences and views around climate change. Plus, she argues that these generalizations inhibit the possibility of analyzing "the configuration of social relations of power in particular contexts or how the vulnerability is produced for other groups such as certain groups of men" (Arora-Jonsson, 2011, p.748). Bunce and Ford (2015) confirm that most literature on gender and climate change has focused on the gender binary failing to consider how gender intersects with other social differences based on class, age, race, and others, producing various identities and subjectivities that also shape the construction of vulnerabilities, resilience, and adaptation. Plus, most of it has been centered around women´s experience excluding men (Bunce & Ford, 2015). Sultana (2014) explains that gender´s intersection with other social categories is helpful to grasp different adaptive capacities and resilience among groups, so vulnerable men and women cannot be assumed to be

passive victims of climate change since they can be agents that cope with and adapt to changes (Arora-Jonsson, 2011).

To fill the existing gaps in the literature, it has been pointed out the need to use an intersectional and power-laden approach to better comprehend the gendered construction of vulnerabilities, resilience, and adaptation for differently situated men and women (Djoudi & Brockhouse, 2011; Bee, 2013; Gurung, Bhushan, & Larrington-Spencer, 2019; Hackfort & Burchardt, 2016; Thompson-Hall, Carr, & Pascual, 2016; Cote & Nightingale, 2012; Leap, 2018; Chaplin, Twigg, & Lovell, 2019; Kaijser & Kronsell, 2014) and to carry out this type of research focusing on intra-household dynamics (Djoudi et al, 2016). Empirical research suggests that already existing inequalities, such as those based on gender, race, age, class. and others, shape the propensity of certain populations to be adversely impacted by climate change (Marino & Ribot, 2012; Hackfort & Burchardt, 2016; Otto et al, 2017; Tschakert, 2012). However, the literature on resilience and adaption has highlighted that although some populations might be vulnerable because of the convergence of different factors, they can show the capacity to cope and adapt, demonstrating that they are not helpless victims (Smyth & Sweetman, 2015; Sultana, 2014; Ravera et al, 2016; Moosa & Tuana, 2014; Azong, Kelso, & Naidoo, 2018; Bee, 2013; Bee, 2014; Djoudi & Brockhouse, 2011; Berman, Quinn, & Paavola, 2014). For example, the study by Azog, Kelso, and Naidoo (2018) in Oku, Cameroon, found that certain factors may shape women´s vulnerabilities; yet some factors build their resilience, such as education, diversified livelihoods, collective organizations, and financial options. Another important study was done by Bee (2014) in Mexico where she found that women´s knowledge and lived experiences are valuable for food security and climate change adaptation. For example, in the context of draughts, women from two communities in Guanajuato gather quelites, which is a type of edible wild plant that serves to feed their families in times of

crisis. The study by Khapung (2016) in Nepal evidence that technical assistance and training on climate-smart agriculture can empower women and, consequently, increase their resilience. The study by Djoudi and Brockhaus (2011) in northern Mali, it shows that in face of environmental change women´s roles have been modified and their burden has increased within the communities, but the authors argue that in the long term these modifications could increase women´s adaptation capacity if they push for changes in their power relations and institutional arrangements that give them further control over resources.

2.2 Feminist household economics:

The first strand of neo-classical literature on household economics, which emerged from the 1950s until the 1980s, assumed the household as a unit composed of individuals with corresponding interests (Kabeer, 2005; Lundberg & Pollak, 1996; Mader & Schneebaum, 2013). According to this unitary approach, also named the common preference model or the New Home Economics (Katz, 1997), members pool together their utilities for the maximization of the household´s overall utility (Kabeer, 2005; Seiz, 1995; Mader & Schneebaum, 2013). This approach derives from the assumption that households work as a single decision-making unit that seeks its general welfare, so from this point of view it makes no difference who has control over resources (Kabeer, 2005). These economists were not interested in the decision-making process that takes place between household members, as long as the model proved effective at formulating predictions (Kabeer, 2005). However, empirically this first model fell short precisely for its assumptions, as it was not able to predict and explain diverse real-life situations, such as gendered preferences and inequalities (Katz, 1997), or why income and resources at the hands of men and women have very different outcomes (Kabeer, 2005; Lundberg & Pollak, 1996). Feminists particularly criticize that this model was based on the nuclear, heterosexual household, that assumes a gender division

of labor based on traditional gender roles (Bergerson, 2010), overlooking gender power relations and conflict (Katz, 1997), as well as other family structures (Bergerson, 2010).

Soon after, new alternative models emerged. Collective models are also within neo-classical economics, but contrary to the unitary model, do not assume that household members always have the same interests, nor the intention to pool together their utilities (Mader & Schneebaum, 2013). It considers that individuals are not always in the disposition to cooperate, so they may be faced with disagreement and conflict (Holvoet, 2005). The most commonly known are the bargaining models (Holvoet, 2005), which tend to be divided into cooperative and noncooperative models (Katz, 1997). Cooperative bargaining models, based on cooperative game theory, recognize that individuals have distinct preferences and bargaining powers, but individuals tend to negotiate binding contracts (Katz, 1997). They cooperate if that implies that they will be better off within the household than outside of it, such as in the case of a divorce (Katz, 1997). Individuals´ bargaining power is associated with their treat point, which is the expected utility a person could gain outside of the household in case cooperation does not succeed (Katz, 1997) (Doss, 2003). A larger utility or "fallback position" means greater bargaining power, which is the "relative amount of influence that one individual has compared to other individuals within the household" (Doss, 2003, pág. 44). These studies make an important contribution in acknowledging that outside factors can influence the bargaining powers of household members, but they also assume that outcomes will always be Pareto efficient[6], which in reality is not always the case (Doss, 2003). Another limitation of these models is that they treat individuals as if they all are symmetrical in terms of their voice, defined as "the right and ability to enter into the household bargaining process"

[6] "Neither person could be made better off without making the other person worse off" (Doss, Conceptualizing and measuring bargaining power within the household, 2003, pág. 46)

(Katz, 1997, pág. 31) and their exit, understood as "the socially and economically constructed alternatives facing household members in the absence of cooperative solution" (Katz, 1997, pág. 31). They don´t recognize that individuals can differ on their voice and exit possibilities (Katz, 1997). Plus, feminists criticize that it does not bother with the decision-making process, or with the role that gender, and other factors, have in this process (Mader & Schneebaum, 2013).

Non-cooperative models go a little further by not only recognizing that individuals can have different interests, but they may also operate autonomously, controlling their resources (Kabeer, 2005). Furthermore, individuals do not negotiate biding contracts (Doss, 2003; Seiz, 1995). Within this approach there are various models, but in general, they are dissimilar to the cooperative model in that they acknowledge individuals may have different information regarding each other, that inflects their bargaining process and, they don´t assume Pareto efficiency, as they recognize that there can be cases where there is no efficient allocation of resources, so they rather test it (Mader & Schneebaum, 2013; Lundberg & Pollak, 1996; Katz, 1997). Although these models are less restrictive than cooperative ones, because they can account for certain gender indicators, they continue to replicate methodological individualism in their formal economic models, which tend to set aside other equally significant aspects of the household decision-making process.

Feminists have preferred to carry out household studies that use bargaining approaches instead of unitary models, as they share the thought that households are formed of gendered individuals, with distinct preferences (Mader & Schneebaum, 2013; Bergerson, 2010). With this approach, they are able to evidence how resources are allocated according to gender and how that inflects decision-making outcomes (Mader & Schneebaum, 2013). For example, the study carried out by Mader & Schneebaum (2013) employing statistical data from 25 European Countries, shows that gender, education level, and relative income are factors that influence the decision-

making power of men and women. Their decision-making capacity differs based on their gender roles, so women tend to make decisions related to the caretaking of family members and the household, while men make financial decisions. In another study done by Bittman et al (2003) using statistical information from Australia, the authors try to analyze the influence that relative earnings have on the time spent on household work. The research finds, among other things, that women´s increase in earnings, when it does not exceed men´s, does lead to a stronger bargaining power that can be used to reduce the time spent in household chores; although that does not lead to changes in the time men spent doing those same chores. Another example is the research done by Doss (2003) in Ghana, where she relates women´s ownership of assets with bargaining power. The author concludes that when women own more assets they have more bargaining power, so the outcomes of their choices are different from those of men.

Other authors, nonetheless, sustain that these formal economic models are unable to capture the complex set of factors that influence intra-household dynamics, so household research can profit from interdisciplinary and qualitative analysis (Katz, 1997; Seiz, 1995). Sen (1987) and Agrawal (1997) are among the first to call upon the necessity of carrying out more research from a gendered lens that uses qualitative methods to better understand intra-household bargaining processes. Sen (1987), for example, proposes that gender relations within households are of cooperation and conflict; thus, to comprehend them it is important to consider well-being levels, perceived self-interests, and perceived contributions to the household. Similarly, Agrawal (1997) argues that most models leave out qualitative factors that allow a more complex understanding of the bargaining process, such as social norms and perceptions, gender differences, and power determinants. These approaches have inspired empirical studies, like the one done by Holvoet´s (2005) in South

India, which focused on the influence of gender norms by looking at how credits that are channelized through women´s groups inflect mother´s decision making capacities and, in turn, how that affects children´s healthcare. The author found that it makes a difference in the case of daughter´s healthcare if credits are allocated through women´s groups because women are able to choose more independently. Another example is Arthur-Holmes & Abrefa´s (2020) research in Ghana. It revolves around women´s work in mining and their earnings, and how they influence their bargaining power and control of resources within the household. Through their study, they were able to confirm women´s employment and earnings increase their bargaining power and capacity to influence decisions related to food, children´s schooling, and the number of children they have. Also, women´s work induced changes in their gender relationships, particularly regarding their sexual relations, childcare, and the approval of their work. Ruwampura (2007) recognizes Sen and Agrawal´s contributions but believes their approach has its limitations because they assume a "standard patriarchal household and work within a framework of methodological individualism" (p. 526). Thus, in her study with female-headed households, Ruwampura (2007) acknowledges the necessity of broadening bargaining approaches to incorporate other household structures and how they are influenced by and embedded in external social networks.

2.3. Gender and farming households:

Similar to the first approach of economists to the household, rural and agrarian studies initially assumed the farm to be a unit headed by the peasant man (Doss & Quisumbing, 2020; Ravazi, 2009; Deere, 2002). Although the family plays an essential role in smallholder farms, women´s contributions in agricultural labor (Deere, 2002) and reproductive labor (Ravazi, 2011), was first disregarded. For this reason, feminists criticized that the gender dimension had been excluded from rural and agrarian studies (Edelman, 2013).

The inclusion of gender in rural and agrarian studies can be divided into two strands of literature. One strand draws from bargaining models, which provide evidence against the unitary household model (Udry, 1996; Soo, Winter-Nelson, & Arends-Kuenning, 2007). Most of these studies analyze how the distribution of resources and assets among members of a household, such as land and income, inflect bargaining and agricultural decision making (Andersson et al, 2018; Jha, 2004; Meijer et al, 2015; Seebans & Sauer, 2007; Soo, Winter-Nelson, & Arends-Kuenning, 2007; Twyman, Useche, & Deere, 2015; Udry, 1996; Menon, Van Der Meulen Rodgers, & Kennedy, 2017; de Brauw, 2015; Farah-Quijano, 2013). For example, Friedemann-Sanchez (2006) in her empirical study carried out in Colombia with female workers in the flower industry, relates women´s physical assets, wage income, and social capital with bargaining power. Through the use of case studies, she argues that women who have property, monetary income, and social capital have greater bargaining power. Twyman, Useche, and Deere (2015) review the bargaining literature and call on the need for research that captures how land tenure is distributed according to gender and how it relates to agricultural decision making. In their study based on Ecuador, they evidenced that female landowners have greater bargaining power which translates into greater participation in agricultural decisions, even when the land is owned together with their partners. The study by Menon, Van Der Meulen, and Kennedy (2017) explores the consequences of land reform in Vietnam over women´s land-use rights, particularly its impact on the welfare and vulnerability of the household. In their research, they found that expanding women´s land-use rights grants them greater decision-making power, which also has a positive effect on the household as it increases its economic security while reducing its vulnerability to poverty.

Some studies also consider the influence of gender norms, ideologies, and practices in bargaining processes. The study by Farah-Quijano (2013) in two Colombian villages shows how the

norm and practice of assigning the household headship to men have changed over the years, giving way to joint household headship and decision making. In lands owned by the husband, decisions are made jointly between the couple, but in lands owned by women, they are more autonomous in their decision-making. The author also explores how children bargain with their mothers and influence their decisions. The study by Jha (2004) explores intrahousehold and interhousehold decision-making in Balinese agriculture. Although households evidence similar practical participation of men and women in agricultural decisions, women don´t have the same authority to take part in collective decision making in subaks due to gender ideologies.

Lastly, the studies by Van Aelst & Holvoet (2017) and Alston & Whittenbury (2013) use this framework to analyze whether bargaining inflects climate change responses. Van Aelst & Holvoet (2017) carry their research in Tanzania, where they study the participation of women in agricultural adaptation strategies. They are able to show that women who perform non-farm income-earning activities are those that have greater decision-making power over adaptations, evidencing a special preference for cover crops and drought-resistant crops. Alston & Whittenbury (2013) analyze how gender relations in Australian irrigation farms are changing due to climatic conditions and economic difficulties. The authors argue that gender relations within farms are being renegotiated, but it is men and women´s opposing gender ideology that is creating greater resistance to changes. They argue that the bargaining framework, in this case, does not provide an adequate explanation, because women´s off-farm work and income did not increase their bargaining power in farms owned and managed by men, since they are the main decision-makers.

The other strand of literature, carried out in different contexts, argues that the farming household has traditionally been patriarchal (Sireni, 2008; Sachs, 1996; Beach, 2013) and based on representations of the heterosexual family (Little & Panelli, 2003; Bryant & Pini, 2011), which

functions according to a gender division of labor that often rests on interpretations of bodily biological differences (Riley, 2009; Saugeres, 2002) that contribute sustaining constructions of hegemonic masculinities and femininities (Oldrup, 1999; Ní Laoire, 2005; Pini, 2005). These social identities are constructed in opposition to one another (Brandth, 1994) and they not only can shape men and women´s subjectivities, but they might inscribe in their bodies and performances (Saugeres, 2002; Little, 2002; Brandth, 2006). Hegemonic masculinities are often founded on land ownership and control (Ní Laoire, 2005), as well as in agricultural labor because they are versed on physical strength, leadership, and managerial capabilities, such as "strong, determined, aggressive, risk-taking and knowledgeable" (Pini, 2005, p.77). The hegemonic representations of femininity, on the contrary, are based on ideas that women don´t have the bodily constitution, skills, and knowledge to do agricultural labor as men do, because they are depicted as "slim, fragile, submissive, nurturing, quiet, and withdrawn" (Saugeres, 2002, p. 648). These representations legitimize ideas that agriculture is a male occupation and that women´s labor, which traditionally has been domestic chores and care work, is secondary to that of men´s, contributing to sustain gender inequalities within farming households (Saugeres, 2002; Shisler & Sbicca, 2019). However, recent studies argue that contrary to having fixed identities, rural men and women have the agency to resist hegemonic notions and perform other multiple gender identities (Riley, 2009; Smyth, Swendener, & Kazyak, 2018; Pini, 2005). Alongside this, other authors sustain that global economic changes and agriculture´s capitalization are restructuring the gender division of labor in farming households, shifting gender relations and identities (Sachs, 1996; Sireni, 2008, Smyth, Swendener, & Kazyak, 2018; Brandt, 1994; Ní Laoire, 2005). More and more women are assuming the farmer's identity, rather than that of the farmer´s wife or helper, and performing agricultural tasks that traditionally have been considered men´s responsibilities, defying the traditional gender

order (Trauger, 2004; Keller, 2014; Pini, 2005). In parallel, the construction of masculinities has also been transforming (Ní Laoire, 2005).

In Costa Rica, there is scarce literature that exposes how family farms are configured by gender. Most of the research found on women and gender in peasant households dates back to the 1990s, but also before this period women´s participation in agricultural production and their role within smallholder family farms tended to be overlooked and ignored as evidenced by the omission of women in the agrarian literature of the XIXth and the first half of the XXth century. In addition, the statistical information available from the second half of the XXth century is considered unreliable because it tended to underestimate women´s participation in this economic activity due to the way information was gathered (Guzman, 1991; Canzaga, 1993; Martín, Román, & Lara, 1996). Thus, it is difficult to determine how women´s involvement in agriculture and gender dynamics have evolved within family farms in Costa Rica.

The papers by Cazanga (1993), Martín et al (1996), and Rodríguez (1996) are among those first studies that provide useful insight into the various roles women played in the production cycle and in the reproduction of peasant units, as well as the gender inequalities they were subject to.

Cazanga (1993) researched the impacts that neoliberal policies had on family farms and peasant women in three localities in Costa Rica. In all three places, despite their different locations, crops, and contextual conditions, the installment of neoliberal policies in the 80s increased women´s involvement in productive labor, even as women continued to be responsible for care and domestic work. For instance, in San Carlos, located north of the country, families were able to transform their production to non-traditional exporting goods, which increased their incomes compared to most farmers. In this case, women undertook the different labors that the new products

demanded alongside their male partners, although a gendered division of labor was detected associated with specific chores. Nonetheless, women continued to be in charge of domestic labor, increasing their overall working time. In other cases, they sought to contribute to the household economy by producing for self-consumption or by doing wage work outside the farm (Canzaga, 1993). In Puriscal, located at the center of the country, the conversion to non-traditional exporting crops was very slow due to agroecological limitations. Hence, family farms continued producing traditional products for export, such as coffee or tobacco, as well as small amounts of basic grains for the local market. However, because of the changing international prices of coffee, household incomes diminished. In response, women intensified their work in the farms by producing vegetable gardens for self-consumption, and in more impoverished households they had to seek other incomes outside the farm (Canzaga, 1993). In Osa Peninsula, in the southern part of Costa Rica, farmers also continued their production of traditional products. Because of deficiencies in the programs that promoted diversification, poverty increased among these farmers. In consequence, women intensified their farm work alongside other members of the family or became managers in cases where the male partner had to look for work outside the farm or migrate to other parts (Canzaga, 1993).

Throughout these changes, women continued to be at the forefront of domestic labor, so their working days became longer. Throughout the three places, most women assume a double or triple burden that is not accompanied by the financial recognition of their work or a fair recognition of their valuable reproductive role for the maintenance of the farm unit (Canzaga, 1993). The author also points out that men usually make decisions regarding production and commercialization, although some of them consult with their families. They receive and control the money, which is invested in agriculture or nourishment. Women, on the contrary, are not economically recognized

for their work within the farm, and those who work in other farms as wage workers are paid less than men (Canzaga, 1993). Another important finding was that despite women carry out agricultural labor, many of them don´t think of themselves as producers because they consider their work as "help". Instead, they define mostly as housewives because they assume domestic and care work permanently and exclusively, which means that many work between 14 to 16 hours a day. Also, the new policies led to an increase in women´s involvement and the formation of groups. Therefore, changes in their productive and reproductive role inside the farm were accompanied by a third role based on their inclusion in community associations that were created to organize women around specific needs and through which NGO´s and international cooperation could offer assistance. However, the time spent in these groups adds to the long working hours inside the farm, resulting in a triple burden for many women.

Martin et al (1996) focused on the situation of women producers of corn, beans, and cassava in three different localities in Costa Rica, evidencing that small family farms have a pronounced gendered division of labor. These farms, whose land is mostly owned by men, are dependent on family labor; so many women perform different types of agricultural tasks, although their involvement tends to vary depending on the situation of the family. The authors distinguish various forms of farm work women do, such as the production of cash crops, especially with chores like weeding, fertilizing, and harvesting; the production of self-consumption crops, such as vegetable gardens; and the caretaking of farm animals. Also, they were classified according to the time spent in farm work: 1) Permanent workers, who are subdivided into: a) household heads and b) women who work alongside their male partners. 2) Occasional workers: Women who work at various moments of the production cycle. 3) Seasonal workers: Women who work only on particular chores in the production cycle, such as the harvest. 4) Non-farm workers: Women who don´t do any type of

agricultural work. The participation of the last three is determined by other factors, like domestic work and/or small children, external wage work, health problems, among others.

Regarding decision making, women involved in agricultural work have higher participation in decisions associated with crops than occasional, seasonal, and non-farm workers. But as in Cazanga´s (1993) study, this research showed that women don´t participate in the commercialization of crops, so men manage the earnings and decide how money is spent on the farm and the household. Plus, it also evidenced that most women identify themselves as housewives instead of producers (Martin et al, 1996).

The research by Rodriguez (1996) sought to determine the access and participation of female producers of corn, beans, and cassava in technology production and transfer, as well as in the commercialization process. According to the author, the participation of women in the production of food is related to a condition of poverty or when there is a need for labor power. In the production of the three crops, women do different chores such as preparing the field, seeding, weeding, and harvesting. However, the spraying of chemicals is usually done by the male partners, as well as commercialization. Plus, women don´t interfere in choices related to the selling of products and the collection of revenues.

The studies by Cazanga (1993), Martín et al (1996), and Rodríguez (1996) exposed that while the household continued to be considered as the exclusive domain of women, where they are responsible for care and domestic labor, neoliberal policies enforced during the 1980s and the subsequent small peasantry´s decline in economic conditions, stimulated them to engage in productive labor to a greater extent, both inside the farm and outside as wage workers. Yet, these changes were not followed by an equal recognition of their labor in economic terms or a greater acknowledgment of the important role they play in the reproduction of the family farm. Men, on

the other hand, remained absent from domestic labor and continued to devote themselves only to productive labor, although in a larger number as wage workers reflecting the proletarianization of the peasantry.

As much as these studies helped to evidence how gender shaped the functioning of these family farms in the 1990s, they lack a more detailed and critical analysis on intra-household dynamics, specifically power relations, decision making, and bargaining among family members over the use and control of natural resources (Agarwal,1997; Rocheleau, Thomas-Slayter, & Wangari, 1996). Hence, there is the need for a present-day analysis of these intra-household dynamics and gender division labor from a comparative approach between male, female and co-managed farms.

3. Theoretical framework

3.1 The lived experiences of climate change: vulnerabilities, adaptation, and resilience

Lived experiences of climate change comprehend how individuals perceive, but also how they act in face of this environmental phenomenon (Abbot & Wilson, 2012). Their place in the world, their relations with others, and the contexts in which they are embedded shape their experiences (Abbot & Wilson, 2012). It is the basis of experiential knowledge that is constantly evolving due to their reflections, engagement with others, new sources of knowledge, exposure to new conditions, and so on (Abbot & Wilson, 2012) (Abbott & Wilson, 2015). I propose delving into how vulnerabilities, adaptation capacities, and resilience are constructed as an approach to capturing the complexity and diversity of lived experiences of climate change. By comparing and analyzing them in relation to their context, it is possible to gather some insight into their commonalities, as well as their structures and mechanisms (Abbot & Wilson, 2012).

In this research I draw from the notion of contextual vulnerability proposed by O´Brien et al (2007), which means vulnerabilities are not only determined by biophysical conditions but also by social conditions; hence, poverty, low institutional capacity, high dependence on natural resources, and other social inequalities are all factors that might increase a country´s or a social group´s climate change vulnerability (Adger, 2006; Adger et al, 2003, Füssel & Klein, 2006, Thornton et al, 2014; Tol, Downing, Kuik, & Smith, 2004). From this point of view, vulnerabilities are socially constructed (Adger et al, 2003) and context-specific (Hinkel, 2011), which means they are shaped by the conjunction of climate stressors and non-climatic factors (Ränänen et al, 2016) that converge at one time, place and within a social group (Smit & Wandel, 2006).

While it is useful to comprehend how vulnerabilities are constructed through the combination of multiple factors that can increase an individual or a household´s propensity to be adversely impacted by climate change, it is also valuable to comprehend what factors shape resilience to climate change. From my point of view, vulnerability and resilience are not the opposite, but they are related concepts (Joakim, Mortsch, & Oulahen, 2015). This means that a person or household might be both vulnerable and resilient simultaneously because of different reasons. As Cutter (2016) mentions "Communities and the social groups contained within them can be highly vulnerable, but that does not mean they lack resilience" (p. 111). Hence, vulnerability and resilience do not exclude one another.

Attending the call to incorporate power and agency into resilience research (Keck & Sakdapolrak, 2013; Lorenz, 2013; Cote & Nightingale, 2012; Bunce & Ford, 2015; Olsson, Galaz, & Boonstra, 2014; Ingalls & Stedman, 2016; Leap, 2018), but also inspired by Brown´s (2011, 2016) notion of sustainable adaptations that are simultaneously guided by environmental integrity and social justice, I content that the resilience of social-ecological systems is built on these types

of adaptation that strengthen the whole system. Thus, from my point of view, adaptations that cause other types of environmental degradation or increase the vulnerability of other individuals or groups by sustaining inequalities are not sustainable and, consequently, they don´t foster resilience from a systemic perspective. Brown (2016) suggests that a key component of sustainable adaptations in the fight for social justice is to alleviate poverty, yet I propose to broaden the scope by taking into consideration that social justice can also be strived for by addressing and transforming other power imbalances and the social inequalities they produce, which can build the resilience of the system in the long term. For example, sustainable adaptations that promote social justice through the transformation of gender inequalities. In this research, I focus on how social-ecological system resilience is built through sustainable adaptations that both seek environmental integrity, such as sustainable farming practices and social justice, through processes that contribute to transforming gender asymmetries, for which particular attention will be put to power relations, empowerment, and agency.

Lastly, I see adaptation as the link between the vulnerability and resilience frameworks because effective adaptation strategies can help reduce vulnerabilities, while it can also help to sustain or build resilience (Joakim, Mortsch, & Oulahen, 2015). I draw from the more comprehensive view on climate adaptation which sees it as shaped by political and social relations, including power relations, resource distribution, governance, knowledge, and subjectivities (Eriksen, Nightingale, & Eakin, 2015). I also draw from the notion of adaptation capacity, which emerges from the fact that people and communities do not possess the same resources to adapt to climate change, nor are exposed to the same biophysical or social conditions. As vulnerability, adaptive capacity is context-specific, so it can vary among social groups, communities, and even countries and it can be influenced by diverse factors that interact with each other (Smit & Wandel, 2006).

3.2 Gender, power and household bargaining approach in smallholder farms

The farms included in this research are among those who largely depend on agriculture for their livelihoods, as most of them are smallholder family farms that simultaneously constitute a unit of production, reproduction, and consumption, where the production is based on family labor and the family´s reproduction is dependent on agricultural production (Gonzales, 1997). Hence, smallholder farms rely upon the productive labor of its members for income, as well as their reproductive labor comprised of unpaid household and care work which sustains farm production (Ravazi, 2009; Ravazi, 2011; Deere, 2002; Gammage & Smith, 2018).

Although the farm can be seen as a unit, I sustain that its members may have different interests and preferences as opposed to what unitary economic models initially proposed (Agarwal, 1997). I argue that households are composed of diverse and differently situated individuals who are capable of cooperating at times, but that also can be faced with conflict (Sen, 1987). Gender can be considered part of the configuring factors that can shape individual interests and preferences, but also relations and negotiations among members, resulting in the gendered distribution of environmental rights and responsibilities within smallholder farms, including productive resources (Rocheleau, Thomas-Slayter, & Wangari, 1996).

Gender is a complex notion that has been given several definitions and that has been explained in various ways. For this reason, I will limit myself to review the ones I consider most relevant for this research. The concept of gender was first coined by feminists during the 70s (Lamas, 2013). It was thought of as an analytical tool that could help set apart the notion of sex, as determined by biology, from the cultural meanings attributed to sexual differences and its consequent social hierarchy (Viveros-Vigoyas, 2004). Bourdieu (2001), for example, considers gender as a social construction: “The biological difference between the sexes, i.e. between the male and

female bodies, and, in particular, the anatomical differences between the sex organs, can thus appear as the natural justification of the socially constructed difference between the genders, and in particular of the social division of labor" (p. 11). These gender constructions become objective social realities because they organize society into hierarchical social divisions that result in relations of domination/subordination between men and women, while they also become internalized by individuals as cognitive schemes that structure their subjectivity and behavior (Bourdieu, 2001). Partly inspired by Bourdieu´s work, Scott (1986) provides a two-part definition of gender: "a constitutive element of social relationships based on perceived differences between the sexes, and gender is a primary way of signifying relationships of power" (p. 1067). Bourdieu's (2001) and Scott´s (1986) definitions are useful to comprehend that those cultural constructions of gender translate into power differences that cause social stratification.

Because gender has effects at different social scales, I also take on Risman´s (2017) conceptualization of gender as a social structure. Inspired by Giddens, Risman (2017) explains that gender can be considered as a social structure because it is "deeply embedded in society, within individuals, in every normative expectation of others, and within institutions and organizations at a macro level" (p.2). The author proposes that this structure produces distinct opportunities justified on the basis of sexual differences, which has consequences at different scales: "(1) at the individual level, for the development of gendered selves; (2) during interactions as men and women face different cultural expectations even when they fill the identical structural positions; and (3) in institutional domains where both cultural logics and explicit regulations regarding resource distribution and material goods are gender specific" (Risman & Davis, 2013, p. 744). Each

one can be considered an analytical scale, but they all are dynamically interconnected. In this research, I put special focus on the individual and the interactional scale, but I also consider how institutional resources and policies shape these other two dimensions.

Given that gender raises issues of power (Scott, 1986) and that power is exercised in social relations when "certain actions may structure the field of other possible actions" (Foucault, 1982, pág. 791), it is important to consider how gender together with other structures like class, age, and disability, organize the distribution of resources in society (Yuval-Davis, 2015). By analyzing how gender intersects with other structures it is helpful to grasp how inequalities are produced, at what level, and under what conditions (Risman, 2004; Risman & Davis, 2013). Being differently located in the gender structure means that some individuals have "power over" others, as they get the possibility to constrain other´s choices and dominate them (Allen, 1998); thus, producing gender inequalities. However, through their capacity to self-reflect and meditate on their experiences (McNay, 2004), individuals can develop different identifications that may be conducive to challenging some of their social positions and their associated power structures (Yuval-Davis, 2015). As Risman (2017) recognizes, "Human beings reflexively monitor the intended and unintended consequences of their actions, sometimes reifying the structure, and sometimes changing it" (p. 3). This means that the gender structure shapes individualities and interactions, but it can also be transformed by human agency (Risman, 2017). Like Risman (2017) states, "(…) gender structures are in continual flux, as are all social structures, and individuals alone, or in collectivities, do react to and change them." (p. 3).

Other types of powers, aside from "power over", are helpful to comprehend how individuals can resist dominations or oppressions that stem from some of their social positions and trans-

form structures. According to Allen (1998), there are two other forms of power: "power to", exercised when individuals can attain their objectives and that in some cases can undermine the domination they are subjected to, becoming an act of resistance; and "power with", which surges from collective and concerted action (Allen,1998). Allen (1998) suggests that power can be exercised in more than one of these senses simultaneously. Rowlands (1997) includes a fourth type of power called "power from within" which surges from our self-perception and acceptance. She argues that the feminist notion of empowerment is based on "power to" and "power from within" because it is about the internal processes that enable people to see themselves as capable and entitled for making decisions. For Kabeer (1999) "power to" and "power from within" correspond with agency, which is "the capacity for purposive action, the ability to make decisions and pursue goals free from violence, retribution, and fear…" (Gammage, Kabeer, & van der Meulen, 2016, p. 6). She considers agency as one of the components of empowerment, aside from resources and achievements. Kabeer (1999) argues empowerment is only possible when an individual has been disempowered beforehand by not having the same possibility to practice choice. So, it entails a change from a powerless state to an empowered one. Drawing from these other types of powers, I sustain individuals can sometimes resist domination that follows certain social positions. Because some individuals may hold powerful and powerless positions simultaneously in different structures (Leap, 2018; Chaplin, Twigg, & Lovell, 2019), the resources from their powerful positions can become sources of "power to" and "power from within". Agency and empowerment can then be used to challenge powerless social positions and the structures on which they are embedded in the context of concrete power relations. In this way, individuals can modify their situatedness, understood as the "… location in the intersections of power as lived in specific circumstances…"

(Kaijser y Kronsell, 2014 p. 422), which shapes their embodied experiences, including their perceptions, practices, and knowledge (Qvotrup & Elg, 2010; Kaijser & Kronsell, 2014).

In the context of the farm, the effect of the gender structure can be observed at the individual level of analysis by trying to grasp how hegemonic gender constructions are either reproduced or contested through gender identities that get performed in agricultural labor. I draw on Paechter´s (2018) proposition of hegemonic femininities and masculinities to explain how these can influence the division of labor within smallholder farms, but also how performing other subjective femininities and masculinities through non-conventional gendered divisions of agricultural labor reflect acts of power and agency that resist the gender structure. Inspired by Gramsci, Paechter (2018) explains certain understandings of what is feminine and masculine become hegemonic in a certain context because they reach consensus. These constructs become regimes of truth that not only organize the social order according to the gender binary but also act as aspirational models that influence people's behaviors. They serve as the dominant models for men and women in a particular context, influencing how they perceive the world and others, but also how they behave, thus, defining the status quo of the binary gender order. However, Paechter (2018) recognizes that there can also be multiple other ways of being feminine or masculine that challenge the hegemonic understandings. According to the author, people can construct and enact different masculinities and femininities depending on the context; so, a person can act varying personal femininities or masculinities, ones that adhere to the hegemonic notion while others that resist it. It is important to clarify that subjective identities are composed of diverse dimensions of which gender is only one among others and it constitutes a dynamic process enacted in everyday practices (Kaijser & Kronsell, 2014). By looking at the division of labor within smallholder farms, I address how some identities are shaped by hegemonic understandings of femininity and masculinity, but also how

others resist these hegemonic notions by enacting other femininities and masculinities that express an individual´s challenging of their social position and the gender structure.

At the interactional level, I will focus on household bargaining and decision-making processes that lead to the allocation and management of resources and labor (Deere, 2012; Agarwal, 1997). Doss (2003) explains that bargaining can take the form of everyday discussions that members have to make certain decisions, or they can just be the outcome of negotiations that took place in the past and that set the tone to how things are done and by whom. In some cases, members can have different and opposing interests or they can have similar ones, but still have a different idea on how to achieve certain outcomes or what the priorities are. Thus, it is important to consider if members have symmetrical voices or rights to take part in negotiations (Katz, 1997) and bargaining power, as it reflects their ability to influence decisions towards a particular outcome (Doss, 2003).

Member´s situatedness is significant to comprehend power relations and household bargaining processes. Each member´s right to take part in negotiations and their bargaining power is tied to their situatedness. According to Agarwal (1997) bargaining power "would be defined by a range of factors, in particular the strength of the person's fall-back position (the outside options which determine how well-off she/he would be if cooperation failed), also termed as the "threat point." (p. 4). Bargaining power can be nourished by a variety of factors ranging from economic and material resources, such as land ownership or incomes, but it also relies on social and human resources, like support systems and personal qualities, all of which are nested in the context of social norms and perceptions (Argawal, 1997) (Gammage & Smith, 2018). It relies on how much we internalize these norms and whether they enhance our agency or restricts it (Kabeer, 1999; Gammage & Smith, 2018). Thus, I sustain that both objective conditions, like material resources,

and subjective constructions, like our own gender identities and self-perceptions of qualities and efficacy, amount to conform one´s fallback position and subsequent bargaining power.

Looking at the bargaining processes reflects the balance of power within the household (Seebans & Sauer, 2007), which can inform on the types of power dynamics that members sustain and the powers at play. As Katz (1997) argues, members not only differ in terms of their bargaining powers but there might also be an asymmetry of voice, which is when they have a different "right and ability to enter into the bargaining process" (p.31). So, members who lack voice are kept from being able to participate in negotiations altogether. The types of powers that are exercised through those processes are also of importance, whether individuals exercise "power to" and "power from within" (Kabeer, 1999, Gammage & Smith, 2018) or if they exercise "power over" others who can´t take part of negotiations (Allen, 1998). Depending on the types of power exercised it is possible to observe if gender relations are of domination/subordination or if they tend to be more equal (Allen, 1998; Rowlands, 1997; Deere, 2002; Ravazi, 2009). Also, in some cases, bargaining can foster empowerment if certain actors can push forward their own goals or preferences in a negotiation process where they did not participate before. Bargaining and decision-making reveal if power structures are challenged or reproduced and by whom.

In the context of the farm, each individual´s bargaining power plays an important role in how agricultural rights and responsibilities were/are distributed within the farm/household, including user rights over the land and control over managerial decisions, (Agarwal, 1997; Deere, 2002; Deere, 2012; Rocheleau, Thomas-Slayter, & Wangari, 1996). I sustain that what members do on a farm and whether they take part in decisions on what to plant when to do so, what inputs to use, and so forth, may be the result of past negotiations or present discussions (Doss, 2003). Agricultural rights, such as land user rights and the decision-making power that comes from managing the

farm, are among the first things negotiated between members with different bargaining powers. As Jha (2004) explains, decision making is the primary task that is bargained by members, because it determines how the other tasks are allocated, like the division of agricultural labor. To understand the outcomes of these negotiations, special attention must be put to the farm manager´s situatedness in the gender structure and its intersection with other structures such as class, age, disability, and others, because it is from where his/her bargaining power comes from that enabled him/her to keep the land user rights. Also, looking at who is the manager is key to understand why there are differences in the power configurations of male, female and co-managed farms that allow a different gendered allocation of farm rights and responsibilities in each of these farms. Afterward, other negotiations can be raised when there is the need to make new agricultural decisions, so it is important to consider the present relative bargaining powers within the household (Agarwal, 1997) and who takes part in those negotiations.

3.4 Gendered construction of vulnerabilities, resilience, and adaptation to climate change

The consideration of gender identities, as well as intrahousehold power dynamics, is fundamental to develop a micro-social analysis on how personal and household vulnerabilities, adaptation, and resilience are constructed, by looking at the relations held between differently situated members of a household. Like Bee (2013) points out, "analysis of household vulnerability and adaptation to climate change requires a more in-depth approach to understanding how resources are shared, and decisions are made" (p. 147). Therefore, I argue that power relations among differently situated members determine the distribution of rights and responsibilities in agricultural production, including how often men and women work on the farms and the division of tasks, plus who participates in negotiations that inflect decision making, which in some cases express gender inequalities that cause differentiated vulnerabilities among household members. Like Sultana

(2014) states, “Viewing gender relations as unequal power relations is important in fully understanding the ways in which vulnerabilities and adaptation play out” (p. 379). Each person´s vulnerability to climate change can, thus, be traced to their situatedness in gender and other structures. Given how situatedness defines bargaining power and an individual´s “voice” or right to take part in negotiations (Katz, 1997), then it too defines their capacity to influence choices in those bargaining processes related to climate change. The scope of someone´s actions to address climate change can be hindered or enhanced by other members, while in turn he/she can enhance or limit others' capacity to act as well. Thus, I argue that within households, members may not be equally vulnerable, as some have power and agency to express their views and knowledge about climate change to other members, participate in negotiations related to agricultural production and influence the types of choices that are made in face of climate change, while others don´t have enough power to influence those choices or even bargain (Kaijser & Kronsell, 2014; Mujere, 2016; Carr & Thompson, 2014). Thus, although all members have experiential knowledge that stems from lived experience (Abbott & Wilson, 2015), not all knowledge and experiences are considered equally valuable within a household. This means that lived experiences of climate change are molded by the power relations members hold with one another and it defines the right each one has to take part or influence the actions and reactions chosen to face climate change, contributing to the construction of differentiated vulnerabilities (Abbott & Wilson, 2015).

Aside from being shaped by household power relations, gendered vulnerabilities are also shaped by broader social and political contexts (Bee, 2013). According to Gurung, Bhushan, and Larrington-Spencer, “Vulnerable groups are not only at risk because they are exposed to a hazard, but also as a result of marginality, of everyday patterns of social interaction and organization as well as access to resources. In this sense, vulnerability describes a set of conditions of people that

derives from the historical and prevailing cultural, social, environmental, political and economic contexts" (2019, p. 12). I argue that vulnerabilities are shaped by the complex interaction between climatic stressors, socioeconomic drivers of change, and past and present contextual conditions, such as gender, so its analysis requires an approach that grasps how these factors intertwine grounded in a particular place, time, and group. I am particularly interested in how external resources from public and private institutions shape the lived experiences of climate change, by contributing to produce gendered vulnerabilities and the overall household vulnerability.

Intrahousehold power dynamics also shape households' climate change adaptations and the capacity to build resilience (Bee, 2013). As Tschakert and Machado (2012) remind us, "Gender is one element of the multiple and fragmented identities that one individual may inhabit that shapes or hinders successful adaptive responses under climate change" (p. 286). My structural and relational concept of gender suggests that adaptations are different within and between male, female, and co-managed farms, since farm managers are the main decision-makers, although their decisions might be influenced by negotiations with others. Hence, adaptations tend to reflect the farm manager's situatedness and subjectivity. In parallel, these can be shaped by gendered institutional practices and resources, as well as social networks; thus, inflecting the adaptation capacities of farm managers depending on their gender (Sultana, 2014; Ravera et al, 2016).

Furthermore, resilience depends on whether those adaptations are sustainable in terms of their environmental integrity and social justice, so it relies not only on the effective implementation of sustainable farming practices useful for adaptation but also if they are chosen on the basis of power dynamics that deter intrahousehold inequalities. Thus, resilience is not only subject to the situatedness of the farm manager(s), but also to the type of power relations that household mem-

bers sustain. Institutional practices and resources can also contribute to building resilience if resources promote sustainable farming practices, but also if they push the transformation of unequal gender relations by promoting agency and empowerment that can foster resilience (Gammage & Smith, 2018).

Lastly, it is important to clarify that some power structures are more flexible than others allowing for these relational positions to change over time depending on the progression of each member´s bargaining power and their engagement in bargaining processes with other members, which can result in the relocation of positions within power structures. Consequently, personal vulnerabilities, resilience, and adaptive capacity are also variable and dynamic, which means they can change over time.

CHAPTER 3- METHODOLOGY

1. Methodology and feminist standpoint

This research is situated within the feminist qualitative methodological tradition, since gender is the main "variable and analytic category" (Harding, 1987, p. 29) to be studied, and tried and trusted qualitative methods, such as narrative interviews and situated ethnographic observations, are still unsurpassed when it comes to grasping how phenomenal perceptions, meaningful understandings, and structures of feeling vary according to gender, as well as individual´s experiential worlds and inter-subjectivities (Martín Alcoff, 2000). Drawing on Haraway´s (1988) epistemology of situated and embodied knowledge, the project is also cognizant of how gender intersects with other social categories such as class, age, marital status, and place, resulting in a diversity of experiences and interests among women and men (Harding, 1987). This also constitutes a feminist approach to the ethics and politics of methodology, as it consciously attempted to minimize (or at least reflect upon) any power relations between the researcher and the participants through a process of critical reflexivity (Harding, 1987), and by allowing participants as far as possible to express their own lived experiences in their own terms.

The empirical basis of this research is an in-depth case study of smallholder farms/households located in three cantons in Costa Rica. My fieldwork expanded from January to December 2018. Prior to the fieldwork, I had contemplated including only two research sites, which were the districts of Grecia and northern Cartago, but the opportunity to include a third site presented itself, so it was possible to incorporate Cóbano among the sites.

In each of these cantons, smallholder farms/households managed by men and by women constitute the main units of analysis in order to unveil intra-household dynamics, such as gender power relations and division of labor that take place within the members of the household. The

idea was to include farms that are managed by men and women because intra-household dynamics, as well as its configuration of climate change vulnerabilities, adaption capacities, and resilience, are likely to be different within farms that are managed by women, in comparison to those managed by men.

2. Study sites

This research was conducted in three sites in Costa Rica: the district of Cóbano in the Puntarenas canton; the districts of Tierra Blanca and Llano Grande in the Cartago canton, and the districts of Bolivar and San Roque in the Grecia canton.

Figure 1: Map of Costa Rica

(Source: Google maps)

2.1 Tierra Blanca and Llano Grande in northern Cartago

The first site that was included in this research is comprised of Tierra Blanca and Llano Grande. Located in the skirts of the Irazú volcano, overlooking the city of Cartago, these are districts of the Cartago canton. Agriculture is the main economic activity as 80% of its population relies on it for their livelihood (Ramirez, McHugh, & Alvarado, 2008). Onions and potatoes are considered the traditional products of the area.

The production of potatoes began in the first decades of the XX century, around 1910, in the locality of San Rafael de Oreamuno, soon after expanding to surrounding areas such as Tierra Blanca and Llano Grande (Ramirez C., 1994). Ever since, the production of potatoes has persisted in these localities, concentrating most of its production intended to supply the internal market; yet, after the neoliberal turn potatoes began to be imported and exported too (Ramirez, 1994; Ministerio de Agricultura, 2007).

As for onions, its production began around 1950 (Ramirez, McHugh, & Alvarado, 2008). At present, much of its production is concentrated in the high localities of Cartago, which includes Tierra Blanca and Llano Grande (Salazar, 2003). It has been mostly produced for the national market as well; yet, with the open market, it began to be exchanged (Salazar, 2003). However, imports have been much more than exports, especially when there is a shortage of the product or when the prices in external markets are lower. Thus, at times imports saturate the market and bring the prices down, which affects local producers. (Salazar, 2003).

Most of the farms in these localities are small productive units (Melo, 1991; Ramirez, 1994; Ramirez, McHugh, & Alvarado, 2008). According to Ramirez, McHugh, and Alvarado (2008), 69% of farms have a land size of 3 hectares or less and the average size is 1.5 hectares. These authors mention that there are historical reasons that lead to this land distribution, starting with the negotiations that took place during colonial times among indigenous populations and new settlers

(Ramirez, McHugh, & Alvarado, 2008), but more recently, around the 1970s, the Cooperative Tierra Blanca acquired large lands that were segregated into smaller parcels and they were distributed among its associates (Araya et al, 2012). Plus, land fragmentation has been associated with heritage within families as well (Ramirez, McHugh, & Alvarado, 2008).

Currently, there are several public and private institutions that participants identify as having some relation to agriculture. Some of them are located in the community, such as the local office of the Ministry of Agriculture (MAG), the Irazú Association of Horticulture (ASHORI), and agricultural commercial houses, while others are not situated in the community but have a certain influence in agricultural affairs, like the Municipality of Cartago, the National Institute for Women (INAMU), National Institute of Rural Development (INDER), the National Irrigation, Drainage and Underwater Service (SENARA) and public banks. Despite the variety of public institutions that participants identify with, there is a generalized opinion that their presence is weak and that their technical and financial interventions are lacking, so they rather seek the services of private commercial houses when needed.

2.2 Bolivar and San Roque in Grecia

The second site is located northwest of the capital San José, comprising the villages of San Luis in the district of Bolivar and San Miguel in the district of San Roque, which belong to the Grecia canton. Green mountainous landscapes characterize these villages, as they are located in the highest hills from where the city of San José can be looked at from a distance.

Presently most of the population of Grecia dedicates to the service sector, while agriculture is mostly concentrated in rural areas and it absorbs the least amount of economically active population, who are mostly men (INDER, 2015). Yet, this canton has been traditionally known for the production of sugar cane and coffee, which still persists.

Thanks to its proximity to the capital and its climatic conditions, settlers expanded coffee production to this locality in the 1800s (Municipalidad de Grecia, 2019). There are currently small, medium, and large coffee farms in Grecia (INDER, 2015). Most of the small producers are located at higher altitudes, like in the villages of San Luis and San Miguel, and they are affiliated to Victoria Cooperative or they sell their coffee to private buyers (INDER, 2015).

Historically, coffee production in the country has been influenced by external and internal factors. The International Coffee Agreement, which started in the 1960s, regulated the international coffee market until 1989 when it dissolved (Samper, 2010; Cruz & Castro, 2007). Although prices experienced oscillations during this time, the agreement kept certain market stability through its quota system (Samper, 2010; Loveless, 2012). However, a few years before the treaty dissolved, coffee prices in Costa Rica started to experience a downward fall (Samper, 2010) and after the treaty dissolved, prices began to vary even more due to its conversion to an open market. Oversupply and changes in the demand have caused a significant international coffee crisis at times, which have led producers to abandon their production momentarily or permanently (Samper, 2010; Cruz & Castro, 2007). Additionally, the neoliberal policies that Costa Rica implemented in the 1980s affected local coffee producers as well. Despite coffee is considered one of the traditional agricultural products, the state withdrew the assistance offered to these producers to promote other types of nontraditional products (Cruz & Castro, 2007).

Nonetheless, in this locality participants recognize the presence of public institutions, which at some point or another have provided them with some type of assistance, such as the MAG local office, INDER, National Institute for Learning (INA), the Coffee Institute (ICAFE) and the Institute of Mixed Social Aid (IMAS). However, it is Coffee Cooperatives who presently assume

a more prominent role in terms of the technical and financial assistance offered for coffee production.

2.3 Cóbano in Puntarenas

The third site where the research was conducted is the district of Cóbano. Located in the Nicoya Peninsula, this district belonging to the Puntarenas canton is considered a coastal area for its proximity to the Pacific Ocean. Compared to the other two localities this is the furthest from the capital city. Traditionally its local economy has been based on agriculture and farming. Even from pre-colonial times, indigenous groups settled in this territory and they produced crops like corn and beans (INDER, 2014), which are still considered the local traditional products. However, recently tourism has been developing, displacing traditional economic activities.

In Cóbano there are several INDER peasant settlements, which are settlements formed in lands that used to be state-owned and then distributed to families in need (INDER, 2014). Around 341 parcels have been distributed in this district, benefiting 452 families (INDER, 2014). The state has had an important impact on the land structure of this locality. Due to state policies, land allocation has also been accompanied by other types of social welfare to help these families achieve socio-economic stability. Most participants then recognize the prominent intervention institutions have had with land distribution and technical and financial assistance. In this locality, it is public institutions like MAG, INDER, INAMU, and Public Banks who play a prominent role in welfare services, as well as the Jicaral Agricultural Center, which is an organization of local producers.

2.4 Reasons for choosing locations

These sites were chosen for their similarities but also their differences. Starting with the similarities, the first thing they share in common is that these are localities that have a significant

population that dedicates to agriculture but given that my research is based on a comparison of farms managed by men with farms managed by women, I also chose them because of the certainty that there are female farm managers. At the beginning of my research, I realized that it was not going to be easy to identify female farm managers because compared to male managers, they are by far a much smaller and dispersed group. Costa Rica has no national open-access database on agricultural producers that one can refer to for sex-disaggregated information, so the logical first step was to consult the Ministry of Agriculture to get that sort of direction. Hence, in great part, it was this information that influenced my choice of the three sites.

The Ministry has a decentralized type of organization, so besides their central offices in San José, they have regional and local offices. These last ones are responsible for doing ground-work, like provide technical assistance, training, and material and financial resource allocation, among other things. My first step was to reach the person in charge of gender affairs from the central office in San José. She clarified that the Ministry´s central command does not hold information of that sort, and she confirmed that because most producers nationwide are men, it was going to be a challenge identifying female farm managers. However, she was aware that a few of her female colleagues were working with female producers in some of the local offices, so she gave me their contacts.

I first got in touch with Johanna, the gender coordinator from the Central Oriental office, which oversees cantons in Cartago and San José. In fact, she already had some experience working with women in northern Cartago, so she was able to share some of their contacts, as well as the contacts of male managers. She also offered to help me organize a meeting for the first weeks of

January 2018 with female and male producers, to explain my research to them and ask their disposition to participate. Thanks to this meeting, I was able to confirm the first participants and get started on my fieldwork in northern Cartago right after.

Around the same time, I got in touch with Ileana, the head of the local MAG office in Grecia. Just as in Tierra Blanca, she had experience working with some female managers in a locality up north and she gave me their contacts. Yet, right after, that locality was separated from the canton of Grecia and it was recognized as a new canton; so, administratively it stopped being under the management of the Grecia office. For that reason, I had to delay the start of my fieldwork in Grecia a couple of months, while she helped me gather other contacts of female managers; yet it became a challenge for her because she did not know that many from other parts of Grecia.

Lastly, around July of that same year, I had the opportunity to expand my research to Cóbano. I spoke with Leda, the head of the local MAG office, who shared the contacts of female and male farm managers from the locality she had worked with. The contacts were helpful to coordinate interviews before my arrival since my financial and time limitations only allowed me to stay in Cóbano only for 10 days.

Another similarity related to the previous one is that in all of them there is a local office of the Ministry of Agriculture and other public institutions. However, part of their differences is that in each locality the presence, role, and intervention of local public institutions are unique. I see them as distinct expressions of a welfare-neoliberal state, so while in some places it has managed to sustain its welfare, in others it has reduced its presence and delegated responsibilities to other local actors as part of the neoliberal turn. In Cóbano, for example, the state has managed to sustain a strong presence and intervention through local public institutions, but in Bolivar and San Roque, public institutions have a weak presence compared to coffee cooperatives, which have assumed a

stronger role for coffee producers; and in Tierra Blanca and Llano Grande they have an even weaker presence, so onion and potato producers seek assistance form agrochemical commercial houses.

Another important distinction is that each place is located in a different geographical part of the country, so they not only have different topographic characteristics, but they also have different climatic expressions and crops. Tierra Blanca and Llano Grande in northern Cartago and Bolívar and San Roque in Grecia have similar topographies in the sense that they are located in higher altitudes, so they are mountainous regions with cooler temperatures. Cóbano, on the contrary, is located near the coast, it is flatter, and temperatures are very warm. Because of these differences, the types of crops and how they are grown also vary in each locality. In Grecia, coffee constitutes the traditional produce grown by most smallholder farms; in northern Cartago, it is onions and potatoes, and in Cóbano the main cash crops are organic vegetables, but also corn, rice, and beans are produced for food security.

Thus, it is their similarities that enable establishing a common basis for their comparison, but it is their differences that are useful to analyze how global climate change has different manifestations and agricultural impacts, which are mediated by a diversity of contextual conditions, such as a gender structure, local institutions, resources, global and local markets, among others that vary depending on the place and that shape how vulnerabilities, adaptation capacities, and resilience are constructed according to gender.

3. Sample

In northern Cartago and in Grecia, I started using purposive sampling by following the contacts that MAG state officials knew and shared. I was aware that using this type of sampling had the risk of conducting to certain biases revolving participants perception and experience of

this institution, so afterward I continued to gather new contacts through snowball sampling (Trotter, 2012), which consists of expanding the sample by asking participants to point at other people that could potentially agree to participate. This way I was able to include other female and male farm managers that had no direct relation to MAG to reduce biases. When I reached the saturation point, I stopped including new participants. In Cóbano, however, my financial and time constraints limited my capacity to use snowball sampling and expand my sample; so, I only used a purposive sample. Also, because of the same reasons, it represents the smaller of the samples and I was not able to reach the saturation point as in the other localities.

In qualitative research, the sample size is not easily calculated prior to the fieldwork because it is not possible to know the point of saturation beforehand (Small, 2009). Therefore, I had calculated a set of 20 farms/households (10 in each canton): 15 managed by men and 15 managed by women, considering limitations of time, distances, and resource availability. However, I ended up doing 61 interviews, corresponding to 39 women and 22 men. I did 27 in Tierra Blanca and Llano Grande, 20 in Bolivar and San Roque, and 14 in Cóbano. In total, I included members of 31 farms/households: 15 of them managed by men, 7 managed by women, and 9 jointly managed.

Figure 2: Number of participants, farms/households, and farm managers in each locality

(Produced by author)

	Men	Women	Farms/ households	Female farm managers	Male farm managers	Jointly managed
Tierra Blanca and Llano Grande (northern Cartago)	9	18	13	5	6	2
San Roque and Bolívar (Grecia)	8	12	10		6	4

Cóbano (Punta-renas)	5	9	8	2	3	3

In addition, I did nine semi-structured interviews with public state officials of seven different public institutions and two with staff members of private entities. With these interviews, I was able to gather information on public policies, as well as measures and strategies available to farmers in each locality.

4. Data gathering techniques

In my fieldwork, I used three different data gathering techniques. The first one was the use of in-depth semi-structured interviews, in which I explored the farm life history (Riley, 2010). Riley (2010) explains that with this approach both individual life histories and the history of the farm are explored. Besides the main producers, other members are interviewed, so it is a way to connect their biographical stories with the collective construction of the farm's history (Riley, 2010). It is also useful to delve into the micro-politics of the farm (Riley, 2010), so used in combination with a gender lens was helpful to explore intra-household dynamics, such as the division of farm and household tasks and responsibilities among members, time allocation, and management, remuneration, decision making, access to credit, knowledge, and experiences of climate change, adaptations strategies and other topics. It is important to mention that before putting in use the interview guide, I reviewed it with one of my female informants from northern Cartago and Johanna, the gender coordinator from the Central Oriental MAG office, and they both gave me their feedback, which was very helpful to improve the instrument before starting fieldwork.

In all farms/households I sought to interview more than one household member, so later I could cross-check the information. I always asked to do interviews individually. Most participants

agreed to speak without the presence of other family members. This means that in most families where I interviewed both spouses or their children, I was able to interview them separately, so they would feel free to speak their minds. Only very few interviews were carried out as a family, mainly because the conditions of the household didn´t allow for individual interviews or because of the direct refusal by some of them to carry out interviews separately.

However, it was not possible to do multiple interviews in all households since in some of them only one member agreed to participate. I especially encountered reservations from men, while women were usually more willing to take part in the research. I take it that being perceived as a young woman and city-dweller was partly the reason why some men were not keen to speak to me. In those rural settings, the hegemonic gender order persists, so I gather that men don´t see me as worthy of their time or knowledge. However, those who did agree to speak with me were very open and helpful. I did not sense at any time they needed to establish some type of dominance or superiority. Only in one case, with a man who is the husband of a female manager, I sensed his need to reaffirm his gender dominance by portraying himself over and over as the one who makes farm decisions.

With women, it was quite the contrary. I take it that being identified as a woman myself, other women felt comfortable speaking with me. Most of them opened up about their different roles, household dynamics and some even shared the hardships and limitations they encounter as female farm managers outside their farms, but also as women within their households. I think most were able to share intimidate details about their lives because of my gender. And because I am aware of my positionality, I was able to listen to them without judgment, enabling them the liberty to speak their mind without constraints. I believe that for all the aforementioned reasons, most of my interviewees are women, although I sought to interview as many men as women.

The interviews were done in Spanish and they were audio-recorded with the prior agreement of the participants. They range in length depending on the openness and disposition of the person being interviewed and the setting of the interview, as some took longer because they were done while visiting the farm. The shorter ones lasted around 1 hour and 30 minutes, while the longer ones lasted up to 6 hours; the average, however, was around two and a half or three hours. To avoid getting participants tired, the longer ones were done in more than one visit, so in some cases, I conversed with the same participant two or three different times to cover all the topics.

The other data gathering technique I used was farm visits and observations. Riley (2010) mentions that another perk of exploring farm histories is the possibility to carry out the interviews while visiting the farms, which gives more freedom to the interviewee to demonstrate and explain certain endeavors, as well as take the lead on how the visit is carried. Most of my interviews were done in the participants' home/farm, so in most cases, I was able to observe the interior of the household, as well as the farm. I asked if they could show me around the farm, so I could get a better sense of how they manage things. This allowed me to observe, but also to be explained in more detail how the household and the farm functions. On my observations, I focused on the dynamics inside and outside the household, the characteristics of the land, the distribution of the farm, the crops they grow and how they are cultivated, infrastructure, farming practices, among other things. All my notes were written down on a fieldwork journal that I completed after every visit.

Lastly, in three of the farms/households, I also conducted ethnographic participant observations and explored in more detail and length the topics of the interview. In order to get their agreement, I offered as a volunteer to work on their farms for a few days. I was able to work two different days on a farm in Tierra Blanca managed by Lucía, one day at another farm in Tierra

Blanca managed by Guido, and one day in Melissa´s co-managed coffee farm in Grecia. During these participant observations, I was able to help Lucía on one occasion with her green beans harvest and the second time with her onion harvest. With Guido, I was able to learn how to sow onion seedlings; and with Melissa, I got to weed coffee plants. While volunteering, I was able to have a closer look at their land, agricultural products, interactions, farm work, division of tasks and responsibilities, time allocation and management, climate, adaptation strategies, resources, and other aspects that complement and verify the narratives. Before starting my field research, I had planned to do more participant observations and do them in different seasons so I could observe the gendered labor practices during different parts of the agricultural cycle; yet, this was not possible for time and resource limitations.

5. Data Analysis

Once all the data was gathered, I proceeded to transcribe all the interviews. Then, I organized and coded the interviews and field notes with codes that emerged from the same empirical data with the assistance of the program ATLAS Ti. Then, I proceeded to cross and analyze different codes, which led to broader themes that were used to write the dissertation.

6. Ethical considerations

Lastly, it is important to mention that the research did not pose significant ethical issues but all normal procedures and best practices concerning informed consent, data storage, anonymity, and confidentiality were carefully followed. Before each interview, I took the time to explain what the research was about and the types of topics I was going to explore with the interview. I also asked participants to fill an informed consent after the interviews, where they consciously gave their permission to use the information they shared for research purposes and include it in subsequent written documents. I also explained and reassured them that I was going to keep their

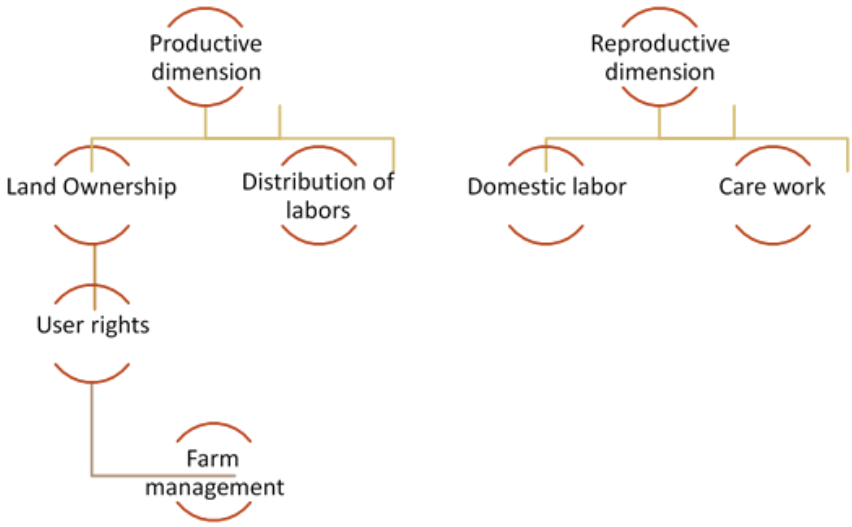
anonymity safe, so none of their real names have been used in this dissertation. They have all been assigned fake names (pseudonyms) to protect their true identities. The only ones whose identities have not been changed are the names of the state officials of public institutions and the workers of private corporations since they were interviewed as representatives of their organizations and they gave their consent to use their real names.

CHAPTER 4- WOMEN AND GENDER IN SMALLHOLDER FAMILY FARMS IN COSTA RICA

1. Introduction

In Costa Rica, there is scarce literature on smallholder farms' gender configuration. Seeing as there is a need for an updated analysis on this subject and to elaborate in subsequent chapters how gender shapes the construction of vulnerabilities, adaptive capacities, and resilience to climate change on these farms, it is necessary to address foremost my research question on how gender structures intra-household dynamics in smallholder farms. Thus, in this chapter, I analyze and discuss smallholder farm´s present-day gendered intra-household dynamics throughout the three localities where the research was conducted. To address the gender dynamics, I will first analyze the farms´ productive dimension, specifically farm management and the distribution of labor, and then I will focus on the farms´ reproductive dimension, such as domestic labor and care work.

Figure 3: Productive and reproductive dimensions (produced by author)



In the first section, I discuss how farm management tends to be gendered based on land ownership and the allocation of rights over natural resources, particularly land user rights, and the

significance gender has on the bargaining processes that can take place between members that attempt to influence how productive resources are allocated and managed.

Farming households integrate productive and reproductive dimensions (Gonzales, 1997), which means that productive and reproductive labor occurs in the same space sustaining one another due to members' collaboration (Ravazi, 2009; Ravazi, 2011; Deere, 2002). However, the distribution of labor and the allocation of productive rights and responsibilities (Rocheleau, Thomas-Slayter, & Wangari, 1996) varies between female, male and co-managed farms. The explanation can be attributed to the gender of the landowner(s), as it confers men or/and women the right to use the land and, thus, become farm managers, which entails decision making for all related matters to the farm´s production and organizing agricultural tasks. Especially for women, land ownership enables them to defy the hegemonic gender order in farming and assume the farm´s management. Thus, the gender of the manager becomes significant as it is conducive to specific configurations of power relations within smallholder farms and, consequently, to a differentiated gendered distribution of agricultural rights and responsibilities. However, the allocation of user rights and managerial responsibilities to the landowner does not necessarily pass uncontested. Other members with different bargaining powers might not always agree with this allocation and try to change who has those rights and responsibilities.

Then, I compare the distribution of labor in male, female and co-managed farms. I argue that female-headed farms tend to partly break with the traditional gendered division of labor, while male-headed farms tend to reproduce it. Starting with the productive dimension of the farm, I analyze the gender division of agricultural tasks and whether it is founded on hegemonic representations of femininity and masculinity or if other subjective identities are performed that challenge these hegemonic notions. I follow Paechter´s (2018) proposition of hegemonic femininities and

masculinities, which are certain understandings of what is feminine and masculine that become hegemonic in a certain context because they reach consensus. These constructs define the status quo based on a binary gender order, which influences how people behave and perceive others. In a farm setting, hegemonic representations of feminine and masculine bodies can result in the embodiment and performance of specific agricultural practices, which can reinforce gender inequalities (Saugeres, 2002). However, it is also possible that through agriculture, individuals perform other multiple femininities and masculinities that challenge hegemonic understandings (Paechter, 2018). By looking at the gendered allocation of agricultural tasks, I address how some gender identities are shaped by hegemonic understandings of femininity and masculinity, but also how other subjectivities can challenge these hegemonic notions by enacting other gender identities that contest the structure.

Lastly, I focus on the reproductive dimension of the households, which includes domestic labors and caretaking of younger or older members. I contend that even though female-headed farms break with the traditional gender division of labor, as women take on agricultural labors and farm management, they also assume reproductive labors. Thus, most of them end up with a double or triple burden. By not renouncing the tasks that traditionally have been undertaken by women within the space of the household, these women do not defy the hegemonic gender order completely. I will argue from this point of view there isn't much difference between male, female and co-managed farms because domestic labor and caretaking responsibilities continue to be seen as women´s domain, while men don´t share the equal burden.

2. The farms´ productive dimension

2.1 Land tenure and farm management

Rocheleau, Thomas, and Wangary (1996) point out that rights over resources are based on legal or customary laws which tend to be gendered; thus, regulating, for example, who are land-owners, land users, or both. In this section, I seek to explain how land user rights are allocated within smallholder farms according to gender. I use the term farm manager to refer to the member(s) that possess land user rights and who, consequently, decide about agricultural production, such as productive practices, types of crops, labor distribution, commercialization, and earnings.

I found no reliable sex desegregated information about management or land tenure that can provide an overview on how rights over resources are distributed in these localities. Faced with this situation, I wondered why are there fewer female farm producers? does land ownership have to do with it? For this reason, in my interviews, I felt the need to explore not only farm management (who has user rights) and labor (how tasks are distributed) but also landownership. I consider researching these aspects is important because it has been shown in other studies that owning land is what gives women the possibility of farming on their terms and make decisions (Twyman, Useche, & Deere, 2015), and it constitutes a means to access other resources like financial credits, institutional assistance, training, and others (Deere, 2012).

The comparison of farms managed by men and women allowed me to find that land tenure tends to be the main factor that defines who manages the farm despite the sex of the owner. This means possessing land is, most of the time, the thing that confers the right to control and decide what happens with the productivity of the farm. In other words, land ownership confers men or/and women with the power to manage the farm and make decisions. Despite the hegemonic gender order that prevails in these localities, owning land confers women with enough bargaining power to subvert the gender order in their farms and become managers. Just in exceptional cases, when

land is owned by a woman but grants farm management to a man, gender tops ownership as the main factor that weighs in on who gets user rights. But in most cases, land tenure and farm management tend to go hand in hand, which is a key insight to understand the subsequent differences between the division of labor in farms managed by men and by women. Nevertheless, it is clear that land tenure continues to be unequally distributed, because it is more common for men to own land and, consequently, manage farms, according to what participants and public officials say since agriculture has been and continues to be considered a male occupation, especially in northern Cartago and in Grecia.

Although user rights are linked to the landowner, it is important to consider that in some cases it might raise tension or conflict with other household members, precisely because households are composed of individuals that might have different interests or can have the same, but a different idea on how to pursue to them. Prior to the allocation of user rights and any other decisions related to farm affairs, a bargaining process might take place between household members that try to influence the outcomes of who has control over the land. To understand how user rights are allocated and how decisions are made it is important to analyze the grounds on which members bargain, together with the power structures that come into play, putting a particular focus on gender.

I have arranged the different farms that participated in the study in three types: a) male-headed farms, in which a male member manages the farm´s production; b) female-headed farms, which means a female member manages the farm´s production and c) joint management, in which the farm´s production is managed between partners. Thus, in what follows I will go over these farm types throughout the three localities and their intra-household dynamics.

Gathering from cases in northern Cartago and in accordance to what Cazanga (1993) and Martin et al (1996) found in other localities, participants describe that, traditionally, there has been a hegemonic gender order based on a rigid gendered division of labor in farming households, grounded on an idea of masculinity associated to the field and femininity related to the household, which seems to still define how most households are organized today. Agricultural production is thought of as a male occupation, and it upholds the hegemonic construction of masculinity, which concurrently makes it unusual for women to be farm managers, mainly because they don´t have access to land as men do. Women don´t tend to buy, rent or use another person´s land for production purposes, as it is for men, but in cases where they come to own it, women tend to assume or get involved in farm management defying gender norms and expectations. Thus, the link between land tenure and farm management is particularly significant in this locality.

Most male-headed farms in this locality have the commonality that the landowner is the oldest male member of the household, having acquired it through inheritance or purchase. Hence, there are five cases where they are also the farm managers and producers. Plus, there are two other families where a younger male member produces either by associating with a partner who owns the land, which entails joint management or by renting land.

Household members tend to acknowledge that, in these farms, men are the decision-makers around productive matters. In most cases, there is no conflict, because some consult certain issues with their partners or other members, allowing them to have a say in farm matters. Yet, I sustain that the true reason behind the lack of conflict is that these farms are organized based on a gendered division of labor where men work on the fields, while women are considered merely peons or "assistance"; so, the normalization of the hegemonic gender order keeps other members from chal-

lenging it, avoiding conflicts. Guido, for example, inherited land that used to belong to his grandfather, but he later bought new land that allowed him to expand his onion production. As the manager, Guido discusses some farm issues with his family, but he is the one who ultimately decides what gets done. “Generally, we do things here as a family, but they believe in me. "Daddy is the one who says, daddy is the one who decides”” (personal communication, 08-03-2018) he stated. Thus, as the older male of the family and the farm owner, he has the legitimacy to make decisions without being questioned. However, there are exceptions. Particularly in one household the unequal consideration of member´s opinions in farm decisions creates tension between them. Joaquin, the farm owner, and manager defines who does or does not get to participate in negotiations over farm decision-making. He works with his sons on the farm and asks them for their opinion on farm matters, but his wife and daughters, who only work on the farm occasionally, are not usually consulted or considered in those negotiations. His wife Matilde says she would like to have more participation in decision-making and have the possibility to give feedback but thinks her opinions might not be well received. In this case, the reproduction of the hegemonic gender order creates certain asymmetries over who has a say in farm matters, which results in some members unconformities, yet it is so fixed that members, like Matilde, don´t have enough bargaining power to attempt the possibility of negotiating with other members or even questioning choices.

As for female-headed farms in northern Cartago, five landowners are the eldest women of the household and they acquired land through inheritance from parents or a partner, a divorce, or through the state. None of them purchased the land they cultivate. In four of these cases, they are farm managers and producers; only in one case, the landowner passed user rights to her daughter.

In these farms, women are the main decision-makers. Most of them make farming decisions on their own, only a couple negotiate with their spouse or children. However, given that it is not

customary for women to manage farms in this locality, some women did have had to negotiate the user rights of the farm in the past. Francisca, for instance, inherited land from her father, so she manages the farm. However, she shared how she was questioned and criticized by her husband when she chose to assume the management of the farm and switch from conventional agriculture to organic. In her words: “The land is mine, so I will manage it … I made the decision to stop producing conventionally and start producing organically” (Personal communication, 08-03-2018). Her husband did not agree with this decision because it is accustomed for men to manage the farm, even in cases when it is the woman’s inheritance. In situations like this, the positions people occupy in different axes of power and how they come into play in negotiations define who gets to decide the use and management of resources (Agarwal, 1997). In this case, Francisca´s husband tried to negotiate based on the gender norm and expectation that men are supposed to manage the farm, while Francisca based her bargaining power on ownership of assets. Ultimately owning the farm gave Francisca the power and agency to shape the outcome of negotiations in her best interest, defying gender norms. There is also Sol´s case where, she as a young woman, produces and manages a land loaned to her by her mother. Sol´s parents were given the land by the state and they both were included in the land title; however, her father was very “machista”, so he first took over the production of the land without letting her mother participate in the decision making or the revenues. Through their marriage gender norms surpassed ownership as the factor that weighed more over who controlled the user rights, but once they divorced her mother was able to bargain based on her co-ownership of the land and reclaim her user rights. Now, she controls her share and with it conferred use rights to Sol, who is now the manager and producer.

Lastly, there are two cases where the land is co-owned by the couple or by one of its members, but management is shared. Nonetheless, as in other types of farms, couples experience processes of negotiation. Mario, the husband, has an illness that impedes him from working on the farm and earning a wage, so his son does most of the farm work. His wife Ana María administers the farm´s finances and works on the side so she can earn some extra money for the household. Mario confesses "I feel ashamed because I´m not even contributing a cent" (Personal communication, 22-01-2018). He considers he cannot partake in the decision making as he would like, since, for him, money is what gives a person the right to participate. "Money is what makes you great", he said. He thus leaves most of the decisions to his wife and son, although they try to include him. Mario´s disability and resulting class position challenge his conventional construction of masculinity, as he is no longer able to perform the role of the breadwinner. Thus, this last example shows that depending on the person´s situatedness within gender, class, and disability structures (Kaijser & Kronsell, 2014), feelings of powerlessness can also make people constrain their participation in decision-making.

In Grecia, the hegemonic gender order persists like in northern Cartago. Most households are organized according to the gender division of labor because coffee production is characterized as a male occupation. Ideas about women not having the required knowledge, not being interested in coffee production, or needing a man to take on certain tasks are some of the reasons given by participants on why women don´t manage farms, which reflect the underlying notion that it is not customary for women to get involved in coffee production because of conventional femininity constructions. Ana gave the following example that demonstrates this point: "[…] if a man works the farm and they get divorced and she is left alone generally what she does is lease the land because she knows she cannot take care of it" (personal communication, 24-04-2018). For that

reason, this locality sets apart from the others because none of the farms/households in this research are solely owned and managed by women. Plus, it is the only locality with cases in which land ownership does not equate to user rights, as some female landowners prefer to confer user rights to male members placing gender as the decisive factor for allocating user rights.

This is the case of three male-headed farms whose lands are partly owned by women due to inheritances, but management is mostly assumed by a male member, usually a partner or son. Lina, for example, is an older female farmer who inherited land but now she has given the user rights to her son and daughter; however, who ultimately decides over the farm is her son. Ana, Lina´s daughter, explains: "Usually he tells me "we need to do this or this". I know that what he says is what we need to do because he knows more, first of all, and to have a problem between us over that, no, never, because he always asks for my opinion" (personal communication, 24-04-2018). Land rights, then, do not necessarily always translate into user rights as sometimes gender prevails as the main decisive factor by granting men the management rights without producing conflicts with other members. This lack of tension is related to the fact that traditionally coffee has been considered a male occupation and most women only get involved in the harvest season; hence these households are organized and function according to the accustomed gender order, which is based on granting men the power to control productive resources because it is part of their masculine role.

The other three male-headed farms are owned and managed by the eldest male member, after having inherited the land. In two of these coffee farms, household members consent that men undertake decision privileges in farm-related matters, which is consistent with hegemonic masculinity representations. For example, Franco inherited the land from his parents and he and his wife,

Sofía, concur that he is the one that makes the decisions regarding coffee production. Sofía explained, "in our case, he is the one who makes decisions because… for example, sometimes he comes and tells me "I want to cut down those trees and plant new ones" and I tell him "fine, that seems good, renew them all", that´s what I say. But those things I don´t… I usually don´t get involved" (personal communication, 18-10-2018). However, an exception is Francisco´s farm as it stands out from the norm because even if he is the main decision-maker, his family joins in more actively giving inputs and negotiating decisions, especially his daughter Sarita, who works alongside him producing organic vegetables. Their dynamics don´t quite reproduce the gender order as they sustain a much more symmetrical balance of power.

Other households that break with the accustomed gender order by sustaining more symmetrical relations are those jointly managed. Inheritance is taken by women as an opportunity as legal owners to get involved in management alongside their partners or other family members. This is what happens in another four farms which are jointly managed. Co-manager Adelina, for example, explained that when her husband is not around during the harvest, she gives directions to the workers. Also, decisions pertaining to coffee production are taken with her husband and eldest son, whom they consider as their partner. "Whatever we are going to do, we usually do it as a family. Meaning we make decisions together" (personal communication, 06-09-2018) said Patricio and Adelina confirmed it by saying "It´s in equal parts" (personal communication, 06-09-2018). These families undertake management together although they do not necessarily always agree, so they negotiate to take into consideration the different opinions, resulting in consensus or accords. Consequently, these families portray their relations as based on cooperation, rather than conflict.

In Cóbano, landownership is unequivocally tied to user rights. In five of eight farms, legal ownership is shared, so farms are managed by women or jointly by couples. Co-ownership bestows both men and women with the possibility to use the land and manage their production. Land entitlement has effectively permitted women to develop their own productive projects, strengthening their autonomy and challenging the hegemonic gender order. In three cases, the land was granted by the state, recognizing from the start both individuals as owners. In the other two cases, one of the spouses who was initially the landowner decided to include in the land title their significant other, so now they both own the land.

In these farms/households, women have had the initiative to develop vegetable production and so they decide on their own or along with their partners how to manage it. However, some confess it has not always been this way and there was a time when they did not feel support by their partners. Their family´s dynamics used to reproduce the hegemonic gender order based on an imbalance of power where women were dominated by their partners, restraining their actions. Over the years their relationships have changed, in part motivated by women´s resistance and bargaining, shifting the gender order to the point that these women now have more agency and empowerment to manage their own production. Luz, a vegetable producer whose husband works in a sawmill, recalls that when they got married her husband had a drinking problem and was very "machista"; hence, he did not let her work or go anywhere by herself. When she threatened to leave him, he changed. Afterward, he offered her the land, which was under his name, and since then she has been able to participate in training that has helped her to develop her production. She explains how she now manages her production:

> "in this case, I make them, the decisions, because he is at work. Let's say, I can´t tell him how many trees to cut because he is the one who knows that, but I can tell him "I have to

order plants. I have to order this much, this much, and this much" because I´m the one who knows how many are needed. I´m telling you, I make the decisions here and he makes decisions over there because I can´t tell him what to do over there, because he is there and I´m here" (personal communication, 28-07-2018).

Simona also stated that things used to be different with her husband, because when they first married, he did not support the things she wanted to do; she felt useless. She believes their relationship has changed in part because these are other times, but also because their daughter started to question why her father was so restrictive with her. Thus, she senses her daughter had a lot to do with her husband's change of attitude. Now he does support her ideas and because of it, she developed her production, which she now oversees completely.

Other households with more symmetrical relations between partners lead to joint decision-making, so permanent tensions and conflicts are unusual. At Román and Carmela´s farm, they make decisions together. To illustrate how things are decided among them he narrates the following example: "we go out to buy plants and she asks, "what plants can we put?" and I say "chive or basil" and she says "no, basil no, lest put in something else, other things, chive for instance" so then we decide on what we are going to do" (personal communication, 30-07-2018). Just as them, other couples seem to have more balanced gender relations because co-owners participate in decision making and, in some cases, they even allow other members to take part as well.

Lastly, in three farms land is owned and managed by the eldest male member, as in other localities. These farm's economy is based most of all on animals, so it is men who oversee these farms' main productive activity, while women grow crops for self-consumption. Because productive labor is gender-specific, so is their management, but men and women tend to negotiate the greater farm decisions, although men have the last word as managers. However, it is important to

underline that women might not be landowners, but contrary to other landless women, in this place, they have user rights to produce and manage their own crops.

In sum, gathering from the farms in the three localities, farm management tends to rely first and foremost on land ownership. So, throughout the sites and in most cases, ownership seems to be what defines who uses and controls the farm and its productivity. This means that although women, in general, are less likely to own land and, thus, become farm managers, those who own it are entitled to use and manage their assets as they see fit (Rocheleau, Thomas, and Wangari, 1996), even in cases where the land is co-owned with their partners as in Cóbano. According to Deere (2013), owning assets, such as land, can give rural women more economic autonomy, strengthening their fallback position and more bargaining power to influence the allocation of resources. I contend that for women, land ownership is key to subvert the hegemonic gender order and contest male dominance in farming. Thus, land titles not only explain who manages the farm´s production, but also the gendered distribution of productive rights and responsibilities in smallholder farms. In the next section, I will present a more thorough analysis that compares the distribution of labor and duties in farms managed by men and by women associated with different femininities and masculinities.

2.2. Gendered division of agricultural labor

Smallholder farms rely on the family´s labor to subsist; hence, it has always been common for both women and men to participate in agricultural production. However, as Rocheleau, Thomas, and Wangary (1996) explain, rights and responsibilities in production tend to be differentiated according to gender. To understand how they are distributed it is important to look at the division of labor and power relations, which depend on the social constructions of gender that tend to vary by class, culture, and place (Rocheleau, Thomas-Slayter, & Wangari, 1996; Elmhirst, 2015). In

this section, I discuss how male and female-headed farms organize and distribute agricultural tasks differently, which also weighs on who has the right to take part in negotiations over the farm´s decisions. Male-headed farms tend to be organized based on the hegemonic gender order, so men take care of all different productive tasks regularly, while women work occasionally on duties that are not considered tough. For this same reason, most women in these farms don´t tend to participate that much in decisions related to the farm. On the contrary, female-headed farms rupture with the traditional division of labor, as female managers work permanently on agriculture and carry out all the different tasks required, while also having the legitimacy to make choices.

The distribution of agricultural responsibilities is different in male, female, and co-managed farms because of land ownership and variances in femininity and masculinity representations and performances. Deere´s (2013) study shows that land ownership can give some women greater autonomy and rights over the use and control of resources. In the same manner, female managers throughout this research get to assume the user rights and responsibilities attached to the management of the farm (Rocheleau, Thomas-Slayter, & Wangari, 1996), and so they have control over their own labor and that of others. Consequently, by undertaking all the different tasks without recognizing gender differences, they challenge the gender order and expectations associated with a hegemonic femininity construction (Paechter, 2018), like notions that women can't or shouldn't do certain tasks because they are weaker or delicate. Thus, their subjective femininities are constructed based on qualities such as independence, capability, decisiveness, and so on. In contrast, in male-headed farms there continues to be differentiated tasks and responsibilities that sustain and reproduce the traditional gender order based on hegemonic notions of femininity and masculinity, such as the idea that men are more capable of doing harder jobs.

In northern Cartago, farms managed by men compared to those by women show differences in the number of times men and women work in the farms, as well as the tasks allocated to each, which result in distinct responsibilities. In those cases where men are the farm managers and where management is shared, men are the regular and permanent farmworkers, while wives, daughters, or sisters are "occasional" and "seasonal workers" (Martín, Román, & Lara, 1996). Most of these women confess they love working in the fields, but they have other responsibilities that restrict them from getting involved more often. Some do daily household chores, others work outside the farm as wage workers or independently; yet they all get involved in farm work at certain moments of the production cycle when extra labor is needed, by performing tasks that are not considered difficult or hard on women. Due to their partial involvement in agriculture, these women receive little or no income for their productive work on the farm, so some rely on others to buy them clothes or personal items or they find other ways to make a profit to contribute to the household economy. Men in these cases tend to make most of their profit from agriculture, so they constitute the main breadwinners, although it is common for other members, like sons or/and daughters, to contribute to the household income as well. These are families that have a diversified income but rely heavily on agriculture for their livelihoods.

Women in these farms tend to get involved in the production of onion much more than the production of potatoes because the latter is said to entail harder work. Rocio, the young daughter of a male farm manager, said that "honestly, I have never seen a woman collect potatoes" (Personal communication, 29-01-2018). Juaquin, a male landowner and manager whose primary crops are onions and potatoes, also agrees that there are certain types of work that women should not do like carrying boxes of a product or producing potatoes. He says, "they can do it, but it´s damaging" (Personal communication, 24-01-2018). Hence, most people concurred that women in these farms

participate much more in the production of onions doing tasks like planting, weeding, harvesting, and preparing them for the market. Men also do these jobs, plus are in charge of tasks considered heavy such as spraying agrochemicals or lifting boxes or bags of products, and they oversee the whole production of potatoes. The differentiation of tasks between men and women and the reasons that sustain such differentiation reveal that in these male-headed farms individuals behave in accordance to local hegemonic ideas of masculinity and femininity, which sustain a gender binary order (Paechter, 2018). Hegemonic masculinity revolves around the idea of doing "tough" or "strong" labor, so men are the ones who do "hard" work in agriculture. On the contrary, hegemonic femininity is rooted in notions of a female body that is qualified as "weaker" or "delicate", so women are not built or capable to carry out many of agriculture´s heavy duties. These gender notions result in a gendered division of agricultural labor, which not only justifies that men carry out most of the physical agricultural work, but also that they are in charge of making productive and managerial decisions, resulting in the exclusion or subordination of women´s opinions to those of men.

On the contrary, in female-headed farms women produce onions plus other types of crops. They don´t choose their crops based on their easiness or convenience. Also, they are the ones who work permanently on the farms and do all the required jobs, including heavy lifting or spraying of substances. Therefore, they don´t make distinctions between which tasks they can or cannot do, nor do they hire male labor to do it. For example, in Tierra Blanca, Francisca, an organic farm manager who inherited her land and whose husband works outside the farm, says "I almost always do everything myself. Let's say: preparing the soil, sowing, growing, the fertilizers, the harvest, selling. Everything." (Personal communication, 08-03-2018). It is also common in these farms for other family members to work at certain moments of the production cycle, when their help is

needed, but women´s labor in these situations does not change. For example, one day I was helping Lucía and her husband with the bean harvest. She is a farm manager who inherited land in Tierra Blanca. Her husband works outside the farm but had a day off. When it was time for a break, Lucía took the bag of beans and carried it over her shoulder up to the house. She did not ask her husband to do it, nor did he offer to carry it for her, although it was a heavy bag.

Also, in these households, women´s earnings from agriculture constitute a large part of the household´s economy, since they chose to give part of their earnings for household needs while another part is used to reinvest in agriculture. However, they do not constitute the main breadwinners since it is common for other members to contribute to the household income significantly as well, such as their partners or offspring.

The analysis of these cases evidence that female managers perform other types of femininities which are not the hegemonic one. By undertaking all the farm´s labors, including its management, these women challenge the hegemonic construction of femininity. It could be argued that they do so by assuming some of the typical masculine behaviors and as a result, they produce new and diverse femininities on the field that evidence that women´s bodies are capable of doing the same labors and take on the same responsibilities as men do. Like Sol states "we may take 20 minutes more than men do, but we do things better than a man because we do them with more detail" (personal communication, 24-08-2018). Thus, their feminine identities are constructed around notions of being hard-working, capable, autonomous, persistent, and dedicated and they see no limitations to what they can or cannot do because of their gender.

Male-headed coffee farms in Grecia also tend to reproduce the hegemonic gender order by enacting hegemonic femininities and masculinities. In these households, there is a noticeable gen-

der division of tasks and responsibilities associated with agricultural production. Women do seasonal work as they participate in coffee production only when it is time for the harvest, which is when extra labor is required (Martín, Román, & Lara, 1996). From November to March all the family, including children, wake up early in the morning to pick coffee cherries until sunset. For example, Ligia, whose husband is a coffee farmer, recalls that since a young age she participated in picking coffee cherries during harvest season. She said: "there was not a harvest that me and the kids missed… just one year when one of my babies was going to be born I did not go because he was due in March, and the coffee harvest lasts from November to February, so that year I was not able to go" (personal communication, 5-08-2018). Another example is given by Franco, a male farm manager, who explains that his wife used to always participate in the harvest. "All this time until now, she no longer wants to, but the old lady always used to help me and women… the external coffee pickers are women many times" (personal communication, 18-10-2018). Therefore, coffee picking is a type of labor that is done by anyone regardless of gender and age and it is considered a good way to earn some money because it is a paid labor. However, during the rest of the productive process, it is men who work permanently and do the rest of the chores like weeding, agrochemical applications, and so on, as these tasks are associated with a hegemonic masculinity representation. On the contrary, hegemonic femininity implies that women´s bodies are not fit to carry on with those other tasks. Sofía´s comment exemplifies this point: "what is done with the chemical spraying pumps is what I believe women can´t do, spraying of chemicals or… well there are brave women, but I don´t know, I have never seen one, for example, prepare the land or that kind of stuff. Women here don´t really get involved with that" (personal communication, 18-10-2018).

In co-managed coffee farms, women get more involved at other stages of coffee production, so they can be considered as occasional workers. This means they participate in various moments of the production cycle, but the chores are distributed by gender depending on their hardship. Just as in male-headed farms, there are hegemonic representations of femininity and masculinity grounded on bodily differences and what these bodies are believed to be capable of doing, which justifies a gender division of tasks and determines women´s limitations in agricultural production while legitimizing men as the authentic farmer. However, consistent with the findings by Martin et al (1996), women who work more regularly in agriculture also get more involved in the farm´s decisions. Their performances in some ways challenge the gender order by getting more involved than expected, yet their behaviors are not that radical as to disrupt the order completely. Gloriana, who co-manages the farm with her husband, explains what she feels capable of, as well as her limitations: "one can put fertilizer, one can cut the weeds… obviously, you´re not going to be there that much, because the man´s structure is stronger than ours but it´s the same, one can pick coffee, can put fertilizer, can cut the grass, can do holes in the ground, can plant coffee, can do all of that, but the part that I do believe is not convenient for women has to do with lifting weight" (personal communication, 26-06-2018). Another example is Adelina who has a health issue that impedes her from doing certain tasks, but she waters the coffee trees and trims the shade trees, plus she grows other crops for self-consumption such as cassava, plantains, bananas, and others. "I avoid lifting things… but thanks to the grace of God I can do everything, so sometimes I go there and I pick the things that I have planted and here I sometimes plant seeds…" she explained (personal communication, 27-06-2019). Thus, these farms' agricultural labors are grounded in hegemonic masculinity and femininity constructions. For this reason, throughout the cases, none of the women work permanently in coffee production as it is still considered a male occupation. Melissa and

Diego´s farm is the only exception. She co-manages the farm and acknowledges that she works alongside her husband and son permanently, taking care of the same chores without differentiating them according to gender. In her words:

> "Our case is very particular. Yes, I ... I take out old coffee trees and other things, for example, I like pruning a lot, pruning coffee I do it myself, you always have to do it among other things. Removing the bud, I really like to remove the buds, well everything ... in fact, everything about coffee and earth I like a lot, fixing fences and everything, pruning the trees and all that. So really here there is no difference in what Danilo does not do or Diego does not do, because now, for example, that we started to take out that coffee or always, as long as I have worked there ... well the only thing is the application of chemicals because maybe two people are required, one that applies it while the other one holds the hose, so they do not need me, but everything else we do it ... there is no difference, maybe I have less strength, for sure that's how it is, but we still do the same work all three of us. For example, when we take out the old coffee trees it's the same. Diego, Danilo, or I roll the chains around the stumps, then we pull them, so it's all the same, all the same" (personal communication, 04-24-2018).

Melissa also acknowledges that she used to feel capable of doing everything that is needed, yet now her age and physical problems are limiting her from doing all the things she used to do, but she does not consider gender to be a differentiating factor. Because of her ideas and behaviors, Melissa challenges the hegemonic notion of femininity and performs another feminine subjective identity by re-signifying her body.

Other exceptional cases to the gender norm are male and co-managed farms that grow other crops, which signal that vegetables don´t convey hegemonic gender constructions with the same

force as coffee production does. Hence, the division of labor is less rigid, allowing women to participate much more in the production of vegetables. In Francisco´s organic farm, for example, women get much more involved in agricultural labor. Sarita, his daughter, works permanently on the farm and does all required labors.

In Cóbano, the hegemonic notion of femininity is constructed around a more active and regular participation of women in agriculture. Thus, families are not organized based on a rigid division of labor that marginalizes women from agricultural work. Yet, there is a construction of women´s bodies as "weaker" and men´s bodies as "stronger" that justifies a gender division of agricultural tasks, as well as a gender divide on the types of crops men and women grow.

In male-headed farms, these differences sustain a gender order based on men´s control over the farm´s main productive activities, which revolves primarily around animals, such as cows or goats. Women contribute by turning the animal´s milk into cheese, which is commercialized by men. Men occupy themselves regularly with the caretaking of the animals and the overall farm maintenance. Women also work regularly, but a lesser number of hours because they take care of household chores; yet their productive work might intensify some days when they have to fill in for partners or other family members. For example, on Cecilia´s farm, there are cows and pigs, so she explained that "he [her husband] milk´s the cows. If he is here, he milks the cows and I do household work. And the kids… if he must go out, then it is up to them to assume that task" (personal communication, 03-08-2018). Thus, men are attributed with those chores that relate to animals and selling the products, and only when the male members are not around, she takes over. "If Martin is not around or he has to work [outside the farm] then I feed the pigs or if there is the need to move the calves… so all of those things" (persona communication, 03-08-2018).

Crops for self-consumption are also a basis for divided labor in these farms because men tend to grow rice and beans and women grow vegetables or herbs. Although women are not land-owners and farm managers, they have a certain autonomy to make decisions related to their vegetables. They tend to care for all or most of the tasks such as planting, weeding, harvesting, watering, and so on, but some of them transfer certain tasks they consider tough to men, like preparing the land. Men assist women more often in the vegetable garden, because it requires more consistent labor, than women assist men in the rice and bean production, as these require less frequent labor.

Likewise, women in female-headed farms grow vegetables, but what makes these farms different is that farm management is mostly undertaken by them as well, while men are the occasional farmworkers who “help” with some forms of labor, as they usually have other occupations outside the farm. Women do most of the daily required labors associated with vegetable production, such as planting, weeding, and harvesting. For example, Carmela, a vegetable producer, believes that “a good and healthy person has no restriction here" (personal communication, 30-07-2018), so there are no differences between what men and women can do on the farm. These women challenge and resist the hegemonic notion of femininity by assuming a dominant role in agriculture, a position that has been traditionally occupied by men. They enact diverse femininities based on qualities such as autonomy, determination, and skills to command. Yet, there are still certain behavioral patterns that some men and women enact associated with hegemonic notions of masculinity and femininity, such as that women don´t perform certain tasks because they are considered “tough”, relying on men to do them. Therefore, masculinity is defined based on bodily strength, while femininity is qualified as the opposite. For example, some women ask their partners or sons to do certain tasks when they get home from work or school, such as watering the plants (when they don´t have an integrated irrigation system) or spraying chemicals. Both chores are said

to require body strength. Roman´s comment evidence this: “I turn the land, prepare it and everything the requires effort, let´s say men´s jobs, that is what we do. That 20 or 30 percent is what we do” (personal communication, 30-07-2018). His statement reflects that men are assigned specific agricultural responsibilities because of masculinity constructions, as well as other types of labor that entail building or repairing. For example, vegetables are grown in greenhouses or micro-tunnels, so the construction or repair of these structures is done by the male members of the household. Simona, who produces vegetables with micro-tunnels, commented: “yes, my husband helps me. For example, those stakes that they put there with the plastic, only he can do it. Cut the wood…the iron bars, all of that I can´t do it myself. Those are jobs for a man” (personal communication, 31-07-2018). Additionally, in farms where there are other crops like rice or beans, men tend to be responsible for them.

Another important aspect is that these women also participate in decisions regarding commercialization and administration of earnings, which is rather different from what Martin et al (1996) and Cazanga (1993) observed in their studies. Women decide to whom they sell their products, the prices, and how they use their earnings. Simona, for example, said: “I sell one part, give away another and eat another” (personal communication, 31-07-2018). They acknowledge that they don´t earn a lot of money and that most of it are used to reinvest in vegetable production or for household expenses, so most of them rely on other members of the family to buy them clothes or shoes when they are in need, yet even a small sum gives them certain autonomy. For example, Melba explains “for the moment I sometimes take the money and I buy other plants, and, on the side, I also put money for the end of the year” (personal communication, 31-07-2018). Hence, by (co)managing the farm women have more control over commercialization and profits.

3. The household´s reproductive dimension

So far, I have shown that it is very common for men and women to take part in agricultural production in smallholder farms, although they tend to differ in the frequency and tasks they do when comparing male-managed farms with female ones. The degree to which women participate in agriculture depends, for many of them, on other responsibilities they might have within farms, such as domestic chores and caretaking of other family members, as was evidenced by Martin et al (1996). However, reproductive labor is assumed by all of them without distinction, which signals it is their primary responsibility. Even female farm managers that work permanently in agriculture undertake domestic chores and caretaking responsibilities.

Throughout the three sites, female participants in all the types of farms, are the ones who perform most household responsibilities on a daily basis, which is consistent with findings by Cazanga (1993) and Martín et al (1996). Female farm managers, wage workers, or those who don´t work for a profit, regardless of their place of residence, have in common that they undertake chores like cleaning, cooking, washing, and in some cases taking care of small children or elderly people. As Socorro from northern Cartago asserted, "every day there is the need to wash, the need to iron, the need to clean, the need to cook, go out and do errands. That kind of thing" (personal communication, 23-03-2018). Despite their different feminine identities that stem from their occupation, of which some don´t adhere to the hegemonic notion, the household is still considered as their domain and for some, it represents a double or even triple burden. In this specific space, all women´s femininities are consistent with hegemonic constructions.

Older women are the ones who assume most of these responsibilities. In some families, some younger women help with chores; however, their involvement depends on whether they have jobs outside the farm or study. For example, Ligia from Grecia explained the situation with her daughter:

> "I remember that while they were at school, I never put them to do anything. I told them "you are in school and you are there" so I was the one who did ... I was the one who did the work. They went to school and came back and meanwhile I had clothes ready, food ready, everything ready…. when she (her daughter) dropped out of school and did not want to study then I said ok if you don´t want to study then don´t study, but then you have to learn to do the household work because it is one thing or the another, but she did not want to study and the boys did study…" (personal communication, 05-08-2018).

Hence, in their case, Ligia and her daughter have been sharing household duties ever since she stopped her studies. In other families it is similar, when younger women have other responsibilities, aged women undertake household chores. Yet, if their daughters or granddaughters don´t work or study, then household work tends to be distributed between them. Either way, the hegemonic construction of femininity holds women responsible for household labor, so young women are socialized to learn and perform these types of labor.

In some families, women also assume the care of their grandchildren or elderly parents. Not only do they spend their days doing household chores, but they also watch over other individuals who need special care, which turns into extra work for them. For example, Ana, from Grecia, explains that her mother had an accident when she was younger, which impedes her from doing certain things. After taking care of household chores at her own house, Ana goes to her mother´s house three times per week to do her domestic labor, plus she also buys her groceries and medicines, and she accompanies her to doctor´s appointments. Another case is Julieta´s. Both her parents are ill, so she and her brother have undertaken farm management and agricultural production. Besides working on the field every day, she also takes care of her parents and does their household labor.

As for men, they acknowledge that women are the main caretakers of the household and, thus, bear most of the responsibilities. The social construction of masculinity rests on the gender division of labor, so they don´t get involved with household labor or care work as much. The extent of men´s involvement in the households varies, ranging from those who don´t contribute at all to those who take part doing certain tasks, yet in none of the homes, chores are equitably distributed. A few men express they do tasks like washing the dishes or if women are not around and "they have to" – as some say- then, they might do other things, as some sweep the floor, others do some cooking, others serve and heat their food or prepare coffee, but that's the extent of their involvement. Thus, for most of them, these are not regular duties. But, when asked who does repairs or renovations around the house, one thing most households have in common is that men are in charge of doing these tasks, which corresponds to a hegemonic masculinity representation.

In some families, women validate men´s lack of contribution around the household based on the traditional gender division of labor, so they accept that men don´t cooperate because it is simply not part of their responsibility. Adelina, from Grecia, recognized her husband contributes little to household labor but she justifies it in the following manner:

> "in my case, my husband works to support the house, so then I have to maintain it, so the truth is that there are other things that I could do but I don´t because my obligation is to keep the house, as a housewife. I have the obligation as a housewife because my husband is many things but for him to come tired after work and get home and find that there is nothing done and to have to do his laundry or do all of his things, I don´t think so…. I believe in a marriage each one has different obligations, and it is not that I consider myself one of those women from before that had to do everything in the house, I´m not, because I

have accustomed them [sons and daughters] to help me around the house but it is a bit complicated because I don´t have a salary" (personal communication, 06-10-2018).

Adelina and her husband reproduce the hegemonic gender order justified on a division of labor, as it is in other families. So, by having both partners agree on those terms, the lack of contribution on the side of men is not a motive for conflict. However, Adelina refuses to see herself as a woman who does everything around the house, distancing herself from the past gender order by claiming that her sons and daughter contribute to household chores. However, the magnitude of their contribution is to wash their dishes and to keep their rooms organized, while the rest of the chores are done by her. Drawing from this case, which serves as an example of other households, it is interesting to note that the gender division of labor used to be much more radical, in the sense that women used to do all household chores without participation from any male member.

Gender relations from the past are described as "machista", according to participants, which means there was a fixed gender order based on a division of labor that valued men´s labors over that of women, allowing to sustain male domination. Josué, from Grecia, explained: "the field was for men and the home for women" (personal communication, 19-06-2018) or in the words of Lucía, from northern Cartago, "before, they got married and women always had to be in the house, taking care of children and watching over the house, while men had to work. God forbid women worked or got married and then both had to work, no. Women were always for the house" (personal communication, 06-02-2018). In most families, women were responsible for doing all things pertaining to the house, so men never got involved with household chores. Miguel, for example, explained how he was socialized growing up: "one sees that those were other times, and one starts to analyze that maybe our own mothers contributed in making us "machistas". Only because you

were a man they didn't even give you a dish to wash, so we got used to that" (personal communication, 26-06-2016). Another example is given by Sofía, from Grecia, who describes her father as "machista" because he never contributed around the house: "he was one of those who said that men don´t do that kind of thing, men don´t even… they sit and wait to be served. They don´t even take the spoon" (personal communication, 18-10-2018). Thus, participants from all three places describe past gender power relations similarly. The concept of "machismo" reflects a hegemonic gender order that not only produced differences of labor and responsibilities but also sustained a hegemonic notion of masculinity that situated men in a superior and dominating position legitimizing differences and subsequent inequalities, such as men commanding women, deciding for them and even in some cases using violence against them. Just to give a few examples, Ana María recalled when her husband banned her from taking bakery courses because he did not want her to go out, or Melba and Clotilde, whose fathers did not want to let them study because they thought it was useless for women to do so as they would get married.

Now, participants perceive people are less sexist. Gender roles, then, have become a little more flexible, which is reflected in men´s participation around the house. They even acknowledge they have seen changes in their own households when comparing their relationships to when they first got married. Luz, from Cóbano, shared that her husband at first used to provide for her and so he did not let her work. After they were close to separating, things changed and now she manages the vegetable production, and he helps around the house. So, according to Luz, "before men used to be machista, but with time, in the times we are living now, women have stopped to be that person that is under a man´s shoes" (personal communication, 28-07-2018). Ana María, from northern Cartago, also shared things have changed ever since her husband prohibited her from taking bakery lessons. Now, he is different because he does not tell her what to do and he helps

around the house. Her opinion is that: “Men help now. Today men help and they help a lot, they help a lot. Before you did not see that” (personal communication, 19-01-2018).

It seems that most women acknowledge certain changes have occurred in comparison to the past. Small actions, such as men serving their own food or doing certain tasks around the house, which might seem insignificant in other contexts, signify for them that the notion of hegemonic masculinity has evolved producing certain changes in the gender dynamics, especially evident in men´s behaviors in the space of the household. Miguel´s thinking reflects those new masculinities when he says “washing, ironing, cooking are not just for women, it is for everyone” (personal communication, 28-07-2018). Some women recognize these changes as positive. Rather than complaining that household chores are not equally divided among household members, what male members contribute with is not only recognized by some women, but it sustains their impression that domestic labor is now shared. Thus, they depict domestic relations as based on cooperation, rather than conflict. Another example is Mila´s household, located in northern Cartago, where her husband and sons depend on her or her daughter to do all household work, including cooking and serving their food. So, from Mila´s point of view, one of her sons contributes to household labor because he serves his own food and he does the dishes, while her other two sons don´t eat if she is not around to serve them. Simona, from Cóbano, whose husband had to take a leave of absence from work, swept the floors or washed the dishes at their house during his stay at home, so she states that “when he can, he helps”. Therefore, although men´s involvement might be limited and inconsistent, these women consider they take part in domestic labors. It satisfies them that they find themselves distancing from that past, which they perceived as oppressive because male members contribute with certain tasks. Their perception is that the gender division of labor has evolved.

Some participants even recognize their own efforts to change the gender order, as in Lina´s experience with her ex-husband:

> "Maybe the mentality of men has changed a little, but they are still macho. They are still very macho, thinking that they are getting married and that the woman is for the home, doing all the work and serving them food. I do not, I never did, I never served food to my husband. I made the food but told him to serve himself. For the same reason, to cushion that enormous machismo that I hate, because I hate it. Machismo is the worst thing there can be in society and then yes, I did try to teach them a little differently" (personal communication, 05-09-2018).

But like Lina, some women sustain that machismo is not a thing of the past. Clotilde´s opinion is that in northern Cartago, "men here continue to be very "machistas" and you can still see it I tell you, because men go out to work and women have to stay in the house taking care of the kids" (personal communication, 23-08-2018), so things have not changed drastically. The hegemonic gender order continues to produce and is sustained by a division of labor, which is particularly evident in the reproductive dimension and the femininity constructions attached to it. For this reason, in some other families, the sense of cooperation is not prominent, or at least, it does not relate to all household members. Those who do not contribute to household chores produce tension and conflict with other members who perceive labors are not fairly distributed. In northern Cartago, Lila, the daughter of a farm manager, complains that in her family, composed of 4 brothers and 4 sisters, men don´t participate in household labor. Only her mother and sisters take care of the house, so she feels it is unfair that her brothers don´t bother to help them, especially because their mother is an elderly woman, and the sisters would like to alleviate those chores for their mother. This has caused conflicts among siblings, and the sisters have tried talking to their brothers

but “They get mad because we ask for things to be equitable… but things don´t change” (personal communication, 29-01-2018). She believes her own mother is in part to blame and she considers her to be “machista” because she just accepts that her sons don´t cooperate. Another example takes place in Lucía´s farm in Cóbano. She complains that her son and grandson who live in her house do not cooperate enough. She referred to them in the following way: “they are lazy… I´m going to propose a law because I pay everything for them and they don´t contribute in any way” (personal communication, 28-07-2018). Her husband Miguel agrees and says that they are inconsiderate because they don´t cooperate with the cleaning. These cases evidence that, although the gender order has somewhat changed, it has not drastically transformed as certain male members behave as though women were the only ones responsible for the household, reflecting the persistence of hegemonic femininity and masculinity representations.

Given that reproductive labors are assumed as women´s responsibility, they manage their time to take care of household chores and other duties, which may vary according to agricultural cycles. Women in male-headed farms in northern Cartago, Grecia, and Cóbano explained their daily schedule adjusts to the schedule of those who work in agriculture, but they continue working long after other members come back from the field. They wake up very early in the morning, between 4:30 or 5 am, sometimes before anyone else, because they have to prepare breakfast for their families, especially for the ones who go off to work as they start their labor at 6 am. In some cases, they must prepare lunch because others who work outside the farm might not come back from work until later in the afternoon. Once everybody leaves, they clean the kitchen, wash clothes, and clean the rest of the house. By the time they are done, they start preparing lunch because at 1 pm those working on the fields come back and the food has to be ready. Afterward, they clean the dishes and the kitchen again. Those women who don´t have to take care of small children or the

elderly can take a little time in the afternoon to rest for a while. However, between 3 and 4 pm families are used to drinking afternoon coffee and women prepare it. At this time, all members are back in the house and it is usually a time spent together talking about their day. After this, is time to start preparing dinner. In farming families, people tend to sleep early, so dinner is ready at 6 or 7 pm at the latest. Most household members relax after their meal for a couple of hours and watch TV, but women have to finish cleaning the dishes and the kitchen before they can take some time off. Around 9 pm they turn in and go to sleep.

When more labor is needed in the production of coffee and onions, women on male-headed farms organize their time to manage both types of labor. During those days, they prepare breakfast and lunch before they go to work. Once they come back to the house at 1 pm, like the other field workers, they serve lunch to their family. Afterward, they do the dishes, clean the kitchen and do some of the household chores that they could not do before. They work more hours during those periods, sometimes doubling their shift and cutting out their leisure time, but most of them express they enjoy these moments because they get to work the land.

In female and co-managed farms, something similar occurs as women not only work in agriculture and farm management every day but are also in charge of household chores. Undertaking farm labor does not mean they renounce their role in the household, so they have to factor both in their time management. Taking on productive and reproductive labor means assuming a double burden. For example, Simona, from Cóbano, who works and manages her vegetable production, says she also does “all household labors, like washings, cleaning, organizing. All that´s on me” (personal communication, 31-07-2018). Because most farm managers work in agriculture regu-

larly, they divide their days between their productive labor and reproductive work. Female manager Lucía, from northern Cartago, is another one who assumes both labors. This is her usual routine:

> "I wake up at 5 in the morning, we wake up at 5 am because he (her husband) leaves a little before 6 am. I make his coffee and lunch, I put it in a bag and thermos, and he goes off to work. I stay and I start to arrange my room. I do all the cleaning slowly because I´m not in a rush, slowly if I don´t have to go down (to the field). Let's say, for example, today I did not have to go to the field. I started to clean and all that, I gave my daughter breakfast, I prepared her breakfast and she got ready, and then she left for work. I was left alone. I´m cleaning, I´m cooking, and then at lunchtime, I prepare food and bread if I have to do bread… But if I have to go to the field, then I wake up, I see my husband off and I leave the house as it is, with beds unmade and all that. I go to the field, either to cut pumpkins or take-out beets or onions or weed or whatever I have to do. By mid-day, I´m back home again and then I start cleaning and doing all that stuff" (personal communication, 06-02-2018).

As Lucía, most of these women start their day early in the morning, sometime before other household members to get started on breakfast for the family and, in some cases, lunch for those who don´t come back at noon. Then, once others leave, they either start some of the household cleaning or they leave for the field and, when they come back, they take care of household chores, such as cleaning, washing clothes, and so on. In the afternoon, if it is not raining, some of them return to the fields to keep working for a while longer until it starts to get dark and is time to prepare dinner. They wash dishes and clean the kitchen before they can take some time off before

going to sleep. Their dedication to productive and reproductive labor means women work long hours and assume a double burden that is not shared with anyone else.

Women confess household work is very tiring and demanding since it must be done every day. Some would rather do agricultural work, instead of domestic labor. Socorro, a 69-year-old woman, who is the mother of a younger producer, and who used to work in agriculture, expressed the following when comparing the two occupations: "I feel that household work is much more tiring because one spends all day working but the house never looks good… let's say clean because you work, work and work and you never get to see the house organized as one would wish" (personal communication, 23-03-2018). Other women also recognize that it is hard work because it implies longer working hours, as Mildred says: "there is always something to be done and sometimes you are the first to wake up and the last to go to sleep" (personal communication, 29-01-2018), so their shift is longer than anyone else's. Yet, when asked how important household work is compared to other types of work, most of them acknowledge that what they do is very important to keep the farm and the family moving; they consider their role to be essential in sustaining their family's life. Ana explained that for her it is very important because "one is practically the one who directs the family" (personal communication, 24-04-2018) or like Monica said: "… although it is very tiring it is very nice, very pleasant because one does things for love and dedication as one waits for them to come from work" (personal communication,12-02-2018). Their complacent answers reveal their interiorization of the gender norm and with it, subjectivities that conform to hegemonic femininities.

Except for a few cases, most women in male-headed farms do not earn a wage as their role revolve around the household and it consumes most of their time, which is similar to what Cazanga (1993) and Martin et al (1996) observed. They don´t have any income or regular source of money

of their own to manage. Then, women´s reproductive labor is not only unpaid but undervalued, although what they do is essential to sustain productive labor. Matilde, a housewife from northern Cartago whose husband manages the farm, gave her point of view: “one works without pay. One does not have pay. The role of the housewife is very hard and one does not have pay” (personal communication, 29-01-2018). So, like her, there are other women who, for the most part, depend on their husband’s income and that of their children (in those cases where they’re old enough to work). Thus, they manage to buy things for themselves, such as hygiene products or clothes, with the little money that their husbands or children give them or are given to them as gifts; thus, they feel very grateful towards those who take care of them. Although women don´t earn and manage their own money, some of them are responsible for buying food and paying the bills. Their husbands or children give them money, so they can decide what is needed and buy at the supermarket, as well as pay for water and electricity consumption. Hence, they are in charge of managing the household´s finances and expenditures.

On the contrary, female farm managers receive an income from their farm production, so they manage their own money. They use part of it to reinvest in the farm, but the other part is used for other household expenses. Thus, they contribute to the household income. When asked if they keep part of it for themselves, they explained that it is rather difficult to save money or to have leftover money because there are many needs, so they prefer to prioritize and spend it on the family or the house; yet, if they have to buy clothing or other personal items then they have the possibility of using their own money to buy it. Like other women, they are also in charge of making the grocery list and buying what is needed, as well as paying the bills. Hence, not only are they farm managers, but household managers as well.

4. Conclusion

In farming households productive and reproductive labor come together; so, their functioning relies on members assuming both. Traditionally, the hegemonic gender order in rural settings was founded on a division of labor that allocates agricultural labor to men and household labor to women, which led to attribute more value to men´s work than to women´s, legitimize gender inequalities and restrict women´s participation in agriculture and decision-making. However, the comparison of male, female and co-managed farms through the three localities evidence that farms/households differ in how labor is distributed according to gender, particularly those related to agricultural production, and who has the most influence in decision-making.

The variations in the gender order that some farms/households show can be explained by land ownership and the gender of the farm manager. First, land ownership confers men and/or women landowners the power and right to use the land for productive purposes. It entitles them to assume the farm´s management and become the main decision-makers. For women landowners, it is particularly significant because it allows them to challenge their social positions in the gender structure by undertaking the farm´s management.

Henceforth, the gender of the manager can cause variations in the configuration of power relations and, consequently, the gender allocation of agricultural rights and responsibilities. Precisely because of this, in female-headed farms, women not only are the main decision-makers, but they control their own labor and that of others. They are used to working permanently on the farms and undertaking all different tasks and by doing so, they perform other feminine identities as opposed to hegemonic ones. Nonetheless, some of them have seen their land user rights questioned and challenged by other members based on gender norms, but women´s bargaining power has been stronger due to their land tenure, so they have been able to keep their user rights and management.

In co-managed farms, women also get more involved in agricultural labor and decisions, because owning part of the land confers them with the voice and bargaining power to negotiate with their partners. So, they share the management of the farms with their spouses.

Male-headed farms, on the other hand, continue to reproduce the traditional division of labor and the hegemonic femininities and masculinities attached to them, which represent men as the legitimate farmers and main decision-makers. In these farms, landless and unwaged women, which are women who don´t formally possess land, are often restricted from taking part in negotiations concerning the farm, because of the power differences that emerge from their situatedness in the gender structure.

Nevertheless, even if some of these households are defying the gender norm through a different gender distribution of rights and responsibilities in agricultural production, the hegemonic order has not drastically changed as reproductive labor is still very much attached to hegemonic femininity representations. For this reason, all farms have in common that women continue to assume domestic labors and caretaking of other family members, sometimes duplicating their burden.

One last observation is that while it is clear that male and female farm managers have decision-making power related to the farm, whether or not they negotiate agricultural decisions with other members reveals their power relations. There are those where asymmetrical relations prevail because managers are reluctant to include other members in negotiations, so they make decisions on their own. In other farms, especially in co-managed farms, households display a combination of asymmetrical/symmetrical relations, because negotiations include some members while leaving others out. In fewer cases, symmetrical relations are the norm, so its members have a more egalitarian style of decision-making, in which they all take part in negotiations where they express their views and influence decisions.

CHAPTER 5 – MAKING SENSE OF A VARIABLE AND CHANGING CLIMATE

1. Introduction

On a very warm and humid July afternoon in a small community located 175 km northwest from the capital San José and about18 km from downtown Cóbano through a dirt road, I found myself sitting down at Mr. Humberto's table drinking fresh coffee prepared by his wife, Melba. Mr. Humberto is 53 years old, works in construction, and he, together with his wife, owns the land where the farm is. While I drank my coffee, I listened to Mr. Humberto´s description of the changes he has observed over the years regarding the climate of this coastal area where he was born. He told me the following memory:

> "[…] we had an experience with my father in Valle Azul (Blue Valley), on his land, of a 9-month summer. A lot of cattle died and practically agriculture… imagine a 9-month summer, it was something serious. Yes, many cattle died, the ducks got lost, well it was something terrible. But you kind of see that, well we saw it as a phenomenon that occurred, but yes, it has been more a less 20 years since I started to see that things are not the same as they used to be. Now when it rains, it rains very hard, so everything is washed down and there are [river] risings and terrible things. But there is also a lot of summer. Yes, this used to be a place I loved because of the rain. It used to rain a lot. Very good, I used to say that this area was very good for agriculture, cattle farming and everything else because it rained a lot. But that is over. Now you don´t know whether the rainy season is going to begin at the end of April, or it is going to start in June or July. There have been times where hard rain comes down in May but then it becomes dry until the rain starts again until June or

July, so there is much instability. Then, you don´t need glasses to see it, because it is right there in plain sight that things are not as they used to be when it rained normally, and the summer was normal. No, that is no more. We have been, in these days, we have been seeing a situation that has been happening. These days everything gets dark but so dark that you think "ok, it´s going to rain", but it doesn´t. It gets all cloudy, it gets dark, but it does not pour. Some drizzle falls but that is it. So yes, of course, the change has been drastic" (personal communication, 31-07-2018).

During a cooler and foggy August morning, sitting at another kitchen table I listened to Clotilde, a 50-year-old widow who inherited land from her parents and her husband, make a similar climate description. The difference is that Clotilde lives in Tierra Blanca, another geographical region distinguished by its mountainous landscape, located about 30 km south of the capital San José. On that occasion, she shared her descriptions of the environmental and climate changes she has seen over the years in this locality since she was a little girl. She recalled this childhood memory, which she relates to these changes:

"[…] I remember that before there used to be whole days of rain. When we were little they used to tease me a lot because there were days we played… we had a "minibank", so there were days we used to spend all day long playing with father "minibank" because it would not stop raining, and back then we only had a TV and there was no place to go. It is not like it is now with cable, computer… not before and we spend all together that day playing "minibank" because you would wake up and it was raining, and you would go to bed and it was raining and the next day it was the same. So, the seasons used to be established, what was the rainy and dry season. Now it is not, it is not" (personal communication, 23-08-2018).

These anecdotes, which belong to people living in very different parts of the country, describe a similar picture of the climate transformations that have been occurring. These two examples illustrate what many others through the three localities have been observing regarding environmental and climate transformation. It is part of their "lived experiences" of climate change (Abbott & Wilson, 2015), which include how participants perceive and make sense of this phenomenon and its impacts, which constitutes the main focus of this chapter.

Lived experiences comprise how we perceive and make sense of this environmental phenomenon, but also the actions taken to face it (Abbott & Wilson, 2015). In this chapter, I will focus on the perceived manifestations of climate change and its agricultural impacts. Lived experiences account for experiential knowledge (Abbott & Wilson, 2015; Agarwal, 1992; Yeh, 2016) that is rooted in historically and socially situated bodies and everyday practices (Qvotrup & Elg, 2010; Allen-Collison, 2011). Traversed by multiple and intersecting power structures, our situated bodies are the site from where we come in contact with the environment, including climate (Yeh, 2016). I delve into participant´s perceived manifestations of these climate changes that disrupt and challenge their business as usual. Their narratives about what they observe at present and how they compare them to past observations constitute a doorway into how climate change has concrete expressions in each locality, as well as the effects it has on their livelihoods and personal lives. Participants come to know climate patterns and changes through everyday agricultural labor, as crops depend on certain climate conditions to grow. There are certain seasons and within them, specific months that are more adequate for agriculture, so smallholder farms tend to plan their production according to expected climate patterns. However, over time, patterns have become

more erratic, making it difficult for them to carry on with their usual plans. Because of their livelihoods, producers and their families are then more likely to take notice of these climate changes and relate them to variations they see on their crops and landscape.

Although each story arises from subjective and personal experiences, when analyzed together they serve to show social patterns and commonalities (Abbott & Wilson, 2015). Also, it is important to consider that lived experiences don´t occur in isolation, so they are shaped by our engagements with others (Qvotrup & Elg, 2010). Hence, I sustain that our perceptions and interpretations of climate alterations are subject to interpersonal exchanges (Abbot & Wilson, 2012; Abbott & Wilson, 2015), especially within members of a farm/household. For this reason, although members can be differently situated in gender and other structures, they share similar accounts of climate alterations and impacts in agriculture.

I acknowledge that these accounts on their own are not sufficient to grasp the complexity of the gendered lived experiences of climate change, so it is important to go beyond and look at how different men and women respond to climate change and the conditions that enable or impair their capacity to respond. However, before trying to understand people's actions, we must first understand what it is they are facing that demands taking action. In other words, their perceived manifestations of climate alterations and impacts will enable us to better comprehend how these climate stressors shape participants´ vulnerabilities, but also why certain strategies are used to cope and adapt and not others.

Before moving along with the chapter, it is important to mention that in the interviews I first sought to grasp participant´s general observations about environmental and climate alterations in their localities without mentioning explicitly climate change. I did not want to predispose in any way their answers. I´d rather listen first to their most truthful descriptions about the environment

and climate and the changes they have seen over the years and, subsequently, how it has been affecting their agricultural production. It allowed me to corroborate if this phenomenon is something they already perceive in their everyday lives, regardless of their climate change knowledge. Only at the end of the interview did I proceed to ask people explicitly about climate change. I was interested in the information they have referring to its causes and the sources of this knowledge. Also, I wanted to know how they view this phenomenon and if they connect it to their daily observations; if they consider it is already happening and if it has had an impact on their lives or their families.

The remainder of this chapter will be structured as follows: In the first section, I focus on participant´s accounts about the alterations they notice in their surrounding environment and the climate of their locality. Particularly, I will refer to descriptions of how the seasons, temperatures, and rain patterns used to be and how they have changed. In the second section, I will refer to the impacts these alterations are having on their agricultural production, as well as how they perceive their effects. Lastly, I discuss their knowledge about climate change, especially what they know about its causes and the sources from which they receive this information, as well as their perception of future risks.

2. Environmental and climate alterations

For most participants from northern Cartago, Grecia, and Cóbano increase in temperatures, variations in the seasons, and erratic precipitation patterns are evidence that climate change is a reality and that it is already happening. Yet, even before explicitly discussing climate change and acknowledging its existence, the majority of them had already depicted very similar descriptions of shifting climate patterns they´ve been observing over the past years, even though they live in localities with geographic, topographic, and agricultural differences.

Participants have lived for their entire life, or most of it, in each of these places, so they are able to compare the past with the present and depict how their "normal" or "expected" has given way to the "abnormal" and "unexpected". While the time period from when they started to notice these changes range from 20 years to only 3 or 5 years, the majority share similar accounts of its manifestations. Thus, each of their individual and subjective observations when associated with one another bring out the commonalities and patterns that translate into social experiences of climate change (Abbot and Wilson, 2015). However, lived experiences don´t occur in isolation; perceptions and interpretations are often shared between household members, so they are subject to processes of communication and reflection (Abbot and Wilson, 2015), converting them into an intersubjective process. For this reason, I was not able to identify significant variations in the accounts given by different men and women on the climate alterations they observe, but that does not mean that their actions or choices in face of climate change, which will be analyzed in other chapters, are not shaped by distinct material realities and power relations; consequently, resulting in different lived experiences of climate change.

Climate change manifestations are related to the seasons, precipitation, and temperature. Regarding the seasons, participants recall there used to be two distinct patterns over the course of a year: the rainy season and the dry season. The first one began in the middle of May and extended to late November or the first days of December, and the second one extended from December to May. In participants´ descriptions of the seasons, it is common for them to refer to the rainy season as "winter" and to the dry season as "summer", because it is a period where there is a lack of rain and an increase of sunshine. Although the use of the terms "winter" and summer" are very common in the country, they refer to different weather patterns to those experienced in the "winter" and

"summer" of the Northern and Southern hemispheres, especially because, in the Tropics, temperatures remain stable. It might get colder or warmer depending on the geography and topography in which one is located in the country. For example, the mountains are colder, while the coast is warmer, yet each region keeps its average temperature all year. Then, the expected variation between the two seasons revolves mainly around an increase or decrease in rainfall and humidity. For instance, Patricia, who is the daughter of an onion producer in Tierra Blanca, refers to that usual transition from summer to winter and relates it with a memory of a religious festivity: "[..] in May they always say "the rain is coming" because here in May we celebrate the festivities, right? The Catholic church, San Isidro and all that, so ever since I was little, I remember that when May comes, the rain comes and so does the winter, so I always remember that" (personal communication, 12-02-2018).

In Grecia and Cóbano, aside from the two seasons, participants also mentioned the presence of two events which they consider part of the normal climate pattern: the "veranillo de San Juan" (Suan Juan´s little summer) and the canicules. Both are characterized by a decrease in rain between June and August after winter has begun. They appear one after the other; yet there is no clarity about the order since some participants believe the "veranillo de San Juan" comes first and then the canicules, while others sustain it is the other way around. Nonetheless, they all agree that during those days the rain recedes a bit. Carlos, from Grecia, describes it as "a good pause that agriculture needs" (personal communication, 25-06-2018).

The accuracy with which the seasons start and end, as well as their regularity, are among the changes perceived by participants in all three localities. It produces a sense of uncertainty due to the variations in the patterns they observe and experience now, compared to what they call the "normal" and expected climate patterns. In northern Cartago, most people agree that the seasons

are not as precise as they used to be and they use words such as “crazy”, “scrambled”, “entangled”, “instability”, “out of control” to refer to these changing patterns. In the past, farmers planned their onion and potato production according to the seasons. They used to prepare their land and plant onions and potatoes in May because they knew that the rain came that month. However, now they produce all year round without really knowing what to expect. Lucía, a female farm manager, explained: “[…] our parents taught us to work with the weather, with the climate, but now you can´t work with the weather or the climate” […] “the climate has changed, one does not know if it is going to rain in May or in January or February. One does not know anymore, as we say. You must accept whatever comes and sow to see what God reaps” (personal communication, 06-02-2018).

Very similar to what participants in northern Cartago have noticed, in Grecia people observe that at present the seasons beginning and end have become imprecise and the seasons per se are less even or regular. So, it is much more difficult to plan agricultural activities accordingly. Julieta explains: “There is no winter or summer anymore. When it wants, it rains and when it does not want, it does not. It is like this all year round” (personal communication, 07-09-2018).

Likewise, producers in Cóbano feel unable to guide themselves and their production based on what they used to know about the climate. Similar to what people perceive in the other two localities, Miguel explains: “now there is not a season that one can say that is stable” (personal communication, 28-07-2018). Crops that are grown in the open, such as beans, corn, and rice, are susceptible to these changes.

Also, participants in Grecia and Cóbano believe that part of these seasonal alterations is the disappearance of the “veranillo de San Juan” (San Juan´s little summer) and the canicules. There are years where they no longer see the rain recede in the middle of the year, so they believe these

periods are becoming less and less common, which also disrupts their customary agricultural planning.

Another common observation relates to variations in precipitation frequency and intensity. Participants report a reduction in the frequency of the rains during the rainy season, but much more intense rainfalls. Likewise, they perceive longer drought periods. Rafael, an organic farmer from northern Cartago shared the following story that exemplifies the situation farmers have been experiencing: “one time like five or six years ago a bunch of farmers from here… it was June and there was still no rain when normally here it starts to rain in May, so they did a procession to the Los Angeles Basilica to ask the Virgin and the priest to pray for them so it would rain. So, they go to the priest: "Father look, it has not been raining in Tierra Blanca and we are in June so we are losing our onion crops" and the priest replies "do me a favor and go back to Tierra Blanca and start planting trees. Go up and plant trees because part of the reason why it has not been raining is the lack of flora" (persona communication, 29-03-2018). Aside from rainfall shortage, Rafael´s story recovers another important environmental change that he has seen in northern Cartago, particularly Tierra Blanca, and that he points out as one of the causes for having less precipitation, which is the deforestation of the land for production purposes. Together, deforestation and the lack of rain, cause another problem which is the lack of water in rivers that affects farmers because many depend on them for irrigation. They also report experiencing tap water rationings during the dry months. Therefore, the limited availability of water for farming and household use is a side effect of the altered rain pattern.

In Grecia and Cóbano, participants perceive a decrease in the precipitation frequency as well. Simona, from Cóbano, shares: “The weather has changed a lot. The rainy seasons have diminished considerably” (Female farm manager, personal communication, 31-07-2018). However, although

the number of rainy days has been declining, when it pours it is much more intense. Melissa, from Grecia, refers to this matter: “It rains very heavily. Quickly maybe, but it is unbelievable the amount of rain” (personal communication, 24-04-2018).

Lastly, participants from all localities agree that temperatures have increased, regardless of the altitude and topographic characteristics of each place. Participants from northern Cartago and Grecia explain that because they are located in mountainous regions it used to be much cooler. To give an example, Monica, the wife of a male farmer from Tierra Blanca, mentions that “in Tierra Blanca, you had to use a scarf and a closed sweater” (personal communication, 12-02-2018). However, now it is a shared observation that it is not as cold as it used to be. Due to these rising temperatures, Mauricio, a young farmer from Tierra Blanca, reports that for the first time in 2017 he saw onion plantations at higher altitudes, which in the past were not appropriate for the growth of this crop due to their lower temperatures. His observation denotes that rising temperatures are provoking variations in agricultural practices and landscape. Carlos, a coffee farm manager from Grecia, has a similar observation. He says: “Temperature is very distorted. To give an example, before an orange produced where I live was very bitter and now it is sweet. It is now warmer where I live. It is warmer. You feel hotter” (personal communication, 25-06-2018). Josue has also observed that coffee production is now being produced at higher altitudes. In San Luis, good coffee could be produced at a maximum of 1200 meters, because higher altitudes were too cold and windy. However, now those altitudes have become apt for coffee production, “[…] so that is where you see that those places where coffee couldn´t be produced, now you can because it has been warming” (personal communication, 19-06-2018) and they have become less windy too.

Contrary to the other two places, Cóbano, located on the coast at sea level, has always been considered warm. Nonetheless, interviewees concur that it has become warmer over the past years.

Gerardo, a male manager, expresses: “summers are hotter. Temperatures have increased a lot” (personal communication, 01-08-2018). Humberto shares a similar opinion when he states that “temperature has increased three or four degrees more than normal […] It is terrible and the sultriness, actually one can feel it, the sultriness is terrible. Oh yes, it has changed too much” (personal communication, 31-07-2018). Hence, temperature rises have been felt in this locality as well.

Most of these observations on how seasons have become imprecise and variable, accompanied by a decrease in the rainfall frequency and higher temperatures, coincide with the climate´s historical data and future climate projections that show a decrease in precipitation averages and longer drought periods in the Pacific and Central Valley, as well as an increase in temperatures in these same regions (Ministerio de Ambiente, Energía y Telecomunicaciones. Instituto Meteorológico Nacional, 2012).

3. Agricultural impacts and effects

Agriculture is at the center of these communities and smallholder farms, so it sets the tone for how life elapses in these farms. Men and women not only notice the same climate alterations, but they also share similar accounts on the variations these changing climate conditions have on crops and landscape. Among the observations made of agricultural impacts is that extreme or erratic climate conditions are causing crop losses, reduced yields, irregular growth, deviations in the plant’s life cycle, multiplication of pests and diseases, and soil erosion. Even though there are exceptions, most participants agree that these effects on agriculture have increased their farm/household economic uncertainty and pose a danger to their livelihood.

Only in Cóbano are there certain variations in how differently situated men and women perceive climate change impacts due to the gender division of productive labors and crops. Nonetheless, it is common in these farms for men and women to help each other with their respective

crops when needed, so they are aware of how climate change impacts the other´s crops as well. In northern Cartago and Grecia, there are no discrepancies in the perceived agricultural impacts, only divergence on how different men and women assess the current effects climate change has on their families and in their life. In both places, male and female managers share very similar accounts of the impacts climate alterations have on crops and in their assessment of effects since they are first-hand observers of these impacts. Yet, other women, like the landless and unwaged, also have very similar accounts although they don´t do regular farm work. I argue that the reason is their "double consciousness" (Brooks, 2011) since as part of their reproductive role they have to be aware and supportive of the life and doings of the dominant group, which in this case are men (Brooks, 2011). As part of their roles, which tend to revolve around others, they are expected to perform tasks that enable others to perform labors outside of the household, or in this case on the farm, but at the same time, women are expected to learn about others´ labors and be aware of occurrences (Brooks, 2011). Hence, they acquire a sense of the male perspective (Brooks, 2011). I argue that because of this double consciousness, landless and unwaged women become aware of how agriculture functions and, consequently, the challenges or complications that occur. It´s part of their role as members of the family to care for their husband´s, son´s, father´s, or brother´s experiences on the farm. Thus, they share similar accounts because it is part of what they learn from these other members.

In northern Cartago, male and female managers, as well as other household members, share how climate alterations are putting at risk the balance between rain and sunshine that onions and potatoes require. Too much of one or the other can harm the crops. On one hand, excessive water can rot the onions, while potatoes stop their growth and enter hibernation. On the other hand, little water impedes both from growing properly. "Too much water or too little water affects agriculture", says Mila (personal communication, 15-02-2018). Thus, with erratic and extreme weather

conditions, farmers have been experiencing changes in the duration of the crop´s cycles, sometimes taking longer or less than expected to produce. Also, it is becoming more frequent that crops don´t reach their usual growth and/or that they lose part of the production. Like Mónica, the wife of a farmer, says "for awhile now these distorted climates have been happening, so that is what has been affecting agriculture" (personal communication, 12-02-2018).

Additionally, they express that crops are now more prone to suffer diseases or pests than before and they believe it is related to these climate variations because they tend to appear and multiply with high and dry temperatures or humidity. Their response is to use agrochemicals, which increases their production cost. From Silvia´s point of view, "Farmers are playing with agriculture like the climate is playing with us" (personal communication, 24-08-2018), which reflects the uncertainty producers face with these new challenges. Another effect is that heavier rains combined with long time agrochemical use are causing greater earth loss and erosion, making it more difficult to produce, according to Guido, a male farm manager: "It used to be easier to produce. You used to make more money. I feel the land was more generous" (personal communication, 28-02-2018).

For these reasons, both male and female farm managers feel they have already been affected by climate change through their agricultural production. Some consider it has had a toll on their families because it threatens and unbalances their household economy. Francisca, a female organic farmer, shares with sorrow: "Yes, I´m living it […] this year it has affected me too much, I had losses, many losses this winter […] At the end of last year I was depending on the profits and it was less than I expected, so it already affected me…" (personas communication, 06-02-2018).

However, not all participants feel personally affected by climate change. Particularly, landless women do not yet believe themselves or their families have suffered due to its impacts, but they recognize it as an imminent threat. In my view, since they are not daily and permanently dedicated to agricultural production, they don´t experience firsthand the proportion of the impacts and damages it can cause on agriculture. Unless those agricultural effects become economic impacts that touch upon the stability of the family, most of these women don´t perceive that climate change has affected them or their family already.

Unlike onions and potatoes, coffee is a perennial plant, so the impacts experienced are others. Its yearly cycle can become altered due to the "instability" of the rain, as co-manager Miguel describes it (personal communication, 26-06-2018). The coffee trees´ bloom and harvest are related to the first rain falls around April and May, explains co-manager Adelina; yet, if the first rain comes early, say January or February, then they bloom before they are supposed to, causing an early harvest. However, the contrary has been happening in Grecia. The harvest has been getting delayed because it has not been raining as much as it used to, so it takes longer for the coffee cherry to mature. Ana, whose brother runs their farm, remembers that when she was growing up, she and her brother asked permission at school to leave early before classes ended, so they could help their parents with the coffee harvest. "I remember that the coffee harvest ended in December. This year we ended up at the end of February and some other people in March, so one starts to notice the difference compared to the past, how it has changed" she says (personal communication, 24-04-2018). For Miguel, these variations are positive, because the longer it takes for coffee cherries to mature, they become sweeter and are sold at a better price for their higher quality. Climate alterations have had a positive impact from his point of view.

However, not all changes have been positive. Heavier rains together with wind have seen to cause the flowers or the coffee cherries to fall, decreasing coffee production. For example, during the harvest 2017/2018 there were a couple of days in January with strong winds and rain that made many farmers lose a great part of their production. Co-manager Melissa recalls that event with sadness and says "… it was terrible for us, terrible.…That was a huge loss for us" (personal communication, 24-04-2018). She describes how they went out in the rain to try to pick the cherries from the ground, although it is not customary, and wound up picking 14 boxes. However, they still lost a great deal because they were not able to pick them all.

Heavy rains are also causing land erosion, which in steep terrains can cause landslides and the loss of coffee plants. Miguel expressed "… before one did not see so much land erosion and all of that. Now you see a lot of land erosion and it is because of the same when it rains, it rains a lot" (personal communication, 26-06-2018).

Another problem that participants claim is related to rain and humidity, as well as warmer temperatures and droughts, is the surge of pests and diseases that affect coffee and other crops. For coffee producers, the two pests that mainly affect their production are: "Ojo de Gallo" (Rooster´s eye or *Mycena citricolor*), a type of fungus that produces white spots on the plant´s leaves, and "Roya" (coffee leaf rust or *Hemileia Vastatrix*), another type of fungus that turns the leaves yellow. Lina, a farm owner who used to produce coffee, explains that "Ojo de Gallo" has existed for a long time, so now farmers know how to control it better, yet "Roya" is a type of pest that didn´t use to exist in Grecia. Melissa says that "Roya" used to be found in milder places, but not in Grecia due to its colder temperatures; yet with the temperatures rising, "Roya" began to affect coffee production in Grecia a few years back. Now "if there is too much summer then it is the "Roya" and if

there is too much winter then it is the “Ojo de Gallo", clarifies co-manager Gloriana (personal communication, 26-06-2018).

Finally, there is a shared perception among some farmers that coffee plants don´t produce the quantity they used to. None of them are sure of what the cause is, yet some relate it to the issues mentioned above, such as the climate, the pests, the degradation of the land due to agrochemical use, or the combination of the three, but they agree that crops have reduced their production. For instance, Gloriana says that “before one “manzana” [0.7 hectares of land] produced 40 or 50 bushels of coffee and today we produce 23” (personal communication, 26-06-2018). Even Franco, a coffee farm manager, who doubts that climate change is a reality says that although he cannot know the cause, he recognized coffee plants don´t produce the same as they used to.

Although participants identify these various climate-induced impacts on coffee trees and other crops, there are some dissenting perceptions on the effect that climate change has had on their own agricultural production and their families. For a few male managers and co-managers, climate change has not yet affected their coffee production, but then again, the adaptation and coping strategies they have already implemented could have prevented their production from suffering. Female co-managers and landless women, on the contrary, feel it has already had an impact on their production and their families, partly because climate change reduces their yields, but also because climate change causes economic strains to their families. To prevent and control pests and sustain the coffee plants through periods of drought or too much rain they require higher investments, so the economic stability of their families worries them. As Melissa explains: “By affecting the crops, which is what we dedicate ourselves to, then it affects the economy and the economy drags other things in the family because it’s not only about food and clothes, it affects

other… emotional stability and everything, the worry and all that, it's obvious it affects" (personal communication, 24-04-2018).

Contrasting with what happens in the other localities, in Cóbano the climate´s perceived impacts vary depending on the gender of the person who manages the farm and the gender dynamics. Men and women produce and manage different types of crops that get affected by climate in distinct ways, which in turn have more or less significant consequences for the family, depending on how much they depend on those crops for economic stability and food security. Therefore, female producers are most familiar with climate change impacts they see on the vegetables they grow, while male producers comment on those of rice, beans, and corn or animal farming, which are the crops and activities they oversee. However, because women tend to help out male farm managers with their crops when they are working outside the farms and men help out female farm managers by doing certain tasks for their vegetable productions, they are aware of how each other's crops are impacted by climate change as well.

Vegetables in female and co-managed farms are produced in sheltered environments because they are the main commercial product. Greenhouses or micro-tunnels keep crops secure from heavy rains or wind, while also maintaining their cycles stable regardless of the uneven seasons. Thus, they grow more protected from climate variations. Despite these preventive measures, female producers believe climate change is making them face more struggles and affecting their agriculture. For one, they recognize that temperatures are an issue, especially during the summer as plants fall under greater heat stress, so they risk drying. Like Simona asserts "… very warm, like sultriness. I feel that harms the vegetable garden" (personal communication, 31-07-2018). For this reason, they change the type of material with which they cover the greenhouse or micro tunnel depending on the season. Also, they see an increase in pests, especially during the transition from

summer to winter, under humid conditions. It can result in the complete loss of certain vegetable varieties. Roman explains "Last year we had an outbreak of "Vaquilla". This year we haven´t been able to have spinach because they leave it completely full of holes, so you see the changes with the pests of beetles, worms, mites, everything", he explained (personal communication, 30-07-2018). However, not all women can grow their vegetables in protected environments. In male-headed farms, for instance, vegetables are a secondary product, so female producers grow them out in the open and, consequently, they face greater challenges to produce them. Thus, their vegetables are more susceptible to droughts and heavy rains.

Rice, beans, and/ or corn are also produced out in the open because they require more space. They are much more dependent on the weather and more likely to suffer due to climate alterations. These crops require to be planted in humid conditions, but because seasons have become highly imprecise, there is now the risk of turning up with fewer yields or losing the crops altogether. Corn can perish because of deficit or excess rain. Roxana, for example, sometimes helps her husband with the production of these crops, so she shared how they became close to losing the corn this year: "my husband planted after the third rain and then there were 15 days of pure summer in which the corn became like this (her gesture indicates how the corn was turned upside down) … I think four more days of summer and I wouldn´t be telling you this story" she said (personal communication, 01-08-2018). In contrast, the year before, they lost the second batch of corn because of too much rain.

Rice requires similar balanced climatic conditions to grow properly. It can be planted either around May or August because it needs rainwater when first planted, otherwise, it won´t develop properly. Yet, at the end of its cycle, it requires less. At present, the inaccuracy of the seasons and erratic rain patterns makes it harder to attain a good harvest. Roxana, for example, believes climate

alterations are responsible for the decrease in their rice production, as they went from producing 20 to 25 sacks per trunk of rice to 25 sacks per 3 trunks.

As for beans, Carmela shared that when she was little it was common to cover the beans in October because they require a large amount of water for them to germinate. Now, sometimes October is dry, so they must delay planting until rain evens out, otherwise, it will get lost.

These producers also link the appearance of pests and diseases with the changing environment and the climate. Joel, who plants rice and beans, has seen a surge in pests and diseases that affect these crops. Rice requires more agrochemicals to prevent and control certain pests. As for beans, they are exposed to other types of pests that also denote environmental changes. He recalls that when he was a young boy, he produced beans with his father. At that time beans didn´t require much care, so they just left it to grow naturally. Now, Joel has to go every eight days to look over the beans because many pests eat them, such as deer, wild boars, and wild chicken. He explains why these animal populations have increased: "Before, there weren´t that many. During that time, one could say that people used to go inside the forest mountain more often. Some people killed those animals. They killed more deer, more wild boars, but not anymore. So, now they have reproduced" (personal communication, 29-07-2018). Thus, the reproduction of those animals has become problematic for certain producers.

Additionally, participants have also noticed variations in the cycle of trees, which they attribute to altered climate conditions. Miguel has seen mangos and avocados bloom at other times of the year. "You see them uncontrolled", he stated (personal communication, 28-07-2018), while Luz saw an apple tree harvest twice in a year and a "guanabana" (soursop), which normally only produces in the summer, gave fruits all year round but in smaller quantities. Hence, climate impacts are not only perceived on their crops, but in their surrounding environment too.

Throughout the three localities, interviewees share the common experience of having their farming practices and livelihood disrupted by variations in climate patterns. Most of the impacts they've observed and suffered cause harm to their crops, increasing the possibility of losses, and it also disturbs their productive ways because they are no longer able to rely on their customary farming practices, generating much uncertainty. The problem they share is that their livelihoods are becoming more unstable and insecure due to these climate stressors.

4. Climate change knowledge and risk perception of the future

Until now I´ve discussed the climate manifestations that participants have seen change over the years and the concrete effects they have on agricultural production and the landscape. So far, these correspond to observations based on their crops and surroundings, but they don´t reflect the state of their climate change knowledge. Besides their experiential knowledge (Abbott & Wilson, 2015), participants are exposed daily to other diverse sources of information from where they gather climate change knowledge. It is important to assess the extent and accuracy of their understanding because it not only shapes their vulnerabilities but, together with their experiential knowledge, it shapes their risk perception of the future and informs the type of responses they mobilize to cope and adapt. However, their understanding of what climate change is, and its causes vary between and within localities. While most participants have very narrow knowledge about these phenomena, others are much more informed.

In northern Cartago, apart from three participants, the rest have heard the term climate change. There is a generational difference in the sources from where participants get their information, as well as a gap in the knowledge that older and younger adults possess. Older participants have heard about it through the media, except for a few women who belong to an association that attended an informative meeting organized by a public institution. However, the vast majority

recognizes their knowledge is very limited. Younger participants, on the other hand, learned about it in school. For younger generations, formal education has played a key role in the spread of climate change knowledge, which is why they have a more exact and comprehensive understanding.

As for gender, it is difficult to identify a pattern, because older landless and unwaged women and men interviewed hold very similar knowledge to that of male and female farm managers. Some of these landless and unwaged women belong to the female association that took part in the climate change informative meeting previously mentioned, but others learned about it through the media, their work, or middle school education, evidencing that there are other sources, besides experiential knowledge, where household members learn about climate change too.

However, most interviewees have only a minor understating of the real underlying processes that produce this phenomenon. Among the causes, a few link climate change to the ozone layer, the melting of the ice caps, and global warming, yet participants did not provide a comprehensive explanation of the processes that cause it. Yet, they hold humans and their activities responsible for it. In the words of Mildred, "nature is taking revenge for all that humans are doing to it" (personal communication, 19-01-2019) or as Francisca said "I am very clear that we have made the problem. The problem is not the rain, or the sun, it is the people" (personal communication, 06-02-2018). Many of them referred to deforestation and pollution, including gases from factories and cars, as well as agrochemicals and incorrect waste management, as the main causes. Thus, some show awareness about the negative impacts that conventional agriculture has on the environment. Their understanding of the phenomenon upholds their pessimistic prospect for the future, as Rosario describes it. They sense that climate change could get worse and make it harder for them to produce, which would cause economic instability that would lead to the demise of

many producers. Yet, a few remain hopeful that humanity is still in time to take action and change its course.

In Grecia, most participants have also heard the term climate change, but it stands out that the two people that acknowledge not knowing about it are two male managers, while the rest of male managers, female co-managers and landless women have learned about it on the news or at educational meetings organized by institutions reinforcing the notion that interviewees are exposed to other sources of information that minimize the knowledge gap between different men and women.

Interviewees show awareness about the role that humans play in causing it, so most of them believe that pollution from cars, factories and burning waste, deforestation, agrochemical use, extensive production are factors that have contributed to producing it. As Lina expresses, "[…] it is our own fault, this is what I say to other producers. We don´t have to complain because we are to blame. Cutting down trees, cutting down trees, hurting nature (personal communication, 05-09-2018). However, it seems that most farmers and their families, regardless of gender and age, hold a limited understanding of the underlying processes that cause climate change. Only three participants, who are organic producers, were able to reflect through their explanations a more thorough understanding of climate change and its relations to greenhouse gases and global warming. With their current understanding participants perceive a bleak future where climate change will make it harder for them to produce. They believe agriculture will be one of the worst sectors impacted and that it will be conducive to a scenario of food insecurity.

Opposed to the other localities, in Cóbano the main source of interviewees´ climate change knowledge comes from their attendance at meetings and informative activities organized by public

institutions. Thus, female and male (co)managers, as well as landless women, share a similar understanding of what climate change is and they seem to handle with a little more detail the underlying processes that produce climate change, such as greenhouse gases or global warming. They also hold humans responsible for producing it. “Everything is humans’ fault because humans are responsible for doing all of this” states Roxana (personal communication, 01-08-218). The pollution produced by cars, factories, and burning waste, plus agrochemical use and deforestation are among the main causes identified by participants. As in the other localities, their current understanding of the phenomenon leads them to a grim perspective of the future because they have the sense that climate change will have more intense manifestations. They fear it will diminish the availability of water, produce more diseases, and reduce the availability of animal food if they don´t get properly prepared.

Overall, the sources of interviewees´ climate change knowledge vary from one locality to the other, depending on the means they have at their reach, for example, the availability of information by local institutions, formal education, or technological access to the media. The extent of their understanding seems to vary depending on the sources as well, because those who acquired their knowledge through formal education or informative activities organized by institutions, seem to have a more detailed understanding of climate change. However, regardless of the locality, those who know even the least about climate change tend to connect what they perceive in their everyday environment and the observed agricultural impacts with climate change. Current climate manifestations are interpreted as signs of climate change and, therefore, it is considered a real phenomenon that poses great risks for the future of their livelihoods.

5. Conclusion

The bulk of participants´ knowledge on climate change emerges from their firsthand observations of changing climate patterns and how they experience its effects through agriculture and the surrounding environment. Aside from pointing at anthropogenic causes, their climate change understanding is quite limited. Nonetheless, their experiential knowledge convinces them that climate change is already taking place and it shapes their perception of future risks which is based upon images of a more intense and damaging climate change. For subsequent chapters, this risk perception is important because it informs how they react in face of this phenomenon and how much effort they direct into adaptation.

Imprecise and irregular seasons, variable rainfall patterns, and rising temperatures constitute their evidence of this phenomenon and, while some don´t feel directly impacted by it just yet, the effects of these climate alterations on crops are very much agreed upon. Crops losses, reduced yields, irregular growth, deviations in the plant's life cycle, multiplication of pests and diseases, and soil erosion are among the effects these changing climate patterns are having on seasonal and perennial crops. Thus, participant´s common observations and experiences speak of a phenomenon that derives into new climate stressors, alongside new challenges for their livelihoods.

Perceived manifestations of climate change, as well as its effects on crops, are very similar among men and women. Although landless and unwaged women don´t work permanently in agriculture, they share very similar accounts to those of male and female farm managers due to their double consciousness (Brooks, 2011). This means that as part of their role within male-headed farms, these women become aware of the experiences of the dominant group, including agriculture and its occurrences. Henceforth, climate change perceptions don´t reveal significant gender differ-

ences, but their observations and the concrete effects it has on agriculture will be helpful in subsequent chapters to make sense of how climate stressors, together with non-climate stressors, shape gendered vulnerabilities and why certain adaptation choices are made.

CHAPTER 6- THE RELATIONAL CONSTRUCTION OF GENDERED VULNERABILITIES TO CLIMATE CHANGE

1. Introduction

In this chapter, I will address the gendered construction of personal and farm/household vulnerabilities. Vulnerability to climate change is defined as "The propensity or predisposition to be adversely affected" (Marengo et al, 2014, pág. 1048). This propensity to harm is not only shaped by climate stressors but by contextual and social factors as well (O´Brien et al, 2007). Hence, vulnerabilities are socially constructed through the convergence of multiple factors, among which gender is considered one, that can increase the risk for certain groups suffering from the adverse effects of climate change.

At the farm/household level, I consider how the socio-economic vulnerability of smallholder farms/households increases their risk to harm due to climate change. Climate change vulnerability is not only the result of climate stressors, but it has to do with other "non-climate stressors" (Ränänen et al, 2016) that shape the socio-economic vulnerability of these farms in the first place. I discuss that distinct contextual conditions and socioeconomic drivers, such as the type of cash crops and their insertion in the market, the scale of production, prices, production costs, institutional assistance, and policies, can become stressors that laced together aggregate to the socio-economic vulnerability of smallholder farms in a locality. Then, these socio-economic vulnerabilities together with specific climate stressors (discussed in the previous chapter), are what increases the propensity of these farms/households to become adversely impacted by climate change.

In this first section, I will attempt to point out those drivers and conditions that can stress the socio-economic vulnerabilities of smallholder farms throughout the three localities. Some are

specific to certain contexts or they can have specific local expressions; so, I also point out those differences. It is important to clarify that drivers or conditions are significant to understand how most farm/household vulnerabilities are constructed in a specific locality, but it does not mean that it is common to all of them, as there are farms/households whose vulnerabilities are constructed differently.

In the next section, I reflect on the construction of household member´s personal vulnerabilities from a gender perspective, since the overall household vulnerability does not necessarily equate to stating that all members are equally vulnerable. I first discuss how gendered policies and institutional practices in each locality inflect the construction of member´s vulnerabilities through the way they govern and distribute resources to different men and women, such as informative activities and training, particularly on climate change; finance or material aid; and land tenure. I evidence that policies and institutional practices can have contradictory effects because they can reduce the vulnerability of some men and women who have access to resources, but they can increase the vulnerability of others who don´t. The main argument is that policies and institutional practices can either enforce gender inequalities or they can help challenge the gender structure and change the power dynamics through an equitable distribution of resources, which inflects the different constructions of climate change vulnerabilities.

Afterward, I analyze intrahousehold power dynamics and how member´s relations can produce differentiated vulnerabilities among them. Vulnerability research suggests that more studies are needed that focus on how power relations, subjectivity, and agency shape the gendered construction of vulnerabilities (Gurung, Bhushan, & Larrington-Spencer, 2019; Djoudi & Brockhouse, 2011; Hackfort & Burchardt, 2016; Thompson-Hall, Carr, & Pascual, 2016). Therefore, in the last section, I develop a micro-social analysis on how members' vulnerabilities are constructed

relationally and differently between them. I argue that an individual´s vulnerabilities can be traced to his/her situatedness since it is from where bargaining power comes from, as well as the right to enter negotiations with other members. Hence, an individual´s scope of decision and action in face of climate change is defined by his/her "voice" or right to participate in negotiations (Katz, 1997) and the bargaining power he/she has to influence those choices. For those marginalized, their vulnerability might be enhanced because it implies being restricted from voicing their views and needs in face of climate change, but also, they are constrained from influencing the choices on how to cope and adapt to it. It limits their capacity to respond to climate change, which in turn can increase their propensity to be adversely impacted. At the same time, they are subject to the decisions of others who might use those circumstances to enforce their power over them and, consequently, sustain unequal power relations. Throughout the last section, I seek to demonstrate that decision-making participation over the farm´s resources is central to the construction of individuals' vulnerabilities to climate change within these smallholder farms.

2. Smallholder farm/household vulnerability to climate change

Climate change vulnerability is context-specific because it can be shaped by a multiplicity of factors that converge in a place increasing the risk for some groups of becoming negatively impacted by climate change (O´Brien et al, 2007). I sustain that the socio-economic vulnerability of smallholder farms produced by the convergence of specific contextual conditions and socioeconomic drivers, coupled with climate stressors and their effects on agricultural production, is what results in the construction of smallholder farm´s climate change vulnerabilities. In the first section, I will begin discussing the contextual conditions and socioeconomic drivers that can cause the socio-economic vulnerability of these farms and in the second section, I will discuss how these

socio-economic vulnerabilities, together with the climate stressors, produce smallholder farms climate change vulnerabilities.

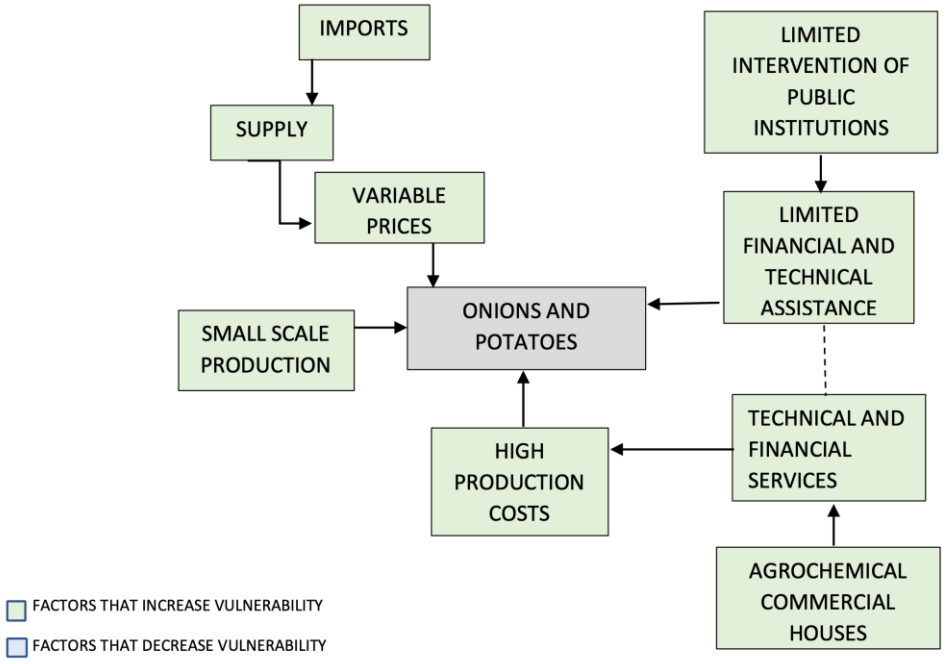
2.1 Contextual conditions and socioeconomic drivers

Among the contextual conditions and socioeconomic drivers that I will discuss and that may inflect on smallholder farm´s socio-economic vulnerability, are the type of cash crops grown by most farms in a locality and their insertion into local and global markets; products price variability due to supply and demand; production costs, including inputs, wages, and other expenses; the scale of production; land policies and distribution; and institutional assistance, including the availability of financial and educational resources. I sustain that in the specificity of each locality, many of these become stressors that when aggregated increase the socio-economic vulnerability of farms/households. While some factors are present in all three places, others are specific to each one, so it is important to comprehend what those factors are, what is their local expression and how they intertwine.

Along this section, I expose why, based on the aggregation and the interrelation of factors, in northern Cartago smallholder farms/households who produce onions and potatoes are the most likely to be economically vulnerable because of the larger convergence of conditions and drivers that exacerbate vulnerability, which is the variability of crop prices due to high local supply and imports; high productive costs; small scale production; limited intervention from public institutions and, consequently, restricted access to financial and technical assistance.

Figure 4: Factors that modulate the socio-economic vulnerabilities of smallholder farms in northern Cartago

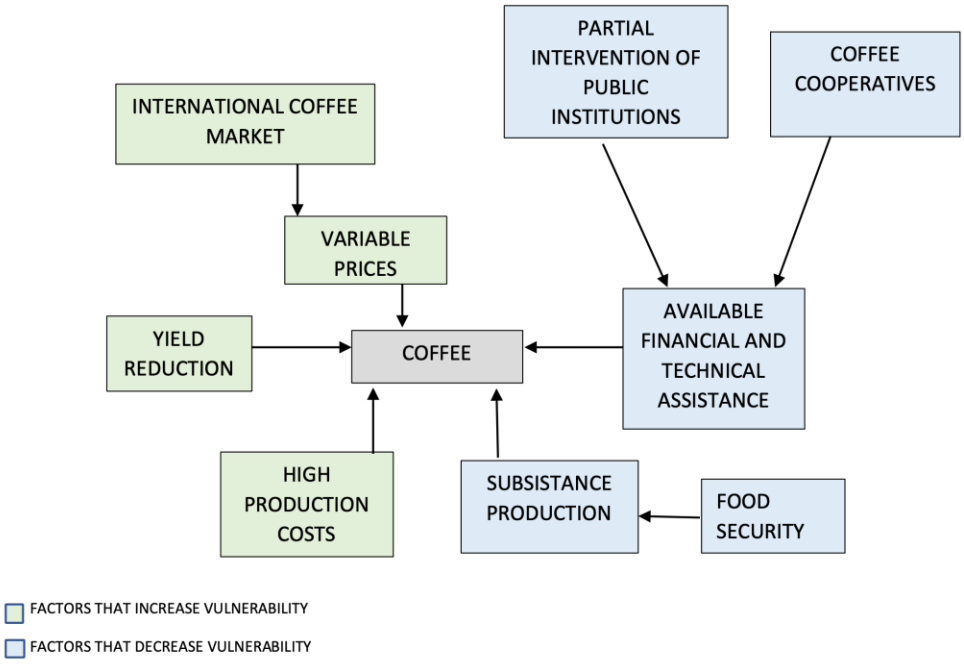
(Produced by author)



In comparison, coffee producers from Grecia have less aggregated conditions and drivers that produce vulnerabilities because public institutions have a little more presence, and they can count on coffee cooperatives for financial and technical support as well. Yet, their livelihoods rely on a crop that faces very variable prices due to the international market and high production costs, just as producers in northern Cartago, plus a reduction in their yields, which results in their socio-economic vulnerability as well.

Figure 5: Factors that modulate the socio-economic vulnerabilities of smallholder farms in Grecia

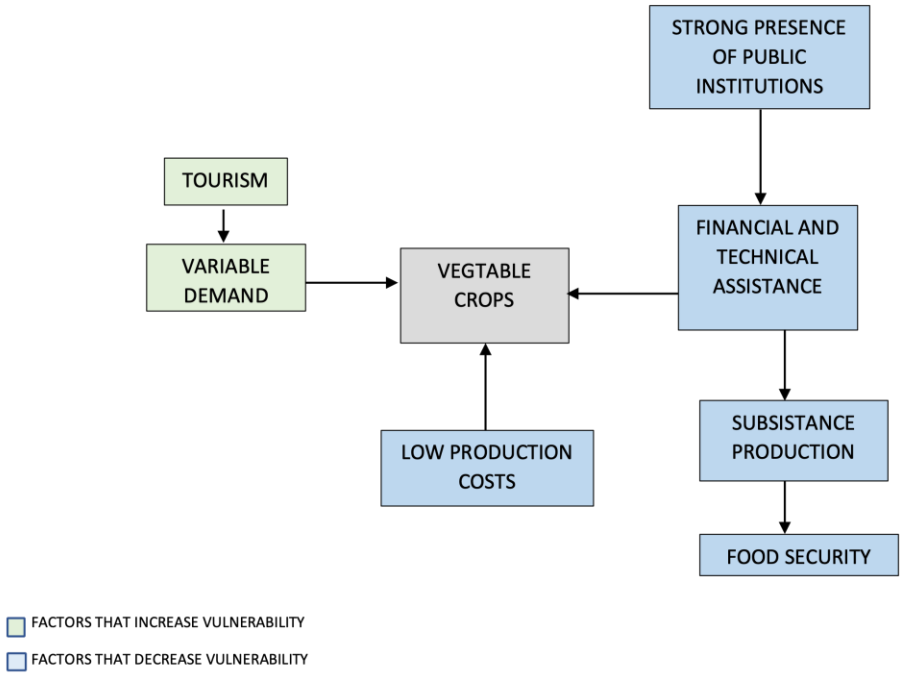
(produced by author)



From the three, Cóbano has the least aggregated conditions and drivers that produce vulnerability. Their agricultural products are not subject to variable prices, but to seasonal changes in demand due to tourism; yet, they have low production costs and they have had long-term assistance from public institutions, which have interceded in land distribution and financial and technical assistance. As a result, most farms have their cash crops or commercial products, but also, they sustain a diversified subsistence production which has strengthened their food security. Plus, most households have other sources of income, so they do not only rely on agriculture. In this locality, farms/households are influenced by more contextual conditions and drivers that bring them economic stability, than those that produce vulnerability.

Figure 6: Factors that modulate the socio-economic vulnerabilities of smallholder farms in Cóbano

(produced by author)



Going over each of the common drivers and conditions, price variability is a driver that increases the vulnerability of producers in northern Cartago and Grecia. In the first locality, prices fluctuate due to the local supply and demand of onions and potatoes and their regional trade, affecting most of all smallholder farms. Lucía, a farm manager who produces onions, remembers the hardship they endured last year due to the downfall of prices. "[…] the prices are very variable, very variable. Last year the prices were terrible. At first, onions were sold at 200 colones ($ 0.35 or €0.32 approximately), which leaves nothing for us, it leaves nothing, only loses because we invest a lot. In the end, around November, October, November, December the price improved but

most people had already sold cheap because we can´t keep the onions for too long" (personal communication, 06-02-2018). Scarcity tends to push prices up enabling those producers who have product at that time to make a good profit; yet low prices set in when there is oversupply, so many are not able to make a profit and some don´t even recuperate their investment.

Unfortunately, these market oscillations are linked to climate patterns because onions and potatoes need water for adequate growth, so most smallholder producers plan their production according to the seasons, which coincides with what (Salazar, 2003) observed in his study. Farmers who don´t have irrigation systems depend on these climate patterns to produce, but it also means most of them harvest at the same time bringing the prices down due to oversupply. On the contrary, those who have irrigation can plant all year round, so they have the advantage they can produce at other times when prices are high, but not all farmers can afford it or have access to the resource. Like Lucía explains: "Since we plant at certain times, because of the climate and all that, big producers are the ones who can defend themselves with irrigation systems, agrochemicals and all that" (personal communication, 06-02-2018). She believes that big producers are responsible for bringing the prices down and for putting smallholder producers out of business. "They are those who can work and get three harvests in one year because they have their irrigation, their motors, their water, and everything. […] says Lucía (personal communication, 06-02-2018). Her statement evidence that smallholder farms, like hers, tend to struggle due to the prices. They face a higher risk of selling at low prices and lose their investment, because they usually don't have the resources and technology to plant large quantities or at other times during the year. Thus, they have no choice but to plan their production according to the seasons and simultaneous to others.

Additional pressure is put on the prices when these products are imported. For some participants, trade constitutes a problem because they believe these products have been imported when

there is already enough supply, bringing the prices down. Silvia, a farm owner, remembers: "while there was no import, no free trade, everything worked better. The moment free trade agreements started to function the agricultural producer fell" (personal communication, 24-08-2018). ASHORI, an association that was formed to vouch for the wellbeing of producers in northern Cartago, tries to protect producers by negotiating with the government when too much product is being imported, explained Guido, a farm manager and associate of ASHORI. However, sometimes a product comes in without paying taxes, so it is much cheaper than what they produce, and it inflects prices. Because of this, producers hold the state responsible for their vulnerable economic situations, because it promotes the import of the same products at a lower price rather than supporting local producers.

More unpredictable than the price of potatoes and onions is the price of coffee because it depends on the international supply and demand. Although some of it is destined for local consumption, most of it is exported. Hence, the oscillation of prices represents a great risk for the livelihood of many smallholder coffee producers in Grecia, which is why most of them consider that prices are one of the reasons why coffee is not profitable anymore.

Patricio and his family exemplify the consequences the open market and neoliberal policies can have on smallholder coffee farms. Several years ago, they had to give up coffee production and look for work outside the farm because coffee prices fell considerably and they weren´t able to pay for their debts and the production costs.

> "like 7 years, something like that, the price went down. The price was totally down as we say. So, despite we worked on it, it wasn´t enough. It kept like that, so people who remained were the ones who had money, and yes because they had money they were able to surpass

that time and normally here, only the ones who were economically well were able to withstand, but most of us had a hard time. So, we decided to lose it because it wasn´t working" (personal communication, 06-09-2018).

Prices forced Patricio and his family to leave coffee production for a while, increasing their economic vulnerability. They were able to begin producing again because of a bank loan they requested but at the cost of facing great pressure and risk.

Josue is another small coffee producer who has faced struggles due to the prices and he shares the hard choices they sometimes have to make due to the market´s behavior:

"Because of the prices agricultural production is very hard, very tough and we are left with little profit. Coffee producers are going through… and it has been many years already, that maybe we have a good year but then we have 4 or 5 bad years. Within those years we don´t have enough to properly care for plants, so since we have to care for them we prefer to abandon them, but then if you abandon them you have a bad harvest" (personal communication, 29-06-2018).

Josue and Patricio both exemplify the unstable economic situation that most small coffee producers face. Because coffee used to be a great investment and a good business, most of them decided to keep on going in the hopes that it will improve in the future, but the present reality is that they face greater constraints to stay in the business and, consequently, a greater socio-economic vulnerability.

Prices are not the main issue in Cóbano. Instead, the problem is related to changes in the demand for the product. When tourism is in its high season, they have no problem selling their products to restaurants or other businesses that deal with tourists; but when it is in its low season, they have trouble placing their products. Gerardo, who produces goat cheese and milk, explains

that during the high season they are not able to produce enough, yet in other periods they don´t sell as much. Vegetable producer Carmela has a similar problem with her organic vegetables. She says that during the high season she has no problem selling to places that receive foreigners because they can afford to pay for her organic products. However, during the low season, she has trouble placing her products because locals prefer to pay lower prices for vegetables that can be bought at supermarkets without the added value of being organic. So, during low seasons she cuts back on the quantity she produces. Their dependence on tourism increases their economic vulnerability, not only because their incomes vary seasonably, but if in the future tourism drops then they would be left without that income; but, for the moment it is profitable most of the time.

Production costs constitute another driver that increases the economic vulnerability of producers in northern Cartago and Grecia. Onion and potato producers consider supplies are too expensive, so it is difficult to produce and gain a profit. Lucia, who produces onions jointly with a partner in northern Cartago, believes she would not be able to produce on her own because of the costs: "[…] I couldn´t look after them. Don´t you see that to produce two pounds of onions (I´m going to talk about two) requires about two million. I have to have two million colones ($3.500 or €3.200 approximately) free to pay for the tractor, peons, supplies, fertilizers, the harvest, everything. To keep something, I have to sell them in more than 400 colones ($0.70 or €0.64 approximately) and sometimes it is hard to make the amount I invested (personal communication, 06-02-2018). Hence, sometimes prices are not high enough for them to be able to cover the costs and make a profit, which adds to their risk.

Coffee producers also face difficulty to cover the production costs. Fertilizers, herbicides, and other inputs, which are part of the regular maintenance, plus the salaries and insurance of peons and coffee pickers, are among the costs they need to cover. If coffee is sold at low prices,

they can only afford to cover the costs, without having a profit. As Francisco, an organic farmer puts it: […] farmers are always struggling and with economic problems, but all their revenue is going to the big enterprises. Buying herbicides, fungicides, fertilizers. So, who is making the profit? As we say, it is the transnational companies definitely" (personal communication, 05-08-2018).

On the contrary, for producers in Cóbano, vegetables, rice, beans, and other crops do not seem to take a large monetary investment. Most of them use only organic products in their regular maintenance, which they produce for themselves, so they spend little money on inputs. Plus, they are the ones who take care of the crops with the support of other family members, so they don´t need to cover the wage of other people to help them.

A significant contextual condition that shapes vulnerabilities in all three places are farmer´s support institutions. In northern Cartago, producer´s financial difficulties converge with the lack of financial options to fall back on. Local public institutions don´t offer much assistance with supplies or loans. Thus, producers tend to turn to agrochemical commercial houses. These private corporations have become important actors because they offer technical assistance as part of their capitalization strategy, with which they promote their products, and then they offer to finance them for a few months until producers get their revenues from the harvest; but at the end, they still have to cover the costs. Producers tend to prefer the technical assistance offered by commercial houses due to the financial flexibilities they offer, rather than the technical assistance offered by public institutions because they don´t finance. Credit options are also scarce. Participants only know of banks, which have high-interest rates. It poses a great risk for them to request a loan because they have to put their land as collateral and if they are not able to pay it back, the bank can take their land. Hence, neither public nor private institutions offer viable and adequate alternatives to help

them cope with the everchanging market´s behavior and, thus, ameliorate their difficulties when their livelihood is at risk.

The perceived lack of support of public institutions has prompted a common negative perception of the state. In the words of Ana María, “the wretched government, forgive my expression, does not help the farmer, they don´t know our suffering, our tears ..." (Personal communication, 22-01-2018). Their claims convey an image of an indifferent or absent state because as some of them say “producers are on their own”, hinting at feelings of lonesomeness.

In Grecia, the decline in coffee producer´s economic situation has rendered them vulnerable, yet, what makes their situation somewhat different is that they have been able to count on coffee cooperatives for economic and technical support. Cooperatives, in a way, fill the gap that local public institutions are not able to fill with their social assistance. Thus, cooperatives help coffee producers cope with the challenges of the open market, and, in consequence, it makes them less vulnerable. For example, Melissa explains that coffee is harvested once a year, but they need money to work all year round to pay for supplies, tools, and peons, so her cooperative helps them with short-term small loans. The amount of money they are allowed to withdraw is calculated in relation to the amount of coffee they produced the year before. So, they can receive money in advance to cover their costs, which will later be repaid with the harvest. Cooperatives also help producers with certain supplies and access to credits. Melissa´s cooperative makes an organic fertilizer that is distributed to them for free and each year it organizes a fair to finance machinery at affordable prices. Ana and Lina also mention they know of long-term loans with low-interest rates they can request from certain public banks through cooperatives and ICAFE, so producers can invest in their farms.

While in northern Cartago institutions, in general, have a passive role and in Grecia, it is cooperatives who carry out significant functions, in Cóbano the situation is quite different as public institutions have performed a vital role before and after neoliberal policies. In the past, people in this locality lived from the production of agricultural products, such as beans, corn, and rice; plus, cattle farming. However, in recent decades these activities have been declining and instead, touristic services have grown, becoming the main source of income for the Nicoya Peninsula, where Cóbano is located (INDER, 2014). Nonetheless, it seems that public institutions have been working to keep promoting and sustaining agricultural production among smallholder female and male-headed farms. Contrary to the limited state intervention that followed neoliberalism, evidenced in northern Cartago and Grecia, in Cóbano public institutions have a strong presence and they have continued providing assistance.

When referring to the assistance offered by institutions, participants make the distinction between "parceleros" and those who are not. "Parceleros" are those who were given land 20 or 15 years ago by the Institute of Agrarian Development (IDA), while the rest of the producers acquired land on their own. The difference has to do with the perception that "parceleros" not only received land titles but were also recipients of other types of resources from the state, while the other producers were not given as much assistance. Lucía, a vegetable producer says, "I am an individual producer, so they help them more…" (personal communication, 28-7-2028), meaning her land is not part of these settlements which, she believes, has limited the assistance she has received. Another participant, Gerardo, a goat cheese and agricultural producer, observed that in his case public institutions denied him and his family support because he receives a small state pension. In his words:

> "because I worked for the state, MAG was not interested in helping me, although all the time I have done things very differently than the "parceleros". The "parceleros" have been given… I remember they started by giving them trees, pigs, chickens, caws… twice they have been given caws. They have been given pens. They have been given work equipment. They have been given finance and nobody has given me anything" (personal communication, 01-08-2018).

Thus, independent producers believe there used to be a difference in the social assistance that public institutions gave to them compared to what "parceleros" received; although, they recognize that lately, institutions are trying to broaden their services to include all of them. Now material resources, tools, and supplies are distributed without distinction, which has enabled both "parceleros" and independent producers to start or improve their own productive projects. It has been particularly evident in female and co-managed farms where women have been able to begin their vegetable production.

In these farms, women tend to work predominantly on vegetables, while men work outside the farm as wage workers or they attend other types of labor inside the farm, such as crops like rice or beans and/or cattle farming. Institutions have contributed to improving these household´s economy by producing an extra income or at least supplying families with food for self-consumption. Thus, institutions have partly triggered a change in these farms' productive dynamics that have allowed them to have a stronger household economy due to the diversification of their crops and/or dynamizing their sources of income. These families' socio-economic vulnerability has been diminished because they don´t depend only on agriculture, and if they do, at least it doesn´t depend only on one crop.

Alongside these institutional practices, participants have developed a positive perception of the state for supporting them. Reflecting on the active role played by institutions and the impact it has on their livelihoods, Melba, a vegetable producer, says: “I have felt very happy because honestly MAG and INDER have given us so much support, so they have really helped to face the situations we have here. Everything we have accomplished has been because of them. They really have motived us” (personal communication, 31-07-2018). Policies and institutions have concrete effects, which in this locality reflect the active role played by public institutions in strengthening the livelihoods of smallholder farms.

In sum, smallholder farms in northern Cartago and Grecia particularly face a greater socio-economic vulnerability due to the synergy of diverse socioeconomic drivers and contextual conditions that place them at higher risk of economic instability, while in Cóbano smallholder farms have been subject to other drivers and conditions that have kept their economic situation more stable and in some cases, it has strengthened it.

2.2 Socio-economic vulnerability + climate stressors = smallholder farm´s climate change vulnerability

The vulnerability produced by contextual conditions and socio-economic drivers when coupled with climate stressors and the impacts they have on agriculture, deepen the overall condition of the vulnerability of smallholder farms. In other words, climate change vulnerabilities are the result of social and economic conditions that combined with climate stressors can aggravate the risk of some smallholder farms being adversely impacted by climate change. These climate stressors, as was mentioned in the previous chapter, are alterations in the seasons, variable rainfall patterns, and increasing temperatures.

In northern Cartago, the sense of powerlessness that arises from the way the market behaves and the lack of options and support producers face is amplified by climate alterations. Unpredictable seasons and rainfall patterns increase the risk of losing onion and potato crops or it impedes them to reach the expected product growth. It becomes harder to secure a profit, especially if the harvest coincides with low market prices. Plus, climate change is seen as the main reason for the proliferation of pests and diseases. To cope with these changes, producers have augmented the frequency of agrochemicals and fertilizers applications to help plants withstand these changes, increasing their production costs. Climate stressors, then, tend to exacerbate their economic problems and it entails a greater risk to their agricultural production, which worsens their overall vulnerability.

A similar experience is lived by coffee producers in Grecia. Besides economic difficulties, climate changes have become a new factor that affects coffee production. Increasing variable rainfall patterns cause the plant to delay or accelerate its production or it can impede the regular growth of the coffee cherry. Thus, there are risks associated with the climate that makes it even more difficult to secure a profit. For example, Ana believes that three or four years ago they lived better than today with the profits they made with coffee. She believes things have changed because of the climate: "[…] there used to be fewer climate impacts, so by having fewer climate impacts then there was more production" (personal communication, 24-04-2018). Besides, they see a proliferation of pests and diseases, so they have increased agrochemical use to prevent or treat the plant. Either way, it means that with climate change production costs increase and profiting is subject to greater risks.

In addition, many of them consider that coffee plants don´t produce the same quantity they produced before. As Carlos expresses: "What´s happening that we can't have the same yield we

had in those years? because 23 or 25 bushels aren´t enough to say that we are financially sustainable" (personal communication, 25-06-2018). Thus, the combination of low prices, high costs, climate stressors, and low yields are the reason given by some producers why they consider that coffee is not profitable anymore. They acknowledge that in the past it used to be a good investment, but now it is no longer the case. Hence, their vulnerability is amplified because of the combination of all these different factors.

In Cóbano, climate change also increases the costs of vegetable producers because they face many pests that require the use of products to control them. Miguel, Luz´s husband, says: "in that greenhouse, the most expensive thing is pest control. There are too many pests" (personal communication, 28-07-2018). But aside from this, vegetable production is less prone to suffer due to climate change because it is produced in protected environments. Thus, it is a stable source of income and food security. On the contrary, rice and bean production has begun to decrease because of unpredictable rain patterns. Families who produce them for self-consumption, which are most of all male-headed farms and co-managed farms, lose a big part of their provisions. In that sense, climate change increases these smallholder farms' vulnerability by reducing their food security and by increasing their poverty, because they must use their income to buy goods that they didn´t have to buy before. For instance, Joel explains that his production of rice and beans was able to sustain his own family´s consumption and that of his 4 sisters and their families for a whole year. But climate change has begun to falter his rice and bean production: "[…] we used to keep 5 or 6 tins of beans. Rice, we used to keep 60 or 70 bags of rice but from a certain while back we haven´t anymore. Let's say… one sows but does not see… this year I planted rice but did not get rice" (personal communication, 29-07-2018). In their case, climate change translates into higher production costs and food insecurity, but in general the vulnerability of smallholder farms in Cóbano

is buffered by the solid financial and technical assistance offered by public institutions, which has helped them to cope and adapt.

3. The construction of gendered vulnerabilities

3.1. The effects of gendered policies and assistance

Now that I have addressed the factors that influence smallholder farms´ vulnerabilities more generally, I focus on the construction of gendered climate change vulnerabilities. I argue that these vary according to institutional practices and policies, particularly due to the way resources are handled and distributed in each locality. Institutional practices and policies are shaped by the gender structure, as its norms, patterns, and beliefs inflect how resources are distributed among men and women (Risman & Davis, 2013). In turn, policies and institutional practices contribute to reproducing the gender structure by sustaining gender differences and inequalities, although it can help to challenge it as well. In this section, I address how gendered institutional practices and policies, specifically the administration and distribution of resources, such as the offer of informative activities and training, particularly on climate change; financing or material aid; and land tenure, shape the construction of gendered vulnerabilities to climate change. I argue that these resources define who is entitled to land and manage the farm; who has access to financial and material resources to cope and adapt; and who can acquire climate change knowledge. These external resources can increase the relative bargaining power of some household members who have access to them (Agarwal, 1997) and, subsequently, reduce their vulnerability, but, at the same time, it may decrease the bargaining power of those who do not, along with their vulnerability. Hence, the way these resources are governed or distributed in each locality according to gender partly explains the construction of climate change vulnerabilities among differently situated men and women.

In northern Cartago and Grecia, “gender-neutral” land policies and financial options tend to favor men, as these policies have a “gender subtext” that continues to promote certain gender differences (Orloff, 1999, pág. 325). Plus, training and informative activities tend to be accessible to or attended by only certain groups. Thus, policies and institutional practices can have contradictory effects for different women and men. While most policies perceived as “gender-neutral” can increase certain women´s vulnerabilities by reinforcing structural inequalities that limit their access to resources, such as land or credits, simultaneously local institutions can reduce the vulnerabilities of other women who are recipients of welfare, such as women´s collectives. Concurrently, male independent producers who are not recipients of welfare can be said to be more vulnerable than some women who do, or the other way around. Hence, policies and institutional practices can render some individuals vulnerable, while at the same time help build the resilience of others. In Cóbano, gendered vulnerabilities are quite different compared to the other localities due to the influence of public institutions. Public institutions have assumed the responsibility of enhancing people´s adaptive capacities through knowledge and material resources that are perceived as equally accessible to men and women. It can be said that they have not had the effect of producing uneven or disproportionate vulnerabilities between men and women because of their gendered practices. Furthermore, they have made an effort to widen the scope of their services to include, besides producers, other women and men, such as landless women. Hence, because of the way they distribute their social services they have been able to minimize many of the participant´s vulnerabilities despite their gender and class differences.

Going over each of the resources, land may be considered the most important resource when seeking to understand how gendered vulnerabilities are constructed. In each locality, the way land is distributed and administered is influenced by policies and institutions. In northern Cartago,

men continue to be considered the main producers in great part because of land ownership and access to financing, both being resources where women still face some important disadvantages. As Clotilde explains, “the majority of properties are owned by men, not women”, since it has been customary for men to own land. Although present policies are “gender-neutral”, women´s lack of resources and the absence of a more explicit state intervention that seeks to balance the scale, are the reasons why women don´t have equal access to land. In Grecia, the state has not been involved in land distribution, nor has it regulated land ownership, as in northern Cartago. Then, it cannot be said that women have equal access to land, but because of inheritances, some women have gotten to be landowners. In both these places, then, women were and still are less likely to own or co-own land and, consequently, manage or co-manage farms, because as seen in the previous chapter, user rights are usually in the hands of the landowner. This means that most women are not in control of what happens on the farms and they lack voice (Katz, 1997) and bargaining power to influence the choices made related to crops, their management, or investments, which, in a climate change scenario, can mean that women´s lack of participation or influence can increase their propensity of being adversely affected by it. On the contrary, in Cóbano most farms are jointly owned. This is partly the result of the state´s land distribution, which recognized both partners as legal owners, and partly because other couples, who acquired land by other means, decided to share land titles. In turn, landownership facilitated these women the possibility of claiming their user rights to the land and farm, allowing them to assume farm management and, consequently, rendering them less vulnerable to climate change.

Another implication for women who do not possess land is that they face more limitations to get finance to invest in agricultural production or other ventures since land is one of the conditions asked to secure a mortgage. In northern Cartago financial options are scarce for everyone, so

banks are pretty much the only alternative, and in Grecia, besides banks, participants can request financial support from cooperatives. Most consider that both banks and cooperatives don´t make a distinction to whom they loan money to, as long as they comply with the conditions. Nevertheless, the issue is that women in general face greater constraints to accessing finance compared to men, because they are less likely to own land or to earn a wage. As Nora, a farm owner and manager from northern Cartago, explains: "if we don´t have land, we don´t have credits because land is a warranty" (personal communication, 21-02-2018). Plus, another difficulty women have is that as Moises, farm owner and manager from northern Cartago points out "… women may not have enough wages to cover the quota or land" (personal communication, 27-01-2018). Hence, women that don´t own land or earn a wage are unable to access financial support due to these structural gender inequalities that "gender-neutral" policies help sustain, rendering them more vulnerable by significantly limiting their adaptive capacity.

Besides landless and unwaged women, other women share their experiences and point out other reasons why credits are not inclusive of all of them and why it puts them in a disadvantaged position that contributes to upholding gender inequalities, while also adding another factor that renders them more vulnerable to climate change. Co-manager Adelina from Grecia complained that a few years back, public institutions went to offer her husband some financial assistance. Although they both own part of the farmland, she says: "… they offered it to my husband, not to me" (personal communication, 06-10-2018), so she considers women don´t have the same rights as men do and institutions fail to provide them with equal opportunities. Another very different example is Sarita´s. She did an undergrad in Nursing, but she later decided she wanted to work with her father on the farm. Now she wants to do a project so she can sell farm products to the consumer directly. To do so, she looked for loans, but she was not able to get one because of her academic

studies. From her experience, loans targeted towards women are offered only to those who don´t have academic studies, so she is not eligible to request them. Thus, both Adelina and Sarita´s experience evidence that is not only landless and unwaged women who face constraints to access financial support.

Quite the opposite has been experienced by participants in Cóbano. For one, they not only have banks as financial options but public institutions and producer´s organizations also provide men and women with materials and tools, such as plastics, wires, equipment, among other things, for their productive projects. This has enabled some producers to initiate climate change resilient projects or improve their existing production to better adapt to climate change. In Gerardo´s case, after being denied help for many years, he recently was given a biodigester because for him "part of Ecological Blue Flag is to fight climate change, so the donation of a biodigester by the Agricultural Center was to avoid greenhouse gases" (personal communication, 1-08-2018). In the case of female producers, the distribution of these resources has not discriminated based on land ownership or gender, so it has enabled both landowners and landless women to develop vegetable productions in contrast to what women experience in other localities. This tendency, according to Carmela, is quite new because "before, women were for the house and men for the field" she says (personal communication, 30-07-2018). It has been predominantly institutional assistance with materials and training that has empowered women to initiate their own productive projects.

Informative and training activities are other resources that vary according to local institutions and policies. In Cóbano, public institutions have been particularly successful at capturing each gender´s interests and integrating them in activities, so training and informative activities related to vegetables are frequented most of all by women, while men attend those related to cattle or other crops. For female producers, it was particularly in the training course "Mejoramiento de

Vida" (Life Improvement) organized by the local office of the Ministry of Agriculture, where women had the chance to reflect upon what could improve their lives, identifying their desire of having a vegetable garden. Afterward, they were provided with the necessary material resources and further training to initiate their production.

Besides those types of training, men, women and their families have also taken part in other informative activities organized by public institutions about climate change. MAG, for example, is trying to promote the program "Bandera Azul Ecológica" (Ecological Blue Flag) among female and male-headed farms. It is a national award given to farms who voluntarily seek to comply with sustainable and ecological requisites, including mitigation and adaptation measures. Roxana, a vegetable producer, explains that "… it is about the family learning to live harmoniously with the environment… the Blue Flag is to live without pollutants, use the least of chemicals possible" (personal communication, 01-08-2018). As part of the program, these producers and their families received climate change training and information. The intention is that farmers and their families feel motivated to produce more sustainably, while also learning to mitigate and adapt to climate change, which reduces their vulnerability.

In northern Cartago, public institutions have begun to promote the participation of women in training. Clotilde believes women are starting to get more invitations to training and informative activities: "until now we have begun to introduce ourselves, but everything used to be dedicated to men. Men were the producers, so informative activities were for men" (personal communication, 23-08-2018). However, Francisca, a farm manager, believes women are even receiving more support than men are. "Now women have more benefits. At this moment. I think so because things have changed and women are more valued" she expresses (personal communication, 08-03-2018).

However, these institutional practices have not been able to effectively integrate all women. Although participation is open to anyone in these trainings, two women acknowledge they have felt uncomfortable at times because most of the participants continue to be men. Lucía, an independent farm owner and manager, explained she rarely goes to any of these activities because "only men go. I have gone once or twice… but to stay in a meeting that lasts two or three hours with 50 or 60 men, you kind of feel uncomfortable, so it´s better not to go" (personal communication,15-02-2018). Things might be changing because institutions now promote the participation of women in agriculture and in these formative events, but the reality is that these spaces continue to be occupied mostly by men because of the hegemonic gender order, which inhibits women from taking part.

As for training and informative activities about climate change, there seems to be a difference between what is offered to independent farm managers in comparison to groups or associations, especially because public institutions promote the consolidation of collectives. For example, most male and female independent farm managers have not taken part in any training or informative activities related to climate change, nor are they aware if institutions organize such activities about this topic. Hence, they know little about climate change, its consequences, and how they can face it. However, participants who belong to the female association reported they have received training on climate change that have been organized by public institutions specifically for them as part of the assistance provided to help them consolidate their agribusiness; so overall, they possess more knowledge about this phenomenon. Comparatively, independent producers can be considered more vulnerable as they have not been offered informative activities and training by institutions, so their lack of knowledge renders them more vulnerable. Meanwhile, participants of the female association were offered climate change training and information, increasing their resilience and adaption capacities through the provision of knowledge.

In Grecia, women tend to abstain from educational activities offered by cooperatives and public institutions related to coffee production because they internalize the hegemonic gender order. Melania´s reason reflects this when she says: “men know more about coffee, so women don´t go” (personal communication, 19-06-2018). The same happens with the climate change educational activities organized by coffee cooperatives. The reduced participation of women suggests that, for cultural reasons, coffee-related activities are not really successful at integrating women, but when training and informative activities are related to other types of crops, women become more interested, which is exemplified by the association of women who grow medicinal plants to produce cosmetics products. As in northern Cartago, public institutions have facilitated female associations to attend all kinds of training, including climate change. Thus, vulnerabilities to climate change are more likely to diminish when public and private institutions acknowledge the special interests and needs of each group. Otherwise, they enhance the vulnerability of those who are excluded from those spaces, creating unequal opportunities to respond effectively to climate change. From this point of view, male or female coffee producers that are not affiliated to a cooperative or association and that have not been able to learn about climate change can be considered potentially more vulnerable.

3.2. Shifting the lens to intrahousehold power dynamics

When shifting the lens inwards it becomes clear that household members are not equally vulnerable to climate change. Their personal vulnerabilities are shaped by all sorts of factors, ranging from policies, material resources, personal qualities, or social relations, that together determine the extent to which a person can be adversely impacted by climate change. In this section, the focus is put on how relations of power among household members contribute to constructing dif-

ferent but related climate change vulnerabilities. Power relations delimit who has or hasn´t decision-making privileges in face of climate change or, at least, which members take part in negotiations where climate change responses are decided. But the way these power relations play out depends on the bargaining power of members, which varies according to gender, land ownership, farm management, agency, empowerment, agricultural and climate change knowledge, agricultural responsibilities, class, age, and disability. These factors are discussed in the following sections because they are key to understand how power relations between differently situated members contribute to producing their personal vulnerabilities.

I sustain that asymmetrical relations, either in farms managed by men, women, or jointly managed, can be the reason why some household members are more vulnerable than others. Members´ situatedness in gender and other power structures may locate them in a disadvantaged or privileged position in household negotiations. Some are disadvantaged because they might not even hold enough "voice" (Katz, 1997) to participate in negotiations, while others are privileged because they have the right to take part in those processes, but also because they may use their bargaining power to communicate their views and influence the choices being considered, sometimes even putting forward their interests and goals.

The disadvantaged might be marginalized based on gender differences, but in other cases, other power structures can become more pronounced or significant in creating differences, such as age, class, incapacities, or the combination of them. The inability to participate in the negotiating table means these individuals cannot voice their concerns, needs, and experiential knowledge on climate change, failing at the possibility of influencing the action routes chosen to address climate change and its impacts. Hence, choices that are made in response to climate change usually reflect only the standpoints of some of the members, because some views are considered more important

than others when dealing with climate change and it enhances the personal vulnerabilities of those left aside.

On the contrary, for other members in a household who have the right to take part in negotiations and hold enough bargaining power, their vulnerability can be reduced. In some cases, those in power willingly choose to include others in the negotiation process regardless of their differences, establishing an egalitarian system of decision-making. In either case, those members involved in negotiations have the opportunity to influence the decisions on how to respond to climate change and its challenges. It enables choices to be made considering their points of view and they are made jointly. It reduces their vulnerability, as they can put in practice their "power from within" (Rowlands, 1997) to voice their views on the matter and their "power to" (Allen, 1998) influence the course of the response.

Decisions and negotiations centered on climate change, then, can reveal the existing power balance (Seebans & Sauer, 2007). They can evidence the power asymmetries/symmetries between members of a household and whether they result in relations of domination/subordination or more egalitarian (Deere, 2002; Ravazi, 2009).

Male-headed farms constitute the norm in northern Cartago. Organized according to the hegemonic gender order based on men´s work on the field and women´s household labor, women in these farms don´t tend to have the same agricultural rights and responsibilities as men do. Agricultural matters are not part of women´s competency, which leads them to abstain from participating more actively in decision-making processes related to climate change as well because, as some of them claim, they don´t know enough or male members know more. Specialized knowledge on agriculture and climate change is then considered an asset that men tend to have due to their labor, constituting a notion on which gender inequalities are grounded. It serves as a

means to justify and normalize men´s privilege to make decisions while women are marginalized because they don´t hold the necessary knowledge, which in turn contributes to render them vulnerable. Rosario, for example, is a housewife whose husband and sons dedicate to agriculture. Although she considers that strategies to face climate change should be decided among all family members, she acknowledges that she doesn´t give feedback because she does not know enough and that her husband and sons know better. Similarly, at Matilde´s house, her husband and sons work on the farm together, so her husband tends to comment and seek advice for farm matters from her sons, but he does not do the same with her or her daughters. She would like to participate in decision making but she feels that her opinions and suggestions would not be well taken by her husband, so she abstains.

Women´s lack of specialized knowledge, no income, limited access to other resources, or their age, can add up to the reasons why they have an insufficient voice to negotiate with other members (Katz, 1997). They are excluded or they exclude themselves from these decision-making processes, supporting, in return, the gender order. As a result, women´s needs, concerns, and ideas related to climate change are not being communicated to other members. Their views are not taken into consideration in those decisions that derive from climate change and the approaches being used to face it are being drafted only from a male perspective. So, put in the simplest of ways: men are choosing for women, which affirms their power over them. Women who don´t possess land, nor an income, can then be more prone to suffer the negative impacts of climate change due to their situatedness. I contend that these women tend to be more vulnerable compared to landless men, such as their 3w3bgvown sons, who despite not owning land participate much more in negotiations for decision making than them, and even more compared to men like their husbands who own the land because the gender order together with class differences, privileges male voices.

Comparatively, landless and unwaged women are also more vulnerable than female landowners and farm managers. In female-headed farms or co-managed farms, female producers take part in decision making and, in some cases, they are the ones who ultimately decide what gets done. Plus, they have control over revenues produced with agriculture. Women like them, who own and manage their farm, can then be considered less vulnerable because not only do they challenge the gender hegemonic order by undertaking responsibilities that are not traditionally assumed by women, but they also have more resources that strengthen their fallback position and their bargaining power to influence climate change negotiations with other family members. Land ownership can then be considered a key resource to be able to act with agency and diminish individual vulnerabilities, especially those of women because it gives them the opportunity and means to defy the hegemonic gender order from a different standpoint on the gender structure. Thus, their climate-related concerns and the strategies they come up with to cope with climate stressors are taken into consideration by other members and they have a greater possibility of enforcing them. Nora, for example, acquired her land through the state and it took her a long time and many bureaucratic processes to achieve it, but now it´s been around 20 years since she´s had it and she has been working to convert it into a project that provides her family with food security. In her words: "Climate change has been talked about for a long time and I´ve always been there listening attentively because I have a family. What I´m building is for my family´s future and their food safety because in times of hunger we eat everything. I´m sowing plants that can be eaten" (personal communication, 27-02-2018). Another example is organic farmer Francisca. She started producing organic vegetables because "[…] by not using agrochemicals I´m contributing with my little grain of sand" she says (personal communication, 08-03-2018). For doing so, she had to go through

negotiations and disagreements with her husband because he was not convinced about producing organic, but, since she is the landowner, she was able to bend the outcome to her advantage.

Nevertheless, in these families, there are also examples of members who can be considered more vulnerable due to their situatedness along other power structures, such as class, age, and disability, which are far more significant in the construction of their vulnerabilities than their situatedness on the gender structure. Such is Mario´s case, an older man who is co-owner and co-manager of the farm along with his wife Ana María. Mario´s illness impedes him from working on the farm regularly, so he feels he´s not contributing to the household income. Although the land is partly his, his wife and son manifest they try to include him in management decisions, but he sometimes does not want to get involved because he feels he hasn't earned it, yet other times he feels he is not listened to by them. "They don´t want to listen to me, so that is where it hurts" he comments (personal communication, 22-01-2018). For example, he believes that in order to face climate change, the land must be worked correctly, which means doing proper drainage ditches; however, he complains that his son didn´t do them for two years and they suffered great land loss because of it. "I tell them, for example, not to do the ditches like that because it's going to cause damage, but if they don´t listen to me then the damage is caused, but if they listen to me then it can be prevented", he says (personal communication, 22-01-2018). Although he has ideas that could help their farm adapt to climate change, his own feelings of powerlessness, plus the power that his wife and son have acquired from undertaking more farm responsibilities due to his illness, have limited his involvement in decision making, which in turn increases his climate change vulnerability and that of his family.

Other household members who can be considered more vulnerable to climate change due to their age are, for example, younger individuals who do not take part in negotiations that influence how decisions are made. There are some cases, from both male and female-headed farms, where sons and daughters are not informed and, even less, consulted on farm matters. For example, Guido is a male farm manager who has two young children with Marcela. They both confess that they don´t always share what goes on with the farm with their children, so when important decisions have to be made, they are taken just by the two of them. Another example is Patricia, who is a 21-year-old girl that is usually not consulted by her parents about farm matters. Regardless, she wouldn't like to take part because she does not feel capable of suggesting ideas since she thinks they know more than her. Yet, when asked what she would suggest to adapt agricultural production to climate change, she commented that greenhouses and wells could help cope with erratic rainfall patterns, showing she holds knowledge. Despite her reservations, Patricia has ideas that could be beneficial for the management of agricultural production in a climate change scenario, but because of her age, she limits herself from sharing them. Sometimes younger household members are not given the choice to manifest their points of view or give suggestions, although some of them have a better understanding of climate change than their elderly from what they have learned in school.

In Grecia, the gender dynamics held in male-headed farms tend to be somewhat different from those of co-managed farms, which influences how gendered vulnerabilities are constructed. In male-headed farms, gendered vulnerabilities are constructed similarly to those in northern Cartago, since women tend to hold little productive responsibilities and so they do not hold enough voice to get involved in negotiations or decision making, including those pertaining to climate change. Thus, landless and unwaged women are likely to be more vulnerable compared to other

male members. But few examples stand out from the norm, such as Ligia and Josue, whose personal vulnerabilities are co-constituted and interrelated. Josué owns and manages the coffee farm and Ligia is part of an association of women who produce organic cosmetic products. Ligia has learned about climate change because she has been invited to many trainings and informative activities as a member of her association, while Josue acknowledges that he knows little about it. Notwithstanding, he is the one who makes all decisions about coffee because he argues: "She might know about plants, but she doesn't know about coffee plants, what they need […]". He shares coffee matters with her but as he says, "she does not influence my decisions" (personal communication, 19-06-2018). Although Ligia earns a small income that strengthens her bargaining power, it is not enough, because she is immersed in an asymmetric power relation with her husband through which they reproduce the gender hegemonic order, which enhances both their vulnerabilities. On her side, her propensity to be negatively affected is increased by not being able to have a voice in the decisions that have to do with their main source of income and, on his side, his vulnerability is enhanced by not taking advantage of her knowledge about climate change, which might be useful to cope with it. Thus, their gender power relation renders them and their family more vulnerable.

Francisco´s farm shows that not all women in male-headed farms are equally vulnerable. On their farm, all household members, comprising his wife and their sons and daughters, contribute to the farm management one way or another; so, ideas about how to deal with climate change are discussed among them. Sarita, her daughter, refers to the climate change strategies they have already implemented and says: "I think these have been joint ideas really since we are always talking about the weather, climate change and all that. And also because of experiences from last year and this one, there are things that we are doing differently today. I think it has been together, between

all of us we talk a lot about it, and yes, also my dad says we have to make this and this" (personal communication, 06-08-2018). In this male-headed farm, all member´s ideas are taken into consideration, but more particularly, Sarita and her father are the ones who make the final decisions since they both work the land. It is worth highlighting that although Sarita does not own the land and she is a young woman, her higher education degree and the farm work she has been doing for over a year gives her a stronger bargaining power that situates her in a privileged position compared to other men and women. At first, her father did not take her opinions seriously, but now she feels empowered to negotiate and make choices alongside him, which can be said to reduce her vulnerability to climate change. Thus, her example evidences that when there is a disruption of the hegemonic gender order, women can see their vulnerability reduced as they have more control over how the farm and the family cope with climate change.

A similar thing occurs in co-managed farms, where women take part in the farm's management. More symmetrical dynamics between the couples can reduce men and women´s propensity to be adversely affected. When both partners have similar resources, it creates a certain balance in their bargaining powers that allows them to sustain negotiations with one another and voice their points of view before coming up with joint decisions over how to deal with climate change. Melissa and her husband, for instance, are changing some coffee plants for other varieties that are more resistant to certain plagues. She says that sometimes decisions are hard to make between them. The following is an extract from their interview:

> Melissa: "[…] I was kind of thinking and he was too that we should renew a little bit of coffee, so he says "yes" and then I asked, "for which one?" "which one do you think we should plant?" because it takes a lot of effort to take information out of him and to get him

to decide, so that's what sometimes makes me… he says I get mad but because I´m like that, I just think and then…

Interviewer: "you want to do it".

Melissa: "exactly, it has to be decided. He is very passive. And I tell him "speak" … but well, we keep fighting over that 43 years later [They both laugh]. But yes, this time it was something like that. I asked "What do you think is the oldest coffee? The one that is oldest, the one that has been producing less maybe?" so then we both agree that it is that part there, and yes, we decided" (persona communication, 24-04-2018).

Sometimes reaching an agreement can take a while, but at least both partners have "voice" (Katz, 1997) and bargaining power to enter those processes of negotiation with one another. Another couple who co-manages the farm and makes decisions together are Melania and Miguel. Besides coffee, they produce vegetables in the open and lately they have been thinking and discussing how to adapt to climate change. Melania explains: "We have been planning on planting products that don´t get so affected, that are not that affected by water because if you start to plant other products first you have to put plastic on them and that implies a huge cost, both in terms of money and time, so it has a great cost. Then, it's better to think about other products that are easier" (personal communication, 19-06-2018). These gender relations can be seen as more symmetrical because the people involved have voice and assets that confers them similar bargaining powers. Thus, it is less likely that individuals seek to prevail in those processes by exercising "power over", as they might encounter resistance and conflict (Allen, 1998). Instead, negotiations are about trying to cooperate. Choosing together how to deal with climate change impacts and to come up with adaptation measures that can reduce both their vulnerabilities, as agricultural practices will reflect both parties' concerns, needs, and suggestions.

However, in both male and co-managed farms, there can be other members, especially younger ones, who because of their age are not included in these decision-making processes, which tend to render them more vulnerable. Franco consults farm matters with his wife, but not with their children because he says they are not interested in agriculture. Miguel and Melania also acknowledge that they don´t involve their son and daughters in those decisions because, as he says, "they don´t get involved with the farms so those are decisions that are not up to them either" (personal communication, 26-06-2018). Thus, climate change-related issues are addressed from an adult-centric perspective in many families. These younger members who are not included in those processes bear a disadvantage produced by the power relations held with other members who exclude them, limiting their possibility of taking action.

In Cóbano, families in female, male and co-managed farms seem to have more symmetrical power relations, which I sustain have partly been motivated due to the institutional assistance offered to men and women in the locality, helping them to break down some of the traditional hegemonic gender norms. Consequently, it has contributed to reducing the personal vulnerabilities of male and female producers, but also those of their family members.

The empowerment of women motivated by the resources provided by local public institutions has enabled more symmetrical relations among members. Women´s situatedness due to public resources and recognition of their "power from within" has given them the chance to contest the hegemonic gender order (Rowlands, 1997). External resources have upgraded their bargaining power, so women are now able to have more control over the farm´s resources. For example, institutions recommended growing organic vegetables in protected environments, but it was women who, as a sign of empowerment, decided how to produce them and how to cope with climate change. Carmela manifests that the use of greenhouses is part of the strategy intended to produce

under these new climate conditions because they have better control over environmental factors. Then, the way they produce under protected environments reduces their own vulnerabilities, as well as their families because they can generate an extra income and provide food security. Even landless women in male-headed farms can be considered less vulnerable than landless women from other localities because they too have their own vegetable crops even though the land belongs to their partners.

Due to women´s agency and privileges in female-headed farms and some co-managed farms, they have the last word in the choices made. Nonetheless, they comment and consult the issues they face with their vegetable production to other members, especially with their partners. For example, Miguel feels at liberty to tell his wife his suggestions. “Yes, sure. It is for the best, participate and listen and answer what you think or don´t think so we can take the maximum advantage”, he states (personal communication, 28-07-2018). Having similar bargaining powers opens the possibility of dialogue. Giving suggestions reduces their partner's vulnerability to climate change because their concerns, ideas, and needs are taken into consideration by women when they make their decisions. For example, Luz, Miguel´s wife, and the farm manager shared the following example: “[…] he asked me "Please don´t buy Kale so we don´t have to deal with that pest". I didn´t order Kale anymore. Why? Because I know Kale can reach a certain growth looking beautiful, but then, after that, it turns white, because of white fly. He saw that and asked me not to order it anymore. I don´t” (personal communication, 28-07-2018). By sustaining more symmetrical relations, gender differences are not as significant in the construction of both partner´s personal climate change vulnerabilities, as well as their families. Another example is Carmela, who discusses agricultural issues with her sons and daughters, too. She portrayed the following example:

> “Well, I am the one who observes the most since I´m there every day, so I´m observing and then I always say: "Román, this is happening, what do you think?" and together we reach a decision, "well let’s do this", among the two of us or among the ones who are there. Yes, for instance, I tell them: "children this and this is happening", let’s say like when we decided to plant only chives. That time, I said: "This is happening, but I´m not sure, what should I do?" so then we all made the decision together…” (personal communication, 30-07-2018).

Sharing with other members the challenges being faced with the crops and providing the opportunity for them to give their inputs, may reduce each member´s probability of facing disproportionate harm because they get to voice their needs and define along with the others how things are going to be handled. Therefore, in these families differences of age or gender are not significant, since they are not used to justify who is included or excluded from negotiation processes associated with agricultural production and climate change.

There are male-headed farms where partners hold symmetrical relations too and are more inclusive of other members in the farm’s progression, even if men are the ones who have the last word when it comes to making decisions about the farm. In Cecilia´s family, for instance, because they are part of the program called Ecological Blue Flag, which gives recognition to those farms who voluntarily seek sustainability and comply with climate change mitigation and adaptation measures, they are required to have a work plan that involves all the family. “We try to talk once a month about what we have to do, the things we did that didn´t work, what are we going to do in those cases to improve what didn’t work, right? so all decisions are made together” she explains (personal communication, 03-08-2018). Although Cecilia and her sons are differently situated in gender, class, and age power structures compared to her husband, he does not assert his power by

choosing for them. Instead, they all take part in deciding the farm´s progress because their relations are not based as much on those power differences. Thus, they can sustain a more egalitarian system of decision-making where they all choose together how to adapt their livelihood to climate change. Each one of them can also be considered less vulnerable because they don´t experience a greater disadvantage compared to others that stems from a power imbalance between them. Egalitarian relations within a household encourages members to take action, to use their "power for" or even get empowered instead of suppressing their capacities, which is what happens in more unequal households.

4. Conclusion

In this chapter, I argued that smallholder farm´s climate change vulnerability is not only induced by the exposure to climate stressors and its consequences on agricultural production but also because of socio-economic drivers and contextual conditions that increase their economic instability, such as the type of cash crops grown by most farms in a locality and their insertion into local and global markets; the products price variability due to its supply and demand; production costs, including inputs, wages, and other expenses; the scale of production; land policies and distribution; and institutional presence and assistance, including the availability of financial and educational resources. Such is the case of smallholder farms in northern Cartago and Grecia, whose already challenging economic situation is aggravated due to the presence of unprecedented climate stressors, which cause negative impacts to their agricultural production increasing their risk of not being able to produce and profit as expected. In Cóbano the situation is quite different because the contextual conditions have provided smallholder farms with a more stable economic situation, as well as capacities to better withstand these climate stressors; so, even though they too experience

them and suffer their consequences, they are less vulnerable compared to smallholder farms from the other localities.

Also, I have shown how gendered policies and institutional practices contribute to the construction of gendered vulnerabilities to climate change, particularly based on how they govern and distribute resources in each locality, especially land distribution, finance or material aid, and climate change training and informative activities. Policies and practices can have contradictory effects, contributing to enhancing the vulnerability for certain men and women, while reducing the vulnerabilities of others. In northern Cartago and Grecia, "gender-neutral" policies and practices on land ownership and finance tend to reproduce structural inequalities that limit most women from accessing these resources. Women are less likely to acquire land and, in consequence, face more constraints to be granted finance. Both conditions add to landless and unwaged women´s vulnerability to climate change because within the context of a hegemonic gender order that relegates women to the household, women who do not own the land are less entitled to take part in decision making about farm matters, including those related to climate change. Thus, they are less likely to influence the response mechanisms used to face climate change, as well as acquire financial support that would increase their adaptation capacity.

As for training and informative activities about climate change, they are available or attended only by certain groups. Public institutions in northern Cartago and Grecia have organized these activities for women´s collectives only and cooperatives in Grecia have done so for their associates, but they are mostly attended by men. Thus, it seems that men and women who belong to collectives, either associations or cooperatives, are more likely to acquire knowledge on climate change and, thus, reduce their vulnerability compared to independent male and female producers who are not given the opportunity to attend these activities and get informed.

In Cóbano, the intervention of public institutions has led to a rather distinct gendered construction of climate change vulnerabilities. First, most women from my research are landowners along with their male partners, partly because of the state's land distribution and partly because of other couple's initiative to share land titles, which led to a more just distribution of the land among them. This gave women the opportunity to request bank loans as well, yet most producers have not done so because local public institutions have supported them with materials and tools for their productive projects. This aid has not been subject to land ownership, so it has also given landless women opportunities to have their own production. In addition, institutions have organized training and informative activities based on men's and women´s interests and needs. As part of these trainings, they have not only made information available to men and women on climate change, but they have been successful at securing their participation in these activities. In sum, their intervention has not produced uneven or disproportionate vulnerabilities between men and women and, instead, they have contributed to minimizing the vulnerabilities of different women and men by widening the scope of their assistance.

Lastly, I focused on farms/households' power relations among differently situated members as it contributes to the construction of related, but distinct personal vulnerabilities. Members' situatedness and the specific resources they have (land ownership, farm management, agency, empowerment, agricultural and climate change knowledge, and agricultural responsibilities), enhance or reduce their vulnerabilities, depending on how restricted/unrestricted they are to take part in negotiations and choices. One of the most significant outcomes is that land ownership turned out to be a key resource that contributes to reduce male and female farm managers´ personal vulnerabilities, because of their decision-making power to control agricultural resources. In female-headed and co-managed farms in northern Cartago, Grecia, and Cóbano, land tenure, as an indicator for class,

represents the most powerful position capable of being used by women to challenge their powerless positions in the gender structure. In turn, it enables them to voice their concerns and needs that might arise due to climate change and act accordingly, which reduces their vulnerabilities and also increases their adaptive capacity, as I will argue in the next chapter. On the contrary, landless, and unwaged women in most male-headed farms in northern Cartago and Grecia, lack "voice" (Katz, 1997) to take part in the farm´s negotiations and decisions, not only because they don´t possess the land, but also because of their limited agricultural responsibilities and their presumed lack of knowledge, enhancing their vulnerability. The same thing happens to other members that because of their situatedness in class, age, or disability structures don´t have the right to take part in negotiations, so they are restricted from being able to share their views and influence decisions related to climate change, rendering them more vulnerable than other members who are allowed to take part, and even more so than those who are privileged for making the final decisions.

Moreover, the blend of asymmetrical and symmetrical relations that most households exhibit is what partly explains that members within a household have different personal vulnerabilities. Only in households with an egalitarian system of decision-making, power differences do not serve as the basis over which members are excluded or restricted from voicing their views and being able to influence choices. On the contrary, members are allowed and even incentivized by others to take part in negotiations and to decide on the best approaches to face climate change together, which in turn reinforces their egalitarian dynamics and, by doing so, it most likely reduces each member´s possibilities of being disproportionately affected by climate change.

CHAPTER 7- CLIMATE CHANGE ADAPTATION CAPACITIES, STRATEGIES, AND PROPOSALS

1. Introduction

In the previous chapter, I explained how climate change vulnerabilities are constructed for smallholder farms and differently situated men and women, but it does not imply that producers are passive victims of climate change, as they hold the capacity to respond and resist it. Therefore, adaptation constitutes a field of research that seeks to identify the actions undertaken to adjust to environmental changes and risks. In this sense, adaptation is about "the actions taken to reduce or moderate or adjust to the expected or actual negative effects of climate change and take advantage of new opportunities" (Ford et al, 2010, pág. 2). Still, to this definition, I would add that, for smallholder farms, adaptation is also about ensuring economic viability. Thus, in this chapter, I address the adaptation capacity and the adaptation strategies undertaken in male, female, and co-managed farms in each of the localities.

Adaptation is shaped by social and political processes, such as: power relations, resource distribution, governance, knowledge, and subjectivities (Eriksen, Nightingale, & Eakin, 2015). Among the resources that can make a difference in the adaptation capacity of smallholder farms are finance, information, and technology (Smit & Wandel, 2006). In the first section of this chapter, I will address how the broader political and social contexts limit or enhance smallholder farms' adaptation capacity and how it affects their adaptation needs. Particularly, I will focus on how institutions and their resource distribution, like climate change information, finance for adaptation, and technical assistance, shape smallholder farms adaptation capacity depending on the resources available to producers in each locality, but also how the unavailability of these resources become limits for adaptation. Also, Smit and Wandel (2006) point at kinship networks as another factor

that can influence adaptation capacities. I will discuss how, in each locality, the social networks and kinship ties that producers hold with one another constitute mechanisms through which useful knowledge for adaptation can be shared and passed on.

In the following section, I will focus on how the farm manager´s subjectivity, including their agency, personal interests, goals, and concerns, as well as their agricultural and climate change knowledge, inflect adaptation choices and strategies in smallholder farms, given that they are the main decision-makers. Adger et al (2003) sustain that adaptation involves decision making and the underlying interests that might move adaptation towards a certain direction; thus, it is important to look at who makes those decisions. Both male and female farm managers are able to choose over farm matters, but their situatedness can lead to having different knowledge, interests, and concerns that can be conducive to distinct preferred approaches to adapt (Ravera et al, 2016; Djoudi et al, 2016), especially if they grow different crops. Thus, I will argue that female, male, and co-managed farms tend to select and execute different adaptation strategies. The gender of the manager(s) is key to understand the adaptive capacity of a smallholder farm and the selected approaches used to adapt.

Although farm managers have the strongest bargaining power and the privilege to have the last word in the adaptations chosen, some consult and negotiate the adaptation responses with their partners and other members. So, adaptations can be the result of asymmetrical or symmetrical relations that, in turn, reinforce the domination of some individuals over others or their more egalitarian dynamics, which, consequently, can have distinct implications for the farm´s adaptation capacity as well.

Plus, it is important to consider that adaptation strategies can have dissimilar and even contrary consequences for individuals or the environment. While they can be effective to minimize climate change impacts and produce benefits for some, they can simultaneously increase the vulnerabilities of others or cause environmental degradation, going against sustainable development principles (Eriksen, Nightingale, & Eakin, 2015; Brown, 2016). In other words, some adaptation approaches might be sustainable because they are socially and environmentally conscious, while others are unsustainable due to their negative consequences and, for that reason, they are considered maladaptation. In some settings adaptation and maladaptation can happen concurrently (Eriksen, Nightingale, & Eakin, 2015). Thus, it is important to look at the array of coping and adaptation strategies being used and the social and environmental consequences they may produce.

Finally, I will address the adaptation needs producers still have and the ideas participants share for further adapting in the hopes that it will serve to inform policies and institutions on how to effectively direct their future resources and efforts to further enhance adaptation capacities.

2. Political and social contexts that shape adaptation.

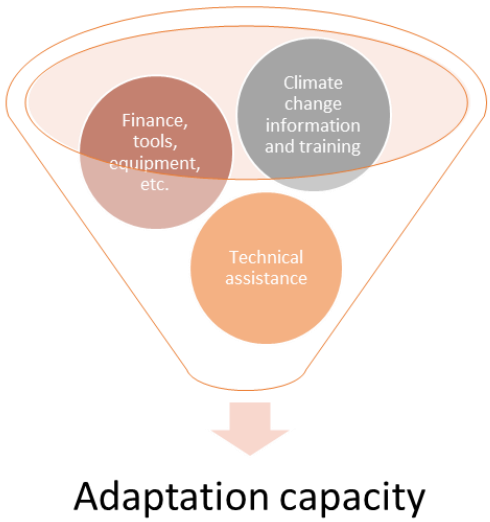
2.1. Institutional contexts and resources that nurture or limit adaptation.

Just as institutions shape the construction of vulnerabilities, they can enhance or limit the adaptation capacity of smallholder farms depending on the resources they make available. However, each locality has a different institutional context that results in distinct possibilities for smallholder farms. In northern Cartago and, to a lesser extent in Grecia, neoliberalism has restricted the assistance offered by public institutions, leaving a gap that has been occupied by commercial houses in the first locality and by cooperatives in the second. Meanwhile, in Cóbano institutions did not withdraw their assistance, as they continue to perform a major role among smallholder farms. These diverse institutional contexts imply that smallholder farms have different facilities to access

information, finance, and technology depending on the place (Smit & Wandel, 2006), which translates into different adaptation capacities and limits.

Figure 7: Institutional contexts and resources that shape adaptation capacity

(produced by author)



Given that in northern Cartago and Grecia smallholder farms face economic instability, which climate change accentuates with the impacts it has on their crops, their most pressing need to cope and adapt is financial. In northern Cartago, male and female farm managers lack financial alternatives since institutions don´t support them much with financial means. Banks are pretty much the only option, but they offer loans at high-interest rates that smallholder farms are not always sure they can cover. Rigoberto, the husband of female manager Lucía, explains that because their economic situation is unstable and precarious, they rather not request loans to invest in their farm because then they would be much more pressured to cover the loan and much more at risk of losing their land. Just like Rigoberto and Lucía, many other producers consider that options to invest in their farms are practically non-existent as banks are not a safe option, which means that the financial options specific for climate change adaptation are even more scarce. The lack of resources might be restricting their possibilities of investing in more effective and long-lasting measures that

could require materials, tools, or another type of input to successfully achieve transformative adaptations. For instance, young female producer Sol, who is also familiar with facing economic limitations, explains that she would like to install a water tank to harvest water as an adaptation measure, but like other producers, her main restriction is that she does not have the financial resources to do so. In this regard she reflects: "Someone can give me an idea but what if I don´t have that money? […] So yes, if I had money, what wouldn´t I do?" (personal communication, 24-08-2018).

In Grecia, male and co-managed farms also confront economic limitations to invest in climate change adaptation. However, in contrast with producers in northern Cartago, coffee producers have more financial alternatives that come from cooperatives, such as short-term credits or accessible inputs, although interviewees don´t consider these to be specific for adaptation. A few others have also been able to request low-interest bank loans with the intermediation of their cooperatives intended for renewing coffee. Although bank loans may increase the adaptation capacity for some, depending on the conditions and interests, it may not necessarily be a financially sustainable and secure option, because due to the producer´s economic vulnerability owed to volatile coffee prices, profits may not necessarily be enough to cover the loans. Carlos is one who asked for a loan two years ago to replace old coffee. Although the loan gave him a grace period of two years, he is now dreading the moment when they start charging him. "[…] it´s very nice when you receive the money, but now you are starting to feel it because they are going to start deducting the payments and with these low prices…" he shares (persona communication, 03-07-2018). Therefore, loans can help them invest in adaptation, but there is the risk of not being able to pay and it causes more worries and uncertainty. Besides bank loans, a couple of producers also acknowledge having heard about the National Forestry Financing Fund (FONAFIFO), a government entity that manages the

payment for environmental services, but they don´t consider it a viable option for all the bureaucracy implicated. Even though coffee producers have certain options, the fact that they are not viable or accessible to all of them, makes them perceive options are scarce and, consequently, it represents a limit for their adaptation. In consequence, financial restrictions prevent some of them from changing productive practices to better adapt because they don´t have the monetary resources to do so. For instance, co-manager Ana acknowledges that to adapt and mitigate climate change they should take more care of the soil by reducing the amount of herbicides they use to keep their land clean from weed; but, that would elevate their costs because they would have to pay more peons to remove weeds by hand and that is just something they are not able to afford.

In contrast, public institutions in Cóbano have assisted most male and female managers with materials, tools, and other inputs that have helped them not only to initiate or improve their agriculture but in many ways adjust their production to better withstand climate change. These financial opportunities are not usually in the form of loans or money. Instead, they consist of other types of resources like plastics, fertilizers, tools, and other materials, that have proven to be of great help. Thus, participants might not consider these resources as funds for adaptation, but they have served that purpose by increasing their adaptation capacity.

Another resource that is much needed in all three localities to increase the adaptation capacity of producers is climate change information. Producers recognize that their partial knowledge of climate change constitutes a limitation to their adaptive capacity, so they would like to have more opportunities to learn and get informed. In Grecia information on climate change is among those resources that are still not equally distributed among producers. While public institutions and cooperatives have promoted learning on sustainable productive practices; climate change has been a topic that has been covered mainly by cooperatives, but not so much by public institutions. In

consequence, many participants have not had the opportunity to participate in these activities to get properly informed about climate change, which is why it is also understandable that most of them don´t hold information about adaptation. Fortunately, institutions do offer training on sustainable practices, which also tends to work for climate change adaptation. Knowledge of sustainable production practices increases these producer's adaptive capacity, but still, information on climate change continues to be a necessity. For example, co-managers Melania and Carlos have gone to various informative activities and training where climate change has been broadly covered together with other topics. Carlos describes that these activities address a "mix" of topics, but most of them are centered on sustainable practices, such as the recommendation to use shades within coffee farms. However, for Melania, climate change adaptation requires a cultural change that could be achieved by increasing the opportunities for producers to learn about climate change and receive guidance, as she explains: "[…] they should inform producers to see what steps they have to take, how we can adapt to that change and what are the solutions" (personal communication, 19-06-2018). Co-manager Gloriana has had a similar experience because she has learned about climate change as a side topic. At the activities she has gone to, for instance, she has been taught that it is important to reforest. They are incentivized to plant double-purpose trees to provide shade for coffee and protect it from climate extremes, while also naturally fertilizing the land with the tree leaves and producing food for their own consumption. Yet, she does not really know the scientific explanations underlying climate change or if there are other adaptation strategies available, so she considers producers need more expert technical support to adapt, besides finance:

> "First, financing because they will need to make many changes, and second, education and training to understand why and how they have to do it. Those are like the two fundamental

pillars that go hand in hand, because you do nothing with understanding and wanting if you do not have how to do it." (personal communication, 26-06-2018).

In Cóbano, producers consider they need more climate change knowledge, although the majority know of climate change and adaptation thanks to the climate change educational activities organized by institutions. In these activities, they´ve been given ideas about how to adjust their practices to climate change, so they are aware of what adaptation means. For example, public institutions have been promoting sustainable mitigation and adaptation practices among smallholder farms with the Ecological Blue Flag program. The program gives recognition to smallholder farms that voluntarily comply with certain sustainable practices. To motivate these changes, producers are given specific guidelines on how to produce sustainably and they are forced to keep track of the changes, so each year they can provide evidence of their improvements. By writing down everything they do, they become very aware of their practices and the inputs they use. As a result, most farms are diversifying their productive activities by growing diverse crops and farming animals, they are using organic supplies, saving water, recycling, and so on. Although this program is a nationwide initiative, this is the only locality among the three where smallholder farms are participating because of the concern and disposition of local public officials. Their experience proves that this type of institutional approach can be considered effective in increasing the adaptation capacity of these farms.

Nonetheless, most producers would like to receive more information about climate change, especially focused on practices they could apply to further adapt. Miguel, the husband of female manager Luz, has gone to trainings and informative activities that public institutions have organized, but he believes that for talks to trigger transformative changes, it is important to make them consistently. "I insist there should be more talks. Maybe more profound and continued because we

do nothing when they come to give us a talk every three years for a day…" he expressed (personal communication, 28-07-2018). Hence, additional and constant information and training are considered a necessity for some of them.

In northern Cartago, the reduced presence of local institutions has meant that most male and female producers have not had the opportunity to attend climate change informative activities. Most of them have very scarce knowledge about climate change and adaptation. Only the women of a female association have been invited to climate change informative activities since women collectives are incentivized by public institutions as part of their welfare strategies. Yet, they have a very narrow understating of climate change. In consequence, producers are unsure of what adaptive measures are more adequate for their crops according to the climate variations they have been experiencing. They tend to seek assistance in commercial houses where they are usually recommended to use agrochemical products and where they are rarely advised on other types of adaptations. As a result, they risk trying certain measures that might not be the most successful, cost-effective, or sustainable. For instance, Silvia, who grows figs, comments that sometimes they seek the help of engineers that work in commercial houses who often recommend using chemicals that have to be applied when it rains, but it is not always the most effective response in face of climate variations because if it does not rain, the chemical can instead damage the plants. Therefore, lack of proper knowledge on climate change and adaptation restrains them from being able to efficiently adapt. For this reason, some of them recognize that one of their most pressing needs is information, and they consider that public institutions should be responsible for providing it. Gabriel, a young producer who helps his parents at the farm, shares that he has not seen local institutions offer support for climate change adaptation, not even trainings or educational activities, but smallholder producers, just like himself and his parents, would benefit from having "[…] information to know

what´s to come and everything that is going on, because climate change affects us all" (personal communication, 31-01-2018).

To summarize, in northern Cartago the lack of educational activities and limited financial resources reduce and limit these smallholder farm´s adaptation capacity, regardless of the gender of the farm´s manager. Additionally, participants are also unaware of climate change policies or government projects to help agricultural producers cope and adapt to climate change. Nonetheless, they believe that the state should be responsible for providing training and expanding financial options, arrange loans with lower interests and reduce the prices of agricultural inputs. In Grecia, resources for adaptation are insufficient, but they certainly have more means offered to them than producers in northern Cartago, which expands these smallholder farm´s adaptive capacity. Nonetheless, participants believe the government, through its public institutions like MAG, INDER, INA, and ICAFE, should be responsible for organizing more training, do more research, provide professional advising, control coffee prices, distribute seeds or tools and arrange low-interest loans for coffee production. Lastly, in Cóbano local public agencies have deliberately made efforts to increase the adaptation capacity of smallholder farms putting at their disposal knowledge and material aid. When those safety nets are accessible to male and female managers, they have more flexibility to adjust their production practices to the changing climate conditions. However, they agree on the need to upgrade their climate change knowledge, so it constitutes their main request to the government and public institutions.

2.2. Networks and social support systems

Learning can be advanced informal settings, like the ones previously discussed, organized by public and market institutions, but it can also be developed through informal settings when information and knowledge are passed on from one producer to another. The collaborative networks

that producers establish are support systems that they can lean on when they need advice or recommendations about their crops. These can take the form of informal social networks, formal associations, or they can be based on kinship ties. Through these relations, adaptation practices are also shared and passed on to others, contributing to expand this type of experiential knowledge, which can enhance their adaptive capacities.

Male and female producers in northern Cartago don´t easily develop close bonds with one another. Thus, in this locality, informal networks are very weak or non-existent. Only those who have social support systems linked to their kinship ties or through formal associations might see an increase in their adaptation capacities, but most producers are reluctant when it comes to asking for advice from other producers with whom they don´t have any kinship ties, nor do they consider assisting others easily. For this same reason, some seek support from external networks, such as regional or national associations or organizations. The experience that co-managers Pilar and Rafael faced when they moved to the community illustrates this point. A few years ago, they moved to Tierra Blanca because they wanted to live on organic farming. When they moved, the street where their property had no electricity, no water, no telephone, so at first they tried to motivate other neighbors to organize and request these services together, as they thought that would make it easier, but people were not interested in organizing. Afterward, they have tried to invite neighbors and people from the community to the training they offer on organic farming, but none of them participate. Because of this, Pilar thinks there is too much individualism, which she says is reflected in a popular local saying: “Each one at home and God in everyone’s” (personal communication, 29-02-2018) that means that what happens in your house is your own problem. Monica, the wife of a male manager, has a similar take when she states: “It is difficult here, everyone is like on their own” (personal communication, 12-02-2018). Producers in this locality don´t tend to

engage in close relationships among themselves that would allow them to cooperate and pass on knowledge on adaption unless it is with relatives or business partners. However, even with a partner, it can be difficult if you are a female producer according to Sol, a young producer. She shares that for her it has been problematic to give agricultural advice when she has produced with a male partner because when she has tried to give them feedback on how to improve certain practices they tend to underestimate or disregard her contributions because of her gender. That is why she states, "when I sow alone I do better" (personal communication, 24-08-2018).

Nonetheless, most producers don´t have reservations about exchanging information and asking for aid among relatives, especially with those who are more experienced. For instance, when Clotilde´s son requires advice related to onions, he asks his uncle. Unfortunately, it seems that in his case and many others the type of advice sought and exchanged is based on agrochemical use, which in the short term can help cope with climate change, but it is considered maladaptation for the environmental and health consequences it can cause on the long term.

In the localities of Grecia and Cóbano, producers have a different social and communal experience. It is common for them to engage with one another and exchange knowledge on farming practices. People sustain informal social networks, as well as those based on kinship ties. In Grecia, co-managers Melania and Miguel are accustomed to asking for guidance. They are now planting new coffee, so he asks his brother or father for advice on the type of fertilizer to use, but they also recently started to grow organic vegetables, so Melania asks other organic producers for tips on best agricultural practices. She shares: "Yes, we have always had that support. Things that one didn´t know but the other did, so they tell you and sometimes they tell you without even having to ask…" (personal communication, 19-06-2018). For her, being able to learn from people with more experience means she won´t repeat the same mistakes others did before her. Thus, producers in

Grecia have stronger ties that enable them to rely on each other for advice. The information they exchange with one another is not only helpful to improve their productive practices, but it might also boost their adaptation capacity. However, not all efforts to collaborate are fruitful. Co-managers Carlos and Gloriana tried recently to promote the formation of a new collective of coffee producers that would work together to produce and sell premium coffee as a way to seek economic sustainability, but their idea did not flourish because people with other interests joined and soon hijacked their project converting it into something else, so they decided to step aside. Hence, social networks can sometimes become a barrier to adaptation as well.

In Cóbano, female vegetable producers have had the opposite experience, because alliances have become an adaptation strategy on their own that enhances their possibility to adjust to climate change. Vegetable producers maintain informal social networks due to their close relationships, allowing them to communicate their hardships and exchange advice with one another. Moreover, their trust and similar interests have enabled them to build alliances and expand their collaborations. Carmela shares that she did many of the trainings with the same group of women. In these trainings, they were taught to form networks that would allow them to exchange products when needed. After sharing many experiences, they developed strong ties, which helps to sustain the network they presently keep. Thus, besides exchanging knowledge on farming practices, they also sell each other crops when one of them does not have a product that a buyer wants. She expresses her feelings about their relationship when she says: "Thank God all of us who produce… we have that trust, that friendship…. We have lots of support, we get along very well…" (personal communication, 30-07-2018). So, instead of competing, they seek to collaborate and support each other's businesses, turning their alliances into an adaptation strategy that enables them to better cope with economic and climate challenges.

3. Smallholder farm´s adaptation strategies

Despite the limitations that were discussed previously that restrict the capacity of some smallholder farms to adapt, most of them have already begun coping and adapting, proving their agency in how they respond to the new challenges imposed by climate change. These responses are the result of the interplay of power dynamics within smallholder farms. Adaptations can be the result of asymmetrical or symmetrical relations. These choices suppose an opportunity for some individuals to reinforce their power over others or to strengthen their egalitarian dynamics, and each one has different implications for the farm´s adaptation capacity. Nevertheless, farm manager(s) are the ones who ultimately decide what gets done, so there can be different patterns in the adaptation strategies employed in male, female, and co-managed farms, which is what I will discuss in this section.

From this perspective, in most male and female-headed farms in northern Cartago, it is not common for all household members to take part in farm discussions and negotiations. Landless and unwaged women in male-headed farms don´t usually take part in agricultural decisions, so they abstain from taking part in those that have to do with adaptation as well since it is seen as part of men´s labor. For example, Matilde, Juaquin´s wife, considers that in their family men are the ones who have the responsibility to think and decide what to do in face of climate change because women don´t usually participate. She would recommend reducing the use of toxic chemicals administered to agriculture and instead seek more natural products as an adaptation strategy, but she does not feel free to tell her husband. Although the farm could benefit from her opinion, her lack of voice (Katz, 1997) keeps her from being able to share with others her suggestion. Because of the gender order, male members reassert their "power over" women by making adaptation decisions without consulting with them (Allen, 1998).

On the contrary, in most female-headed farms, there is a disruption of the hegemonic gender order because women are the managers who have the agency to ultimately decide what gets done in the farms. Their management does not necessarily translate into more symmetrical relations, because except for two women, most of them don´t include other household members in their decisions, probably as a mean to preserve their power and agency in face of others who might want to take it from them justified on the gender order. Then, I contend that just as in male-headed farms, the adaptation strategies that are being applied in female-headed farms reflect mostly female manager´s views and interests. For instance, Nora does not have a life partner with whom to negotiate, but she does have sons and daughters, whom she does not include or consult on farm matters. In consequence, the adaptation strategies implemented in her farm, as in other male and female-headed farms in northern Cartago, reflect managers' situatedness and subjectivity.

For this reason, I sustain that male and female managers have different interests and goals which are conducive to prefer certain coping and adaptation schemes. Male producers are centered on producing larger extensions of a sole crop to make a profit, so they tend to employ adaptative measures that can help them achieve the purpose of producing more to gain more, even if they can be more harmful to the environment or for health reasons. Fewer manifest having other concerns that motivate them into taking other types of more sustainable adaptive actions. Female managers, on the contrary, tend to opt for transformational adaptation measures, because aside from their economic interest, they have other types of concerns that guide them towards other kinds of actions that not only are intended to minimize climate change impacts or produce a profit but that simultaneously imply opting for other more sustainable ways to produce that can have health and environmental benefits or at least reduce their own environmental footprint. Although they might not

promote their family's participation in negotiations over the farm's issues, they extend their reproductive role as caretakers to their agricultural production by thinking about their family's wellbeing when they choose. As a result, their agricultural production is more diverse than those of male producers, which is centered on monoculture.

My argument rests on the observation that one of the most common responses in male-headed farms has been the increase in agrochemical use as a mechanism to strengthen crops so they can better withstand variable rain patterns and to secure a profit. Mauricio, a young producer, tends to spray more often depending on the weather: "in the worst of winter you spray them every 5 days. In the summer it is easier to care for them, every 8 days" (personal communication, 23-03-2018). While it is not possible to affirm that these observations can be generalized to all male-headed farms in this locality, since it's not the purpose of this study, it does seem to suggest that agrochemical use is a strategy mostly employed in these farms rather than in female-headed ones to cope with climate alterations. There are exceptions, like Mario and Ana Maria´s co-managed farm or Sol´s farm. Sol explains her reasons for increasing her agrochemical use:

> "Now much more chemical is used than before. Because before it was… a white mosquito, as we call it, or the black one or a mining bug. No, now because of those weather changes ... yes, today it was raining in the morning, at noon it was so sunny that I could not stand it and now that I went up it was already raining again. So, in the case of beets, with the weather that we had today, on Monday I have to put a product so that the leaves don´t rot and it is already one more chemical than normal…" (personal communication, 25-08-2018).

Especially when there is too much rainfall, male producers tend to apply extra chemicals as a preventive measure. This strategy is a type of maladaptation practice (Eriksen, Nightingale,

& Eakin, 2015) because the use of more chemicals as a coping mechanism contributes to land and environmental degradation. Also, they are adding more toxic components that can cause health problems among themselves and consumers (Galt, 2009). It might be helping them to cope momentarily with these climate changes, but by doing so they are potentially causing more harm to others and contributing to enhancing their vulnerabilities. It is an unsustainable solution from health, environmental, and economic perspectives.

Besides this generalized maladaptation scheme, male-headed farms are also implementing preventive adaptations to deal with the changing rainfall patterns. Two widely used strategies are furrows that serve to drain water and keep the land from eroding and irrigation systems to keep crops moistened during the dry spells, whether by constructing reservoirs, harvesting rainwater, or using back pumps.

Among the male producers, two of them stand out because they are the only ones who employ additional sustainable adaptation strategies that reflect environmental concerns. Moises, who considers himself an environmental lover, seeks soil protection by rotating crops. He also keeps land moist and cool (see picture 1) by planting trees, like avocados, for shade, and he uses wild plants considered natural repellents for pest control, like a plant called “grain of gold” (see picture 2). For Guido, water is a valuable resource, so he uses efficient irrigation systems, such as drip irrigation. He also came up with an innovative idea of using a natural and free-of-cost type of mulch, such as dried pine leaves, to protect onion seedlings from heavy rainfalls (see picture 3). As a safeguard measure for his workers, he modified the working hours to reduce the time they are exposed to the most damaging sun rays. Lastly, to ensure his economic viability, he plants plots in different months to disperse his harvest throughout the year. “I have them staggered. Is one of the ways I found to survive”, he explains (personal communication, 08-03-2018).

Picture 1: Avocado tree (Photo by author)

Picture 2: "Grain of Gold" flower (Photo by author)

Picture 3: Mulch (Photo by author)

In contrast, female managers are concerned with environmental and health issues that influence their productive practices and adaptation strategies, aside from seeking to profit so they can contribute to their household´s income. Although they might not negotiate with other household members and consider their views, they partly choose based on what would be beneficial for their families and others, due to their reproductive role in the family. Therefore, gender norms mold their interests and preferences, persuading them towards sustainable ways to adapt to climate change, rather than choosing to use more agrochemicals. Female managers Francisca and Nora, for instance, chose from the start to produce organically. For Francisca, her main motivation was to reduce the environmental impact produced by traditional agriculture. Now, with climate change, she recognizes she has had to increase the use of inputs to prevent plants from getting diseases and to help them grow, but they are all organic. The adaptation strategies she has used are in accordance with her type of sustainable production (see picture 4). In Nora´s case, she hopes to give her family food security, so she has been trying to plant different types of edible plants that can withstand climate alterations. “There are many things that I´m seeing that resist summers, so those are the

ones I´m interested in because they can give a food system that I will be able to use. So that's what I´m working for. I´m going to secure my family´s food whatever way I can", she explained (personal communication, 21-03-2018). Her adaptation strategy has been to find those plants and trees that by themselves better endure climate extremes, rather than infuse crops with inputs that can help them endure. By doing so, she has also reforested her land, which is also helping her to adapt.

Among the organic producers, there is an exception, which is Pilar and Rafael´s co-managed farm. They produce organically due to a joint decision they made from the beginning, so in their case, it´s not been a gender difference. Both have environmental and health concerns that have led them to prefer an alternative type of agricultural production. From the start, they have chosen to produce in such a way that it has allowed them to reduce the negative impacts of climate change and become an example of resilience.

Picture 4: Organic production (Photo by author)

Even other female managers who produce in traditional ways have tried to come up with more sustainable adaptation measures. Sol, who was mentioned earlier for using agrochemicals to cope, is now trying to make a change in her productive practices. "… I´m trying to apply new and

organic products because the land has been mistreated with so many chemicals and we all eat that…", she explains (personal communication, 25-08-2018). Her environmental and health concerns motivate her to change her practices. Lucía, another female manager, copes with the dry months by planting short-term crops, such as squash, beets, or peas (see picture 5), which require less water and fewer agrochemicals, keeping her costs down. Although mainly motivated by economic reasons, she passes on the option of planting a type of onion seed that is used during the summer that requires less water, but more inputs. In her words: "What one does is what I did, change. Now I could have had all of this planted with onions, but I wouldn't have been able to take care of it because you have to put more into it. So, I plant a small part with squash and another of beets and they don´t require much" (personal communication, 15-02-2018). She rather keeps her costs down, but by doing so she also chose to reduce the amount of chemicals she applies. Additionally, she acknowledges that rotating onions during the winter with other summer crops helps to preserve the soil, as well as fertilizing it with organic residues from the harvests. Both of these measures are not only sustainable practices but adaptation strategies as well.

Picture 5: Picking peas during summer (Photo by author)

Another widely used adaptation scheme among female-headed farms is the construction of furrows to drain water and prevent land erosion. Lucía, particularly, has had problems managing rain waters because her sister´s land is located beside hers at a higher level, so all the water tends to run down to Lucía´s farm. She had to invest money to build proper ditches and drains, but she considers it an effective measure to protect her plot. (See picture 6).

Picture 6: Furrow between onion crops (Photo by author)

Another alternative is what Sol does. She gathers and places all organic residues, such as leaves or parts of crops, around the property to create organic barriers. This type of practice she learned from her grandfather. He taught her that residues are not to be burned because it pollutes the air and they can be useful as a natural fertilizer too, so she uses them instead of burning them.

In Grecia, at the coffee farms, there does not seem to be a significant difference between the adaptation strategies being implemented in male-headed farms compared to co-managed farms. Both farm types use sustainable and unsustainable adaptations for their coffee. As was clarified in previous chapters, there are no female-headed farms among the ones who participated in this research, since they are not at all common in Grecia. Hence, the adaptations that male-headed, and co-managed farms use on their coffee cannot be traced in an evident way to the gender of the manager. Also, there are male-headed and co-managed farms that show a combination of symmetrical/asymmetrical relations among its members, where women and men take part in negotiations, as well as male-headed farms where the manager chooses alone. Thus, the main difference observed in the adaptation strategies being implemented is related most of all to the type of crop. I

suggest that because in this locality coffee production continues to be viewed predominantly as a male activity and that most agricultural labors are done by men, it is possible to infer that even in households where decisions are bargained, coffee adaptation choices may be inclined towards men´s perspectives since men are still considered the ones who know more. Moreover, in the production of other crops, such as vegetables, producers use only sustainable agricultural practices and adaptations. Some producers explain that because of the extension of coffee productions it is more complicated to adapt it only using sustainable means than other small-scale crops, but I suggest that it might have to do also with the fact that women get more involved with the manual labor of these other crops, which they prefer to produce organic, so they have more influence on the adaptations chosen.

Climate change adaptation schemes for coffee production in male and co-managed farms involve unsustainable and maladaptive practices, but also the employment of a variety of sustainable practices. Among the farms that produce coffee, most of them use chemical substances to prevent and control diseases like "rooster´s eye", roya, among others. Tomás, a male manager, explains that during the rainy season it is more necessary to spray them. "If the winter is very intense like they say and the "rooster´s eye" proliferates, then you have to be spraying every month and if the roya also multiplies then you also have to be spraying for that every month. For the two things…", he comments (personal communication, 03-07-2018). Hence, many of them increase the use of chemicals during the rainy season as a coping mechanism to the multiplication of pests, but, as was discussed previously, is a type of unsustainable maladaptive practice.

In parallel, others are replacing old coffee plants with pest-resistant varieties. For farm manager Josue, replacing his coffee has been effective because he hasn´t had many problems with pests or diseases since he renewed the coffee plants that used to get "rooster´s eye". Now he barely

has to spray them with chemicals and, instead, he applies an organic fertilizer. “A well-fed plant almost never gets pests”, he says (personal communication, 19-06-2018). However, Ana, whose brother manages the farm, explains that with new varieties they still have to use chemicals because “[…] it does not mean it does not get sick, it just gets less sick, so you always have to spray them” (personal communication, 24-04-2018). The replacement of old coffee plants with pest-resistant varieties is an adaptation scheme that many are investing in and that seems effective to reduce the quantity of chemicals used. However, new varieties are more expensive and, while the seedlings grow, their coffee production reduces; thus, most of them have had to ask for loans to carry out the investment, but this is not always the safest option, as was discussed above.

Herbicides are also among the most used chemicals to control weeds because farmers believe that plants are more prone to suffer diseases if they are not weeded. Many of them recognize that it´s harmful to their land, yet it would take much longer to weed by hand or with a motorized cutter, which increases their production costs. Most of them can´t afford to do it differently. Nonetheless, some producers are trying to reduce the use of this chemical. Farm co-manager Miguel explained that an adaptation measure he and his wife have adopted to protect the land has been to use herbicides only around coffee plants, but in between the rows they leave grass and weed to keep humidity and to prevent land degradation and erosion. “Grass is no longer bad weed; it is good weed. That is something many don´t understand”, he says (personal communication, 26-06-2018). At Melissa´s and Diego´s farm, they decided to stop using herbicides altogether. She shared that her father was the first to start applying it, so now “the lands are tired” (personal communication, 24-04-2018), which she believes is the reason why coffee doesn´t produce as much anymore. After she inherited the land, they decided to stop its use and it has taken them a long time to see a

recovery. At some farms, then, producers are trying to diminish the use of herbicide and keep the grass as an adaptation measure suitable to protect the land.

Another widely used adaptation measure is the use of drains and holes to prevent and diminish erosion and some also use organic residues to build barriers that can slow down water, keep the land moist longer and fertilize it (see picture 7).

Picture 7: Land barriers made of organic residues (Photo by author)

The use of double purpose trees in between the coffee plantation and/or in the margins of the land as living barriers are also among the common strategies employed. For one, producers use them for shade and protection from heavy rainfalls or winds, but depending on the type of tree, it can also produce food for the farm´s own consumption. In Melissa and Diego´s farm, for example: "Some are just for the shade, but the majority have a double purpose because they are fruit-bearing trees. We have sweet lemon, avocado, sour lemon, mandarin lemon…", she says (personal communication, 24-04-2018). Plus, their fallen leaves or branches can be used for fertilizing the land

or for creating barriers. For Lina, “the guava leaves are the best for fertilizing. They fall so much they become a very good fertilizer. So mostly, that´s what we keep all around the farm” (personal communication, 05-09-2018). Additionally, it is worth mentioning that an adaptation measure used in Melissa´s and Gloriana´s co-managed farms has been keeping trees on the sides of water streams that cut through their properties to protect water sources.

Aside from coffee, a few of these farms grow other crops for self-consumption or to commercialize. The difference with these crops is that producers feel that adapting them is more feasible than coffee. They use simpler and cost-effective practices that are also sustainable. It can be considered a type of transformative adaptation since it implies searching for alternative practices and actions that not only minimize climate change impacts but also simultaneously reduce the environmental and health outcomes agriculture can have. For instance, by diversifying the products they manage, these farms reduce the risk of being adversely impacted because their livelihood does not depend only on one crop. They all grow them using organic and sustainable practices, which means their adaptation strategies correspond to this type of production. At Francisco´s farm, aside from coffee, he and his family produce vegetables. Crops are diversified and rotated depending on the season (see picture 8), as some endure better the lack of rain or higher temperatures, while some adjust to the rain or lower temperatures. During the winter, rainfall can be so intense that many crops don´t survive. Last year they had to use plastics to cover some crops, with which they were able to produce more than other years, proving to be an effective adaptation strategy. Yet, Francisco affirms that they prefer producing during the summer because they have a drip irrigation system in place, so they can produce more and reduce the risk. Co- managers Melania and Miguel use the same method of rotation and they plant products that better withstand each season and pests. Following a similar strategy, vegetable producer Lina stopped the production of

tomatoes and potatoes altogether after experiencing continuous pests. On Francisco´s farm, they have also avoided planting certain crops during the seasons when pests tend to appear; but they also use natural means that consist of not getting rid of insects, so they eat and control each other. Additionally, the repellents and fertilizer that producers use are organic, and most are fabricated by themselves. They are not only sustainable but also cost-effective. Lastly, to prevent land erosion and washing, organic residues are used to build barriers, as well as drains and holes to retain land when it rains too much.

Picture 8: Diverse organic crops (Photo by author)

In Cóbano, most couples in female, male and co-managed farms sustain symmetrical relations that enable them to negotiate, and in some cases, they include other members of the family approaching a more egalitarian style of decision making. Choices on adaptation help to reinforce these dynamics that couples and families sustain. But, aside from their intrahousehold dynamics, what sets this locality apart is that the different adaptation strategies used in female and co-managed farms compared with male-managed farms have to do with the fact that these farms' main

economic activities differ according to the manager´s gender. Also, within the farms, the distribution of productive activities and crops is gendered; so, productive labor is adapted differently and with diverging levels of need. The adaptations employed ultimately reveal the preferences of the manager(s) or caretakers of each activity. For instance, Humberto recognizes that Melba, his wife, decides over the vegetable production; yet he feels entitled to give his opinion although they don´t always see eye to eye. “I help her. We comment. We have some discrepancies over certain things”, he states (personal communication, 31-07-2018). Although they might not always agree, negotiations around adaptation consolidate their symmetrical relationship, as he is able to seize those opportunities to use his power for nourishing her options with his views and negotiate alongside her the alternatives. By taking into consideration his views, Melba is not asserting her power over him as domination, but instead, she is using them to inform her own decisions. However, as co-manager and caretaker of the vegetables, she has the final say, but at least her choices are enriched by these exchanges.

As Melba, other women in female and co-managed farms produce vegetables, which are grown in protected environments, such as greenhouses or micro-tunnels (see picture 9). The use of these protected environments has been recommended by public institutions to women who have participated in their training activities. These structures can protect crops from certain climatic conditions, such as heavy rains, while also giving producers control over the amount of water or sunshine plants need. For this reason, it is an adaptation scheme that enables production to better withstand certain climate extremes.

Picture 9: Micro-tunnels (Photo by author)

Despite greenhouses and micro-tunnels can shelter vegetables from certain climatic conditions, one of the main difficulties female producers have had to deal with is rising temperatures. The plastics regularly used to build protected environments increase the inner temperature, which is harmful to plants and makes it harder for people to work in. Thus, these women had to come up with a solution. During the cooler temperatures of the rainy season, they keep the plastics and it protects plants from heavy rains; but, once the dry season starts, some of them change plastics for cloth or they put a piece of cloth over the plastics to cool down the space while keeping the shade. Other producers have also tried to lift the height of the structure to let more breeze and airflow through it. Based on their experiences, women have come up with innovative ways to better fit these protected environments to different climate patterns and their particular needs.

With climate change, producers assert that pests have been multiplying. To deal with them, women fabricate and apply their own organic and natural repellents. However, some vegetables are more difficult to manage. A few of them have opted as an adaptation strategy to reduce the number of crops produced during the months they have observed pests intensify, while others have

stopped altogether the production of certain crops that they have seen are problematic. Additionally, because they produce organically, they tend to diversify the crops they produce and rotate them to protect soil biodiversity and they use drains to prevent land erosion.

Another factor that has allowed them to produce in greenhouses and adapt to climate change is having water for irrigation purposes. Some households don´t have access to tap water and for others, the service is not consistent, so most households in Cóbano have wells. These wells are tested and regulated by a public institution, so water is safe for consumption. Besides their household use, wells are used to irrigate crops, especially during the dry season, increasing their adaptive capacity.

In male-headed farms, on the contrary, female producers grow vegetables in the open rendering them more vulnerable to changing climate patterns. Besides diversifying the crops and producing them with organic inputs, little effort has been made to adapt them. I argue that the reason is that adaption in male-headed farms is focused on what the male manager considers is the main economic activity, which is also the activity they oversee. The main economic activity in these farms is based on animal production instead of vegetable production, so vegetables are considered a secondary product as it is produced solely for self-consumption. For instance, Tatiana, Gerardo´s wife, grows vegetables out in the open and she has been trying to get Gerardo to invest in the adaptation of those crops: “I have been telling him that to work we have to install a roof. That´s what I need, because if a tough winter comes then it will harm all my crops” (personal communication, 01-08-2018). Yet, it seems that Gerard, like other male managers who ultimately decide over farm matters, doesn´t consider this type of production essential, so investing in its adaption is not a priority. Instead, in female and co-managed farms, besides producing vegetables for self-consumption, women commercialize them. They contribute with their profits to the household

income, while also gaining economic autonomy. For this reason, they have stronger bargaining power, so they can decide over their own production and they have been able to produce in ways that minimize the impacts that climate alterations can have over their crops, like the use of protected environments.

In male-headed farms, like was aforementioned, adaptation strategies tend to be focused primarily on animal production, as it constitutes the main source of income. Men in these farms, but also in the co-managed farms that have cattle, are the ones who decide the adaption measures for this productive activity. A widely used adaptation scheme, suggested by public institutions, has been to diversify the production of crops that are adequate to feed animals and increase their production (see picture 10). During the dry months, animals run out of food because there is no water. As Cecilia explains, "a piece of land was just burned to plant sugar cane because, supposedly, we are going to have a very dry summer and we have to prepare with food for the cattle…" (personal communication, 03-08-2018). Therefore, producers have been expanding the food produced during the winter to feed animals over the summer, but to do so they have been using some chemicals, which means their adaptation is not entirely sustainable. Another commonly used and cost-effective adaptation practice has been transforming animal wastes into fertilizers that are used on crops that will later be used to feed the animals.

Picture 10: Crops for cattle feeding (Photo by author)

In addition, men tend to be responsible for the production of rice, beans, and corn in all farms that grow them; but because those crops are produced for self-consumption and not to commercialize, men have not previously used any adaptation strategies. Nonetheless, male managers, Gerardo and Joel, plan to make some changes in the short term. Gerardo will try to produce beans by putting in place an irrigation system and reducing the land´s acidity by applying calcium. Joel also intends to produce beans using irrigation and plant a new pest-resistant variety of rice.

In sum, each farm in Cóbano has started to adapt the productive activity that, depending on the gender of the manager, contributes the most to the household's income; yet, for the other secondary activities that don´t create revenues and that are other member´s responsibility, not many actions have been taken to adjust them because they are not considered a priority. Furthermore, it is important to highlight that these adaptation schemes that are being used in male, female and co-managed farms have been made possible thanks to the recommendations and resources provided

by public institutions. Thus, institutions have effectively increased these smallholder farms' adaptation capacity.

4. Adaptation ideas for the future and suggestions for public institutions

So far, I have gone over the resources that enhance the adaptive capacity of smallholder farms and the barriers to adaptation they face in each locality, as well as the adaptation strategies they have managed to put in practice considering these aspects. Nonetheless, producers continue to have adaptation needs, since it is a process rather than an outcome. As part of this process, some have ideas on how to further adapt if they had the necessary means, while in other cases the lack of clarity on that process evolves to skepticism and worry about the future. Either way, their ideas, and worries can give a better sense to the state and institutions on how to move forward and channel their aid in such ways that they could help producers get better prepared for the future of climate change.

The suggestion most mentioned by men and women in northern Cartago, regardless of their age, occupation, or land entitlement, is moving agricultural production to protected environments, such as greenhouses, so producers can have better control over climatic conditions and the resources crops need. However, they consider this is an expensive option, especially because they don´t have the necessary economic resources that would require to build the structures and buy the plastics or net to cover the crops. The young daughter of a producer, Patricia, explains: "[…] many people are already trying to work with greenhouses and that is probably a good strategy, but it is very expensive so we would have to search for something else." (personal communication, 12-02-2018). As much as protected environments could be an effective way to adapt to climate change, most producers can´t afford them.

The other suggestion that was widely mentioned has to do with the provision of water for irrigation purposes. Some producers believe that the state should be responsible for investing in infrastructure that can carry water to producers who don´t have access to the resource. Others consider that constructing their own water reservoirs to harvest water during the rainy season could help them adapt during drought periods. Either way, many producers face limitations to adapt because they don´t have access to water during the summer or the financial resources to build the reservoirs.

Another idea is to invest in seeds that are more resistant to certain climatic conditions, which is something that some producers are already trying. For example, Clotilde and Lucía mentioned there is a type of onion seed that is usually planted in the summer because it requires less water, but like Clotilde says, "sometimes they buy it for summer and it rains and it is a type of seed that does not work well with water" (personal communication, 23-08-2018). Thus, changing to other seeds is not necessarily the most effective strategy to deal with climate uncertainty. Plus, improved seeds are usually sold at higher costs because they are developed and commercialized by private commercial houses.

Lastly, the necessity of planting trees to keep the land from eroding and moving ahead or delaying the sowing of the crops was mentioned, which is something many of them already practice with a certain amount of success, but it does not remedy the uncertainty that climate change generates.

In Grecia, coffee producers find it hard to imagine other types of measures that they could take to minimize the impacts of climate change. They are skeptical about coffee production being able to further adapt. Ana´s claim reflects this sense of helplessness: "What else can we do? If the climate changes there is nothing else we can do…" (personal communication, 24-04-2018).

Henceforth, the adaptation proposals that could eventually be used are few and some are less viable due to the high cost they would require, like moving coffee production to higher altitudes or changing it for other types of crops. However, other suggestions could be more feasible, such as: putting in place irrigation systems; stop the complete use of herbicides; leave grass and weed to grow, and increase the number of trees for shade.

Regarding other crops, producers have higher hopes that vegetables are easier to adapt to climate conditions. First, they could be grown in protected environments, like greenhouses, or they could be covered with plastics to protect them. However, they see its limitations in that greenhouses are expensive. Like Julieta, a vegetable producer, questions: "How are we going to fit larger productions in greenhouses?" (personal communication, 07-09-2018), manifesting her worry that it is not suitable for all types of productions. Aside from that, Adelina believes it is possible to adjust sowing to the seasonal changes, like waiting until rain settles before planting and if that does not work, they are easy to water. "… the vegetables I grow, I adapt them according to the weather, but coffee you can´t" (personal communication, 06-10-2018). So, it seems that in their view small-scale production is simpler and more viable to adapt than larger productions, such as coffee.

In Cóbano, vegetable and animal producers worry most of all about the future availability of water resources, probably because they depend on their wells since public water provision is deficient. Like male manager Joel expresses, "Without water, we can´t survive with the animals" (personal communication, 29-07-2018). Their adaptation ideas are conducive to reducing water use and waste, such as planting trees, which would be a protective measure for their wells and streams. Men particularly worry about the future safety of their animals, so they suggest increasing the production of animal food or reducing the number of animals in their possession in case climate

change reached more extreme manifestations in the future. Also, goat producer Gerardo would suggest doing certain infrastructure and technological transformations, like building a new and improved barn to preserve the health of his goats and installing a bigger biodigester to generate more energy from the goat's manure. As for female vegetable producers, they consider it important to improve the infrastructure of their protected environments, so they can better withstand climate shocks.

5. Conclusion

In this chapter I exposed that the adaptation capacity of smallholder farms relies on the resources available to producers, so local institutions can enhance or limit that adaptation capacity of smallholder farms. Comparing the three localities, it becomes clear that, depending on the place producers have different access to financial aid for adaptation, technology, and climate change information and training, which translates into unequal adaptation capacities. In Cóbano, institutions have made the effort to increase the adaptation capacities of male and female producers by offering climate change information and training from a gendered perspective. They have also distributed material aid and tools to male and female producers, enabling them to start climate change resilient projects or adapt their existing ones. In contrast, the weak presence that institutions have in northern Cartago translates into barriers for adaption, since most male and female producers don´t have suitable financial alternatives that enable them to invest in adaptation, nor access to climate change informative activities. Halfway in between these two localities, producers in Grecia have more access than in northern Cartago to financial support and climate change information thanks to the role cooperatives have assumed, which increases their adaptive capacities. Nonetheless, they need a wider array of financial alternatives, as producers in northern Cartago, and they require more climate change training, which is a necessity externalized in all three places.

Besides resources, I have also shown that social networks can shape the adaptation capacity of producers and smallholder farms. The relations that producers hold with one another through informal networks, kinship ties, or as part of formal organizations, facilitates sharing useful information for adaptation, but these networks also vary from one locality to the other. In Grecia, for example, it is common for producers to establish informal networks that allow them to ask for advice from other producers and exchange know-how; but the clearest example is Cóbano, where the trusting relationships that female vegetable producers have been able to form not only enables them to exchange information, but it has also allowed them to form cooperative alliances. Through their network, they exchange products they don´t have at the moment, which by itself constitutes an adaptation scheme that benefits all of them. However, there is also the reverse situation in northern Cartago, where it is difficult for producers to form informal networks, so their options are to exchange advice with their kin or informal organizations, restricting their possibilities to adapt.

Despite the external barriers and limits some smallholder farms encounter, they are already using adaptation strategies that are the result of intrahousehold dynamics. Climate change by itself might not change intrahousehold dynamics, but it constitutes a new setting where decisions on how to cope and adapt either reinforce power asymmetries by sustaining the domination of some household members over others or strengthen their symmetrical relations that encourage members to use their power to persuade others about the decisions to make (Allen, 1998). Moreover, I sustain that asymmetrical relations within a farm can limit its overall adaptation capacity because it prevents some members from putting forward their ideas on how to cope and adapt and, consequently, limit the array of possibilities that can be considered; while those who have an egalitarian

system of decision-making, enhance the farm´s adaptation capacity by expanding the options available (this will be further discussed in the next chapter).

Nonetheless, it is farm managers who ultimately decide what adaptation strategies are employed, so the adaptations used in each farm reflect their situatedness and subjectivity. The comparison of the three localities shows that female managers are much more inclined towards the use of preventive and sustainable adaptations than men, who to a larger extend tend to resort to reactive and unsustainable coping mechanisms. It seems that gender norms, which deposit the responsibility for the caretaking of the household onto women, influence the adaptations they prefer and choose. Motivated by their families´ wellbeing, as well as environmental and health concerns, they extend their care work to their agricultural production.

In the final section, I discussed that adaptation is not an outcome, but a process that requires improvement and new strategies to continue adjusting to the changes to come. Through this final section, it becomes clear that most producers have a sense of the type of actions they could take to further adapt, most of which revolved around investments and improvements in infrastructure and technology, but financial limitations keep them from being able to take those additional steps.

CHAPTER 8- COMPONENTS FOR RESILIENCE BUILDING

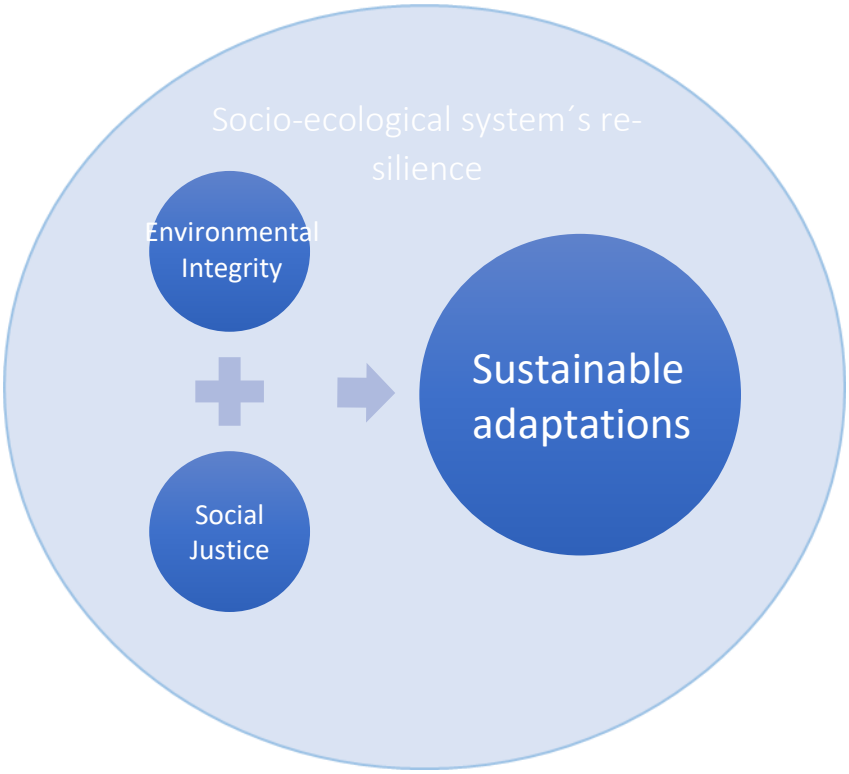
1. Introduction

In this chapter, I discuss cases of smallholder farms that are an example of resilience, as well as the drivers and conditions that have enabled them to build it. Resilience is defined as "enhancing the ability of a system (however you define it) to anticipate, absorb or recover from a shock and to adapt successfully to such conditions so as to make the system better and more secure in the future (Cutter, 2016, pág. 112). From my perspective, resilience is not only about individuals and smallholder farms employing effective measures to face climate change, it is also about strengthening the social-ecological system as a whole (Folke et al, 2010; Brown, 2016). Therefore, vulnerability and resilience are not opposites. While vulnerability was analyzed in terms of the drivers and conditions that can increase the risk of individuals and households being adversely affected by climate change, resilience is based on those conditions that allow a farm to cope and adapt by ensuring the welfare of the whole system, not just a part of it.

To analyze resilience, I draw from Brown´s (2016) notion of "sustainable adaptation" which are those strategies that build resilience by seeking social justice and environmental integrity at the same time. Resilience entails putting in practice effective adaptation measures that reduce climate change impacts, while also being socially and environmentally sustainable. Then, it excludes those actions that cause harm to others or negative environmental impacts.

Figure 8: Components of resilience

(Created by the author based on Brown (2016))



In this chapter, I draw from the stories of female manager Francisca and co-managers Rafael and Pilar from northern Cartago; male manager Francisco from Grecia; co-managers Carmela and Román, and female managers Simona and Clotilde from Cóbano, whose sustainable adaptations pursue both environmental integrity and social justice for which they have developed resilience. In the first section, I describe each one of their stories and in the following sections, I turn to discuss the drivers and conditions that have enabled them to move towards social justice and environmental integrity.

Environmental integrity is sought by smallholder farms that use environmentally conscious and sustainable farming methods. In this research, those farms that exclusively use environmentally sustainable adaptations are those that identify themselves as organic.

Organic farming practices tend to seek environmental integrity because, according to the literature, at the heart of it is the recognition and respect for ecological processes (Jouzi et al, 2017). Thus, organic farming refuses to use synthetic agrochemicals due to the harm they can cause to the environment and human health; plus, it promotes farming practices that keep soil fertility, protects biodiversity, and water conservation (Jouzi et al, 2017; Niggli, 2013). Also, many organic farming practices are simultaneously effective at minimizing and preventing climate change impacts as well (Jouzi et al, 2017; Muller et al, 2012; Niggli, 2013), rendering them more resilient than conventional agriculture (Criveanu & Sperdea, 2014; Aazadi et al, 2011). Consistent with the literature, most of the organic smallholder farms that took part in this research claim they still have not suffered the negative effects of climate change on their production, since organic practices better prepares them to cope and adapt to climate change.

Environmental integrity can be driven by institutional resources, like finance, training, and technical assistance that promote sustainable farming, but also by the manager´s subjectivity, including environmental and social interests and goals. Critical of neoliberal notions of resilience that portray it as an individual´s responsibility and that favors diminishing the state´s intervention (MacKinnon & Driscoll, 2012; Cretney, 2014), I argue that institutions and their availability of resources can be key for strengthening the resilience of smallholder farms through the promotion of sustainable farming and resources that contribute to implementing it. Costa Rica´s welfare-neoliberal state structure, which continues to be part benefactor and part neoliberal, has different expressions depending on the place. Localities like Cóbano have public institutions that still have

an important presence in the communities and their interventions are vital to increase the adaptation capacity of smallholder farms and help build resilience. Thus, I will discuss that due to the resources that institutions have made available to some smallholder farms, such as: finance, training, and technical assistance that promote sustainable farming practices, they have been able to choose sustainable productions and adaptation strategies that are successful in withstanding climate change. However, in those cases where farms/households don´t have enough institutional support, I draw attention to the role played by subjectivity in resilience building. I discuss cases of producers who seek other alternative and sustainable productive approaches to build their resilience, motivated by their environmental and social concerns and goals.

Aside from environmental integrity, I propose that to build resilience farms must also seek social justice through adaptations that challenge and transform unequal social structures. Power dynamics and agency have been marginalized from resilience studies, but they both are of importance to understand how the resilience of social-ecological systems is built (Lorenz, 2013; Cote & Nightingale, 2012; Bunce & Ford, 2015; Olsson, Galaz, & Boonstra, 2014; Ingalls & Stedman, 2016; Leap, 2018; Cutter, 2016). Some power dynamics can lead to effective but unsustainable adaptations because they are based on the reproduction of social inequalities or injustices. Thus, these adaptations are far from building resilience, because they not only sustain social asymmetries and inequalities, but they distribute the benefits and costs of these choices in an unfair manner (Olsson, Galaz, & Boonstra, 2014; Ingalls & Stedman, 2016). Then, to build resilience, adaptations have to promote the transformation of asymmetric relations and unequal social structures.

Across the stories in this chapter, social justice is advanced through transformations: 1) of the gender structure when driven by land ownership, which can be the source of women´s empowerment and agency and, 2) of gender and other structures when there is farm co-governance, which

can be driven by household egalitarian dynamics that encourage members to use their "power to" (Allen, 1998) or/and institutional resources, such as training that contributes to challenging the gender structure. As for the first one, I argue that transformation of the gender structure through women´s empowerment and agency can foster resilience, for which land ownership is a key resource. Owning land gives women the power and agency they need to challenge and resist the gender order and take on the farm's management enabling them to choose sustainable adaptation strategies for their agricultural production. Referring to the second one, I sustain that other types of power, like "power to" (Allen, 1998), and power dynamics that favor the distribution and sharing of power can conduce to co-management or co-governance of resources, which constitutes a mode of governance that more likely fosters long term social-ecological system´s resilience (Olsson, Galaz, & Boonstra, 2014). I contend that in the setting of the household, resilience is built by those power dynamics that promote an individual´s "power to" and agency and that is inclusive of all members in the negotiation over adaptation strategies. Hence, resilience is partly built upon the power dynamics through which adaptations are negotiated and chosen, as they can contribute to the transformation of unequal social structures rendering the social-ecological system stronger and better.

2. Stories of resilience

2.1. An organic co-governed farm

In Cóbano, the state and public institutions have intervened in how land is distributed and pushed changes in the land structure. Half of the farms from Cóbano that took part in this research are co-owned by couples that were granted land by the state. Carmela and her husband were among the land beneficiaries. It was given to them about 15 years ago, but they have lived there only for the past 6 years because, before, they did not have a house on their property. Thanks to the state´s

land allocation, Carmela has been able to assume the farm´s co-management alongside her husband.

Right after they were given the land they tried to produce, but they had a hard time getting plants to grow. She explained that their land used to be a cattle farm that was probably contaminated by agrochemicals. It was not until they began weeding by hand and stopped spraying agrochemicals that the soil recuperated after a while. Carmela is among the female vegetable producers who began using environmentally sustainable farming practices and adaptations thanks to the types of resources public institutions have made available to them. Carmela shared that when she was first invited by the local office of the Ministry of Agriculture to a training course on how to grow vegetables in biointensive beds she took the opportunity, although she was not really interested in vegetable production. She was kind of doubtful because she didn´t think they would be able to produce vegetables in warm temperatures, but, after verifying that they grow very well, she decided to continue producing them. Now Carmela and her family use organic sustainable methods, which are among the farming practices that render some of the smallholder farms in Cóbano more resilient because they don´t cause any type of environmental harm. They grow all sorts of plants and trees using organic inputs and they try to use all organic residues to fertilize the land, as well as protect their water source by keeping part of the forest intact where their well is. She and her family are so committed to organic farming that they refuse to use the conventional fertilizers that institutions regularly provide them as land beneficiaries. She prefers to keep it stored than to use it, since she has asked not to send it anymore, but they keep on sending it.

Like other women in the locality, Carmela produces her vegetables in protected environments as an adaptation mechanism for climate change. However, they are not completely effective against pests. With climate change she has seen an increase in pests especially during certain

months when seasons are transitioning, so to deal with them she prefers to limit her production to those months when she knows it is less likely that her crops will be affected by them, instead of applying chemicals. Sustainable practices and adaptations are what turn this farm into a perfect example of resilience because they rather keep environmental integrity instead of turning to other unsustainable - but probably easier - practices.

Carmela says that her vegetable project has always been supported by her husband and children. Moreover, agriculture is an activity where all members get involved. They have 7 children, six boys, and one girl, of different ages, and 5 of them still live at home. They all have a strong bond and they get along very well. Those who live in the house help with agricultural labors and they all give inputs and feedback on production matters, so they get involved with the management. Román expresses the following about their household dynamics: "They [sons and daughters] collaborate with experience, they collaborate with experience, it goes hand in hand … These are decisions that… not just of the two us, but of all of us because we all sell, we all consume, and we all have the same…" (personal communication, 30-07-2018).

Their egalitarian dynamics have been driven by local institutions and training activities that help to impulse changes in the household´s gender practices and relations. They acknowledge that their relations improved after they took part in a training course that was organized by the local office from the Ministry of Agriculture called "Life Improvement". This training course was not particularly about gender, but according to Roman, it helped them realize as a family that they all have to do their part and contribute with household chores because that should not be Carmela´s exclusive responsibility. Thus, it helped change their gender dynamics and push their relations towards a more egalitarian mode that enables choosing adaptations based on principles of social justice.

2.2. A (re)source of empowerment

On a sunny February morning, I went up to Tierra Blanca, in northern Cartago, to Francisca´s farm. When I arrived, she took me to the back terrace in her home, so we could talk while she continued doing laundry. Francisca is a middle-aged woman, who produces organic farming on a land that was passed on to her by her father. Only a few women, like her, own land in northern Cartago and have decided to work and manage it. She shared with me that at first she and her husband started to work the land together through conventional means, but when she learned about organic farming, she decided that she wanted to produce in that way.

Francisca became interested in organic farming when she was introduced to it by her sister´s husband. She became more curious and started to research on her own. One of her main motivations was that she wanted to take care of the environment. She is aware that humans are the main cause of pollution, but "we only have one place to live, so what are we going to leave for future generations?", she asks (personal communication, 06-02-2018). Concerns over the environment and the wellbeing of future generations is what got her interested in organic farming. When she decided she liked it, she enrolled herself in the National Institute of Learning on an organic farming specialization. It took her a year to get trained and during that period she got to know many people, some of which belong to the association she is now part of. The association is comprised of organic producers from all northern Cartago and by being part of them she has been able to undertake new projects and continue her training. Nonetheless, her decision came at a cost, because she had to face her husband's disagreement and opposition when she decided to undertake organic farming, especially because it is not accustomed for women to work and manage farms. Now it has been12 years since she started producing organic and her husband still does not support her. He refuses to take part in any farm activities. Yet, because she is the landowner, she has been

able to defend what is her right from a social justice principle and stick with her decision of seeking environmental integrity through her farming practices.

Clotilde and Simona are both female managers from Cóbano who through their empowerment were able to transform their unequal gender relations. At the beginning of their marriages, both of their husbands were controlling and restrictive. Clotilde recalls that when she got married to her husband, he wouldn´t let her work, but their situation changed after they went through some problems that ended up with him passing on the land to her as an apology. Afterward, she began attending training courses where she got motivated to start her own vegetable production. Because she wanted to do things on her own without help from her husband, she requested a bank loan to buy all the materials she needed to build a greenhouse and she acquired her know-how on organic vegetable production from the training courses she attended. She studied all about organic fertilizers and repellents and she even learned to do them, so now she produces her own inputs. Now her husband supports her projects and encourages her to continue, so she believes that their relationship has changed and improved. He does not try to restrict her anymore and he even offers to help with some of the agricultural tasks.

In Simona´s case, after some years of marriage, they moved to the farm they have now. Her husband received the land as an inheritance, but they used her own inheritance to build the house, so her husband decided to put both of their names in the land title. She remembers that during the first part of their marriage he was not that supportive of her ideas and choices, and because she did not want to upset him, she tried to keep what she thought and wanted to herself. But since they moved to their land, he started working outside the farm, so she began taking over the farm´s management and producing corn with the help of a peon, which made her realize that

she was capable of managing the farm by herself. Her interest in having her own vegetable production was born later when she attended the training course "Life Improvement". She also became motivated by another project she had just started for the protection of bees, which made her want to produce crops that would attract bees and help them reproduce. When she first started, she acknowledges that she didn´t know anything about organic farming, but she has been able to learn by attending training courses. Plus, the Jicaral Agricultural Center gave her materials to build the structures, like plastics to cover the greenhouse, the drip tape to make an irrigation system, and the necessary supplies to produce organic fertilizer with worms. Simona recognizes that taking care of the farm and having her own production makes her feel useful and over the years she has seen her relationship with her husband change as well because he now shows more interest and support with what she does.

After assuming a decision-making position within the farm, both Clotilde and Simona have had the chance of creating resilient farming systems by choosing to produce their vegetables in a manner that minimizes climate change risks and effectively adapts to it, for example, by using organic inputs, protected environments, drop irrigation, natural control of pests, which are also environmentally conscious strategies. In their case, public institutions have played a key role in contributing to building their resilience through training on sustainable farming methods and adaptations that enable pursuing environmental integrity.

2.3. Pursuing the dream of an organic farm

Co-managers Rafale and Pilar bought their land in Tierra Blanca a few years ago and moved from San José because they wanted to make a living on organic farming. Both Rafael and Pilar did their master´s thesis on organic farming and it was their dream to have a project like the one they have.

Over the years they have developed a particular system for their organic farm. I got to see this system when I went to visit their farm back in March 2018. When arriving at their farm, from the road it caught my eye that their farm stands out from the others for having plenty of plants and flowers all around, especially because it is surrounded by single crop farmlands. When I got there, Rafael awaited to greet me and before he invited me to come inside, he pointed out that the other lands are at a lower level than theirs due to erosion, which he considers an important success of organic farming.

One thing that stuck with me from what Rafael explained is that organic agriculture is not only about the economic revenues it can generate, although economically it is a good investment, aside from that, it has other non-quantifiable benefits that represent an added value for this type of farming. Culturally, it rescues and preserves seeds, genetic diversity of plants, traditional practices, and knowledge of food and cooking; environmentally, it preserves biodiversity, and it is much more resilient to climate change; socially, it has an impact on the community and the country, plus the different kind of relations producers develop with consumers; and he also sees in it a spiritual gain.

Walking around his farm I could see that it is not an extensive land, but they managed to build three greenhouses where they produce a great diversity of crops in small quantity. Each greenhouse has its own drip irrigation system, and they have five water reservoirs for the summer months. Rafael explained that they rotated the crops by families, to preserve the soil quality of the land and control diseases. Each family of crops takes certain nutrients from the land for its growth, leaving others behind when they are harvested, so by taking into consideration what nutrients each plant needs and which ones they leave behind, he rotates them in a way that each family of plants gets the nutrients it needs to grow properly. Plus, rotating them keeps pests from multiplying, so

it is a natural way to control them. Because land is well cared for, he does not see the need to stop his production from time to time to give the land the chance to regenerate; thus, with his system, they can have four or five harvests in a year of diverse products they sell at the farmer's market.

This system reduces production costs because crops need fewer inputs. Also, they make their own organic fertilizers and their own seedlings, which reduces the production cost even more. Therefore, their organic production is not only environmentally sustainable but also economically sustainable all year round. However, it does require a certain amount of organization and effort because they have to keep a registry of all the plants they keep, so he can plan ahead how to rotate them. Besides organic crops, they also have a seed bank with their own seeds and others they wish to preserve, and they also organize training activities on organic farming to pass on their knowledge to others.

Besides practicing environmental integrity, Rafael shared that organic farming adapts better to climate change than conventional agriculture, first because they keep trees and plants all around their farm that make it much cooler than their neighbors who have torn down trees to produce monoculture and, second, trees and plants protect their land from eroding during heavy rains. Also, their drip irrigation system and their water harvest have been an effective way to sustain a rational use of water and keep producing during the drier months. Their organic production has allowed them to withstand climate change impacts by using sustainable practices that protect and benefit the environment.

2.4. Switching from traditional agriculture to an organic farming family project

Francisco started producing only one type of crop: coffee. Back then he used conventional methods and used agrochemicals like many others, sometimes not even following the instructions

and applying them without much safety concerns. As a matter of fact, Francisco´s interest in organic farming was partly the result of a chemical intoxication he experienced back in the 80s with agrochemicals. Before that time, he always had problems with them because he was very allergic, so it was often that he experienced a burning sensation and itch on his face due to chemicals, yet none of those times were as serious as the one time when he was hospitalized for eight days in really bad shape. Also, there was a time when one of his peons got intoxicated because he was spraying chemicals to tomatoes when he found one ripe and ate it. He reprimanded the peon for doing so, but he still got sick after eating the tomato full of chemicals. After both traumatic experiences, he became constantly concerned about risking his peons or himself every time they had to spray chemicals. When he discovered organic farming, he became motivated to make the switch because it meant no longer putting himself at risk, his own children or peons, since organic farming only uses natural products that are not toxic.

Also, he says their recycling habits motivated them to pursue organic farming as well because they had already acquired consciousness of how much time it takes for certain materials to deteriorate and how much harm pollution does to the land and rivers. They wanted to continue their environmental contribution by keeping the soil balanced and healthy, so that future generations may benefit from the land.

He acknowledges that when he first heard about organic farming in the 90s he wasn´t convinced by it. It was his wife who told him she wanted to start an orchard but only with organic inputs. To help her, he suggested contacting a Japanese man who was working for the agricultural center in Grecia at the time and knew all about organic farming. The Japanese man started to help his wife and other women who wanted to learn once a week. To help them begin their organic project, Francisco lent his wife and the group of women a piece of his land for their orchard. After

two months, the orchard was already producing vegetables and that is when he became convinced that organic farming did work. Afterward, he made the switch to organic farming.

During our conversation, he explained to me that organic farming is environmentally sustainable because, contrary to what conventional agriculture seeks, organic farming tries to protect insects, birds, bees, and other living organisms and produce in balance with them. Simultaneously, it protects the health of those who work on the farm, by not applying substances that can put them at risk. It is also economically sustainable because they produce all of their organic inputs from organic matters they find in the same farm, instead of helping commercial houses get richer by buying their products. Lastly, organic farming is more holistic, so based on its values he has tried to include his family in the farm´s productivity and promote their bonds. Although most of his daughters and sons are already grown up and some have their own families, they have remained on the farm and they get involved with the farm´s production one way or another. Francisco says that, once he learned about organic farming about 25 years ago, his intention became to involve all the family in his project and form an association. It has helped them to develop and sustain strong bonds over the years. Because they all participate in the farm´s production, they also converse and share their ideas about climate change strategies for the farm. Sarita, his daughter, says: "I think these have been joint ideas really since we are always talking about the weather, climate change and all that" (personal communication, 06-08-2018). Their symmetrical relations facilitate exchanging ideas that influence their capacity to cope and adapt, but also the way their adaptations are chosen stem and reinforce a principle of social justice by including all household members, regardless of gender or other differences, which contributes to the development of resilience.

Like Rafael and Pilar, they produce a diversity of crops, but they sow them in a staggered way so they can have the same products all year round. They grow them out in the open, so to

protect them from heavy rains the past years they have covered them with plastics, which has been an effective strategy, but they also have tried to produce as much as they can over the summer and reduce the production of certain crops during the winter. To prevent land erosion, they use diverse methods like drains, trees, and barriers made with organic matter. Pests are dealt with by natural means, like restraining the production of certain plants during the months when pests appear or trying to keep around other insects or animals, so they control each other. These practices are not only adequate for preserving environmental integrity, but they have also been effective for climate change adaptation, rendering the whole social-ecological system more resilient.

3. Environmental integrity through sustainable farming

The type of agricultural practices used on a farm is fundamental to determine whether the farm contributes to the resilience of the social-ecological system. Farms/households that use sustainable farming practices to respond to the challenges posed by climate change, instead of environmentally degrading or unhealthy mechanisms, can be considered as seeking environmental integrity and, thus, fostering resilience as they sustain their own wellbeing and that of the system as a whole.

All farms mentioned in this chapter identify themselves as organic. This means that of all the farms included in the research, these are the farms that exclusively use environmentally sustainable farming methods. Like Rigby & Cáceres (2001) explain, organic farming seeks human, environmental, and economic sustainability through food production that takes into consideration the interrelations between social and ecological systems. In Costa Rica, there is a law that was passed in 2007 that promotes and regulates organic farming. The law defines organic farming as "all agricultural and agroindustry that uses natural systems to sustain and recuperate soil fertility, biological diversity and the right use of water resources, and that is conducive of the biological

cycles in the use of the soil. This activity dismisses the use of synthetic agrochemicals, whose toxicity can affect human health and the environment, just as the use of transgenic organisms" (Ley de Desarrollo, Promoción y Fomento de la Actividad Agropecuaria Orgánica (N° 8591), 2007)(Law for the Development, Promotion, and Encouragement of Organic Agriculture) (personal translation). Thus, at the heart of organic farming is environmental integrity.

In accordance with the principle of organic farming, these farms use organic inputs to protect human health, crop diversification to keep biological diversity, and crop rotation that sustains soil fertility. These practices also serve as adaptations because they better equip production to withstand climate stressors, which is why most of them don´t consider that climate change has had an impact on their production yet. While these practices are common to all of them, there are some differences in how organic producers manage their crops and farms, like the different management styles developed by Rafael and Pilar, who prefer to sow by families of plants, compared to Francisco, who prefers to sow them staggered, or between Clotilde and Simona who produce under protected environments while Francisca produces out in the open. Nonetheless, what they all share are the efforts made to preserve environmental integrity.

3.1. Resources that promote sustainable farming

In Cóbano, where public institutions continue to perform a strong role, female vegetable producers like Carmela, Simona, and Clotilde are using environmentally sustainable farming practices and adaptations thanks to the types of resources institutions have made available to them. In their case, institutions play a key role in building resilience. Producers in general are knowledgeable on climate change and sustainable farming, but institutions have been more effective at building resilience from their interventions with female vegetable producers. From the start, female producers were motivated in their training to use organic farming, as well as sowing in protected

environments, and, in most cases, they were given materials and supplies to erect the required structures. Unfortunately, not in all cases, institutional resources result in resilience. Male producers in Cóbano have started shifting towards more sustainable farming practices due to the assistance offered by institutions, but they continue to use a few agrochemicals. For instance, Joel manages the farm owned by his elder father. The farm´s main economic activity is based on cattle farming, but traditionally they have also produced rice, beans, and corn for their own consumption. While talking to Joel on his porch it surprised me that, without having asked, he mentioned that climate change has made it difficult to produce these crops. Later on in our conversation, I found out that Joel has acquired his knowledge on climate change and adaptation through his attendance at trainings organized by public institutions. Thanks to what he has learned in those trainings and the technical support he has received from institutions, he has been able to implement some adaptations that have also turned his farm more sustainable. For instance, he now plants more pastures to feed the cattle as an adaptation mechanism and he has changed the way he handles their feeding. Plus, he has been given materials to build a place to feed the cattle, electric fences, wire, hoses, water tanks, and other supplies for climate change adaptation. But despite all efforts put in the sustainable adaptation of cattle, he uses agrochemicals to produce rice and corn. Thus, his farm system is not entirely sustainable, nor resilient.

In Grecia occurs a similar situation. Despite the promotion of sustainable practices by coffee cooperatives and public institutions, which coffee farms have incorporated, many of them continue to use agrochemicals as an adaptation mechanism. Even if they have made significant progress, their adaptations are not entirely sustainable from an environmental perspective and so they are still a step away from resilience. Carlos and Gloriana, for instance, are co-managers of their coffee farms. They own a piece of land, but they mostly produce in rented lands. They started their

coffee production together when they became a couple about 18 years ago. Both grew up in families who produced coffee, so they learned to work on coffee since they were little. Gloriana remembers that, before they didn´t need agrochemicals to grow coffee because there were not as many diseases as there are today, so they were not accustomed to using them. Now they have tried to continue producing coffee in the most sustainable and organic way possible too. Thanks to training courses, they have learned about sustainable production and they have applied much of what they have learned like: planting trees on the farm for shade and along the river basins to protect water sources; the use of organic matter from trees to fertilize and protect the land from erosion; keep water drains to prevent land erosion and weed the land mechanically. All these practices constitute "climate-smart" practices because they not only serve to adapt but to mitigate as well (Harvey et al, 2013); however, the proliferation of diseases and their higher frequency is one climate change impact that has led Gloriana and Carlos, as well as other producers, to increase the use of fungicides to cope. Thus, as much as they try to implement good farming practices, the use of agrochemicals is what keeps them from resilience. The availability of low-rate investments coordinated by cooperatives has made it possible for some coffee farms to start changing their old coffee plants for other pest-resistant varieties, but as long as they continue to use chemicals on their old plants or their new ones they will continue causing negative environmental impacts.

In sum, local institutions can play a key role in promoting sustainable farming practices and adaptations that seek environmental integrity. Their resources are useful to guide producers towards more sustainable ways of production and helping them to put them into practice.

3.2. Subjectivity as a driver of resilience

Institutional resources are vital for the development of resilience. Unfortunately, they are not available in all places or for all producers. When faced with that void, producers' own subjectivity becomes crucial for seeking alternatives to develop resilience, such as the organic producers in Grecia who are not under the scope of coffee cooperatives or organic producers in northern Cartago. In those cases, it becomes clear the role that subjectivity and agency play in resilience building, especially how environmental and social concerns, and goals become the main drivers of resilience. For instance, female manager Francisca from northern Cartago was driven by her environmental concerns to seek knowledge on organic farming outside of Tierra Blanca, because those resources were not available in the community. In the case of Pilar and Rafael, their resources and knowledge also stem from sources outside of Tierra Blanca. It is undeniable that in both cases their personal interests have been the motor of their sustainable and resilient type of production.

Francisco, from Grecia, is another example because organic vegetable farmers don´t have the same institutional support that coffee producers have from cooperatives. From Francisco´s perspective, public institutions don´t have many technical experts on organic farming to assist them. Hence, it was his own negative experiences with agrochemicals, together with his and his family´s environmental and health concerns and goals that led them to seek knowledge and training on alternative farming practices and that has enabled them to build resilience. Thus, subjectivity and agency have played a key role in leading Francisco to the path of organic agriculture.

4. Transforming structures for social justice

Besides environmental integrity, resilience is also about climate change adaptations that are negotiated or chosen through processes that advocate for social justice by contributing to transform asymmetric social structures. Some farms seek social justice by challenging the gender structure

through women´s empowerment, while in other cases it is the gender structure alongside other structures that get contested through egalitarian dynamics that promote member´s "power to" (Allen, 1998) and that lead to farm co-governance.

4.1. Women´s land ownership as a pathway to resilience

Farmland is differently distributed in all three localities according to gender, with women, in general, facing a greater disadvantage to possessing land. In most cases in northern Cartago and Grecia women acquired land through inheritance, like Francisca, but the state and public institutions can also intervene in how land is distributed and push changes in the land structure, such as Carmela´s case in Cóbano. In either case, land is a key asset for women to challenge the gender structure and give impulse to its transformation. Francisca, Clotilde, and Simona´s stories evidence that land ownership in the hands of women constitutes a means to subvert the hegemonic gender order that allocates men to the field and women to the household, so women are able to become farm managers with decision making powers that contribute to the development of resilience from a social justice perspective.

Land ownership bolsters their fallback positions and, consequently, their voice (Katz, 1997) and bargaining power within the household. Under these circumstances, land ownership can empower women to take part in household bargaining processes from a distinct social position than before, which is what happened to Francisca, Simona, and Luz when they decided to use their land to produce vegetables despite the restrictions they encountered before from their male partners. It gives women the opportunity to use their agency to defy the gender norm and perform other types of subjective feminine identities through their farm labor and management. The role these women choose to assume on the farm I interpret as a type of everyday resistance to the patriarchal order that still prevails in the rural localities where these women live. Their resistance is possible due to

the class position they hold with land ownership, which enables them to challenge the hegemonic gender order continuously.

Once female landowners have been successful at subverting the gender order, they can continue to modify their situatedness by enhancing their bargaining power through the acquisition of knowledge and skills, which keeps strengthening their capacity to participate and even lead farm decisions, including those that have to do with climate change. Thus, women´s empowerment and changes in the gender structure can also be influenced by institutional resources. Clotilde and Simona, for example, show that training on organic farming, alongside inputs to carry on their organic projects, constitutes valuable resources to develop resilience.

These female managers compared to other women who are not taking part in those conversations about climate change, have a better chance at developing climate change resilience. Their capacity to push forward their views and opinions that will influence the choices on how to deal with climate change puts them in a privileged position compared to many other women in unequal households. Hence, women´s ownership or co-ownership increases their chances for developing resilience, but for women who don´t own land, their chances of contributing to resilience are much more limited, since they are less likely to be able to resist the gender order and influence the farm´s adaptation strategies.

4.2. Farm co-governance and egalitarian dynamics

Women´s co-ownership of land opens another possibility that can lead to resilience. I contend that land co-ownership can promote resilience when it leads to engage in more egalitarian dynamics since members are encouraged to use their "power to" negotiate on farm matters (Allen, 1998). Egalitarianism challenges the hegemonic gender order while enhancing the wellbeing of its members and that of the social-ecological system more broadly. This type of dynamic is most of

all present in co-managed farms, like Carmela and Roman´s, because landownership provides both partners with bargaining powers that allow them to enter negotiations with one another, increasing the possibility of holding more symmetrical relations between them and, in their case, with other members as well. Egalitarian dynamics can also be further induced by training and workshops that stimulate critical and reflexive analysis of intrahousehold gender dynamics among members. They favor the use of member´s power for joint farm management. Yet, it is not an exclusive situation of co-managed farms, because there are also a few male and female-headed farms that sustain dynamics such as this, like in Francisco´s farm/household.

What can be observed from Carmela and Roman´s family, as well as Francisco´s, is that family members can use their "power to" and agency to influence the course of negotiations over adaptation strategies and their outcomes. On its own, member´s involvement in decision making does not translate automatically into effective coping and/or adaptive climate change strategies; but, intrahousehold dynamics that promote the exchange of creative ideas and knowledge among its members increases the availability of options that might be useful to respond to climate change. From this perspective, there is a wider range of options to choose from and those who take part in the choice can also have the possibility of being benefited by it. Egalitarian relations can contribute to building resilience for the household as a unit, but also for each of its members and, in turn, that of the social-ecological system as well.

Instead, households that have asymmetrical power relations decrease the possibility of developing or strengthening resilience. Dynamics that privilege some member´s voices and knowledge, while disregarding others, mean that these families´ adaptations are made based on asymmetric social relations, contributing in turn to sustain them. Their adaptations are not sustainable from a social justice point of view and, consequently, they are not useful to develop resilience.

Also, the constraints some members face to voice their ideas and proposals, mean these families value fewer options or opportunities to cope or adapt to climate change. Thus, it limits their overall possibilities of choosing and implementing effective responses to climate change. In Rosario´s home in northern Cartago, for instance, her husband produces onions, but he also works alongside their sons at another farm as peons. She used to help him occasionally with their onion production, but now she has a health problem that restricts her from taking part. However, recently she got interested in becoming part of an association of women who are trying to get started with their own organic production. To receive support from local public institutions, they were first asked to get properly trained in organic and sustainable farming, and as part of their training, they had to attend an informative activity about climate change. Although she has some knowledge on the subject and considers that climate change adaptations should be the responsibility of all household members "because we all can get benefited or not" as she says (personal communication, 31-01-2018), she abstains from taking part in those negotiations because she believes others know more than her, despite being the only one in her family to have taken part in an informative activity about this topic. The reproduction of the gender hegemonic order in Rosario´s family and the way she has internalized it is what really prevents her from voicing her opinion and knowledge, which could potentially enhance her family's resilience. The privileging of male voices justified on the idea that they know more normalizes their unequal power relation and it impedes the family from making farm choices based on a principle of justice. This limits the family´s possibilities to reach sustainable adaptation as it keeps intact the gender structure.

Even cases where smallholder farms manage to effectively cope and adapt to climate change, but in which they have achieved it on the basis of gender inequalities, cannot be considered sustainable and, consequently, do not foster resilience in the long term, as they do it at the expense

of the wellbeing of part of the social-ecological system. This is represented by Josue´s case, who grows coffee in Grecia. Although he recognizes experiencing climate alterations, like temperature increases, he considers his coffee production has not yet been impacted by climate change. The reason, he sustains, is that because he is the landowner and manager he knows best when it comes to coffee, so he makes decisions on his own without consulting them with his wife or other family members because they don´t know as much as him. From an environmental perspective, his choices might have led to adjust his production to the changes, like planting new pest-resistant coffee or using organic fertilizers and implementing sustainable practices, but he has done it by excluding his family who also depends on coffee production. Thus, it cannot be said his actions enhance resilience from a systemic perspective because he reproduces household inequalities.

This type of unjust and, consequently, unsustainable adaptations could also contribute to intensifying household inequalities in some of the families. Such could be the case when the benefits or revenues obtained with those coping and adaption schemes are not equally distributed among the members, contributing to reinforcing power differences. I don´t have direct evidence of this, because I don´t hold exact information on the profit farms make and how much is distributed to each member, but I can infer this is the case for dependent women in male-headed farms. For example, women in these farms who don´t receive an equal share from the revenues made with agriculture and who don´t have an income, rely on the "help" given by others to buy or get what they need, which rescinds their autonomy and enables others to sustain their power over them. So, the revenues produced by effective adaptations could in these cases help to reproduce or even deepen household inequalities if those revenues are unevenly distributed and used to reinforce power asymmetries. These farms' responses to climate change are then far from being resilient.

5. Conclusion

In this chapter, I have drawn from stories of smallholder farms that comply with my definition of resilience. Resilience is fostered through adaptations that seek to strengthen the social-ecological system. Only sustainable adaptations that are based on environmental integrity and social justice can really conduce to resilience from a systemic perspective. Environmental integrity is sought by households that use environmentally sustainable adaptations, which in this research are all organic producers whose practices are environmentally conscious. In some cases, environmental integrity can be driven by institutional resources, like in the case of Simona and Clotilde who have managed to produce organic farming thanks to the trainings and material assets that public institutions in Cóbano have provided for them; yet, in other cases, it can be driven by producer´s subjectivities and agency, like in Francisco and in Francisca´s case. The lack of institutional support made them both seek other ways to become resilient, motivated by their environmental and health concerns and goals.

Aside from environmental integrity, resilience has to be based on social justice as well, which is pursued by adaptations chosen through dynamics that contribute to destabilizing unequal social structures and that contribute to positive transformations of the system. This may be achieved in two ways: 1) through the empowerment and agency of women that is driven by land ownership, like in Francisca, Simona, and Clotilde´s case, and 2) through farm co-governance driven by egalitarian dynamics that promote the use of member´s "power to" negotiate farm choices (Allen, 1998), as well as institutional resources that help to challenge the gender structure and inequalities, such as in Carmela and Roman´s family.

What these farms have achieved by putting forward sustainable adaptations that simultaneously engage with environmental integrity and social justice is the reason why I consider them examples worth sharing and learning from, because by doing so they contribute to building the

desired resilience consisting of transforming the social and ecological dimensions of a system so it can become stronger and better in face of future risks.

CHAPTER 9- CONCLUSIONS

> "Social inequalities and climate change are two sides of the same coin. One cannot conceptualize inequalities and power any longer without taking the consequences of climate change into account, and one cannot conceptualize climate change without taking its impacts on social inequalities and power into account" (Beck, 2010, pág. 257).

Climate change has become part of the lived embodied experiences of smallholder producers and their families. Their situated bodies are from where they encounter climate change; it is from where they perceive it. But despite having similar climate change perceptions, involving variations in the seasons, altered precipitation patterns, and increased temperatures, being differently situated means that experiences are not the same. While some are marked by the possibilities to take action and exercise choice in face of climate change, others are marked by helplessness, silencing, or restraint.

Throughout this research, I have put smallholder farm´s intrahousehold power dynamics at the center of the analysis to comprehend the variations in the lived experiences of climate change. This research has contributed to filling the gap that exists in the literature on climate change concerning how vulnerabilities, adaptation, and resilience are shaped by intersecting categories of difference and power relations (Djoudi et al, 2016). My main contribution consists of providing a micro-social exploration on how gendered vulnerabilities, adaptation capacities, and resilience to climate change are constructed at the household and personal level, by looking at how gender and other structures shape household bargaining and decision making. By comparing male, female and co-managed farms I have shown that power configurations, the division of labor, and decision-making

vary depending on the gender of the farm manager(s), which explains why these farms´ vulnerabilities, adaptations, and resilience differ. However, throughout the research, I also evidenced that gender does not operate alone, since individuals´ powers are also shaped by their positions in other intersecting structures, such as class, age, and disability. Thus, the power dynamics of differently situated members within a household also explains why there can be a differentiated and related construction of their personal vulnerabilities, adaptation capacities, and resilience.

1. Connecting scales: Smallholder farms in the local and the national context

The construction of smallholder farm´s climate change vulnerabilities, adaptation capacities, and resilience, as well as that of its members, is mediated by broader political, economic, and social contexts. Thus, the way these are constructed for female, male and co-managed farms are the result of historical changes in farming and current political and economic tendencies that have distinct local expressions.

In Costa Rica, agriculture and farming have been of great economic importance and part of the country´s success has been linked to policies and welfare that protected the agrarian sector in the past, but over the years this sector has suffered significant changes due to the country's adoption of neoliberal policies during the 1980s. The country´s pressure to adopt these policies and its resistance to get rid of the welfare state has resulted in a current hybrid model that throughout the agrarian sector has different expressions depending on the locality and its agrarian production. Hence, the fact that each locality has a specific institutional, policy, and market context, structured by gender, explains why resources available to different men and women lead to variations in how vulnerabilities, adaptation capacities, and resilience are constructed according to gender.

In northern Cartago, although public institutions have a weak presence, their limited and gender-neutral assistance has tended to mostly benefit men, contributing to sustain the hegemonic

gender order. Most farmlands are owned and managed by men, so landless and unwaged women in these male-headed households, together with younger individuals, are among the most vulnerable because they lack "voice" (Katz, 1997) to influence climate change-related decisions, including those related to adaptation. Just a few female landowners, who inherited land, are among the least vulnerable because they manage their farms. Acceptance of their decision-making entitlement over farm issues challenges the gender norm, while also minimizing their climate change vulnerabilities. They display a stronger adaptation capacity and a greater possibility to build resilience, in comparison to other women.

Yet, now under the effects of neoliberal policies, which do not recognize gender differences, both male and female managers face greater economic insecurity, which climate change has aggravated. The lack of institutional assistance in these circumstances means that smallholder farms lack options to invest in their adaptation and, thus, face greater barriers. Consistent with the neoliberal logic, adaptation is left to each individual producer and market-based solutions (Bee, Rice, & Trauger, 2015), so the adaptations they have managed to execute so far clearly correspond to each farm manager(s) situatedness and subjectivity, which is why there are gender differences. Also, subjectivity proved to be important for resilience building. In the few resilient cases, producers sought knowledge on organic farming from sources external to the locality, mainly moved by their environmental interests and goals to keep environmental integrity.

In Grecia, coffee production receives limited assistance from public institutions, which coffee cooperatives complement through their services; but both are based on a gender-neutral policy that has contributed to the persistence of the hegemonic gender order. Based on a hegemonic masculinity construction, coffee production is undertaken by male producers or female land inheritors alongside their male companions, but not by women on their own. In co-managed farms, women

perform specific forms of labor and they weigh in more on productive decisions, but there is still a clear gender division of agricultural tasks, which is even much more pronounced in male-headed coffee farms, enhancing landless and unwaged women´s vulnerabilities and reducing their capacity to adapt. But regardless of their inner arrangements, coffee farms currently face similar economic constraints and instability due to coffee´s international market, which becomes more pronounced due to climate change. The silver lining is that, in this locality, smallholder farms have access to resources from coffee cooperatives and, to a lesser extent, from public institutions, that increase their adaptation capacity, although resources are not specifically intended for those means. Nonetheless, among the challenges that these farms face is that unsustainable coffee adaptations, such as agrochemicals, are widely used and keeps them from building resilience. Male-headed and co-managed farms use similar sustainable and unsustainable coffee adaptations that reflect men´s greater influence in coffee-related decisions, while other crops are being adapted using only sustainable means, partly because they are easier to adapt through sustainable practices. It can be inferred that it is also because women get much more involved in the labor production of these crops and, consequently, they have more influence in their adaptations. However, more research is needed to confirm this.

In Cóbano, the role that public institutions play has been life-changing for many families. Primarily, because of the state's land distribution that pushed a different land structure by recognizing both spouses as legal owners, and because of their financial and technical assistance to both male and female managers, which has strengthened smallholder farms' financial situation. In gender terms, their involvement has prompted changes in the gender order from within the family as well. Through the recognition of men and women´s particular interests and needs, they have been able to promote social justice by empowering women through their productive projects, which has been

accompanied by a process of re-socialization for women and the rest of the family. So, it is not that "machismo" has disappeared or that families have completely changed their dynamics, but helping women attain a more prominent role within the farm and increasing their bargaining power, enables men and women to practice more egalitarian dynamics. In turn, women´s and other household member´s vulnerabilities are minimized, since at least gender stops being one of the barriers that impede these families from being able to effectively adapt. Also, by contributing to transform gender and other inequalities, institutions have helped some female and co-managed farms to build resilience since they are now able to choose adaptations on a basis of social justice; plus, their technical assistance on organic farming has enabled them to adapt in ways that seek environmental integrity.

In essence, each locality exemplifies a distinct scenario in which there is a particular expression of the present welfare-neoliberal governing model and their implications for smallholder farms' livelihoods and gender relations in face of climate change. The first scenario is one where gender-neutral policies combined with neoliberal approaches to climate change tend to reinforce household inequalities and differentiated gender vulnerabilities while posing greater barriers for the adaptation and resilience of farms. In a second scenario, I have shown that neoliberal and welfare approaches mean greater adaptation capacities for smallholder farms - although not completely devoid of barriers- but with gender-neutral policies that reproduce household inequalities and differentiated gender vulnerabilities. The last scenario is one where public institutions, with gender-sensitive approaches, have succeeded at minimizing gender vulnerabilities, while developing adaptation capacities for different men and women and, in some specific cases, resilience. From my point of view, these scenarios evidence that the country is at a crossroads where it can decide whether it will succumb to the neoliberal approach, which has proven insufficient to overcome the

climate change vulnerabilities and adaptation barriers that smallholder farms currently face and that, most likely, will increase their precarity and social inequalities, or if it will follow the historical legacy of a welfare state that, through its local public institutions, can make a huge difference in helping to build the adaptation capacity of smallholder farms, while also transforming social asymmetries. Moreover, these local scenarios should be taken seriously by policymakers and political leaders to reflect on what the country´s ambitions for the future are and the decisions it should invest in at present to achieve them.

2. The most significant resource: Land tenure

Among the empirical data gathered from each place, there is one empirical finding that is particularly significant and that is common to all three localities, which is how valuable land is for women and for challenging the normative gender order. Access to land, in this case, is of primary importance to comprehend the differences between women in different farm types and between men and women.

Owning land entitles the owner to assume farm management and make farm decisions. Most farmland is owned by men since agriculture has been predominantly a male-dominated occupation. Land tenure bestows men with the right to assume farm management and, consequently, organize the farm/household based on the hegemonic gender order by reproducing the traditional gender division of labor, which allocates agricultural labor to men and reproductive labor to women. It is common in these farms/households for men to be the main decision-makers and for women to remain at the margins of those choices. Because of this historical pattern, land is particularly significant when in the hands of women, because those who possess it have greater bargaining power, as they hold a stronger fallback position. These findings are consistent with the feminist economics literature on bargaining that shows that women´s assets, including land tenure, can increase their

bargaining power (Twyman, Useche, & Deere, 2015; Friedemann-Sanchez, 2006; Doss, 2003; Agarwal, 1997). A greater bargaining power, in this case, means that women landowners have more influence in decisions (Doss, 2003) related to agricultural production, such as what crops to cultivate, the distribution of agricultural tasks, commercialization of products, revenues, among other things. In some cases, they even have the last word in those decisions.

Furthermore, in this research, I have shown that land ownership, as a marker for class, not only locates women in a powerful class position that strengthens their bargaining power but it can also be used by them to challenge the hegemonic gender order and the powerlessness that derives from their social position in the gender structure. Material assets, together with their capacity to self-reflect on their social position, can enable women to use their agency to subvert the gender order in their farms/households and modify their situatedness by taking on farm management and performing other feminine identities through their agricultural labor. For this reason, one of my main contributions to the agrarian literature is showing that female-headed, and co-managed farms/households have different power configurations compared to male-headed farms, which is expressed in each farm´s distinct gender allocation of productive rights and responsibilities, including decision-making privileges over farm matters, the performance of agricultural labor and control over others labor. This supports what other studies have found concerning the changes observed in gender identities and division of labor in farming contexts (Sireni, 2008; Brandth, 1994). However, female managers' capacity to challenge the gender norm in a farming setting is not enough to renegotiate their reproductive role, as they continued to perform these labors as well. Domestic labor and care work continue to be considered part of women´s responsibility and, for this reason, many of them assume a double or even triple burden. This means that female managers

have been able to alter the hegemonic gender constructions in farming, but they have not managed to overturn the gender structure completely in these households' reproductive dimensions.

In the context of climate change, land ownership and holding managerial leadership means that male and female managers are entitled to influence, or even have the final say, on decisions related to the farm's climate change responses and adaptations. Because of this privilege, men and women farm managers are among the least vulnerable to climate change. Also, because of their situatedness and subjectivity, men and women tend to choose and implement distinct climate change adaptations, which is consistent with what Assefa Mersha & Van Laerhoven (2016) observed in their comparative study of male and female-headed farms in Ethiopia. Women, in this case, are more inclined towards sustainable, preventive adaptations motivated by their caretaking role, which makes them more concerned about their families, as well as environmental and health issues, while men tend to use reactive coping mechanisms that secure their production and profit. Each farm/household´s adaptation capacities are also reliant on the resources available to men and women in each locality. Furthermore, through farm management women have a higher possibility of developing resilience, because they are not only entitled to choose sustainable adaptations that foster environmental integrity but also their adaptations enact social justice by contributing to transform gender and other inequalities.

Through my empirical analysis, I confirm what Arora-Jonsson (2011) asserts about not all women being equally vulnerable. In this case, female managers situatedness and the bargaining power that derives from it bestows them with greater resources that minimize their vulnerabilities, increase their adaptation capacity, and even grants them the possibility to build resilience, despite being embedded in institutional and policy contexts that contribute to reproducing the patriarchal norms that are deeply engrained in society.

3. Power dynamics that produce differentiated personal vulnerabilities, adaptation capacities, and resilience

Despite there being a clear relation between land ownership and the right to use and manage the farm, the allocation of this and other agricultural rights and responsibilities can be disputed and bargained by other members. An important contribution of this research was providing insight into household bargaining over the allocation of agricultural rights and responsibilities, which not only include the right to use the land, but also control over decision making, understood as the primary task that determines how other tasks are distributed and by whom (Jha, 2004). Looking at who is entitled to bargain over farming decisions and who isn´t, as well as who makes the final choice, provided valuable insight to understand why there are differences in vulnerabilities, adaptation capacities, and resilience among members, which in turn configures the overall household´s vulnerability, adaptation capacity, and resilience.

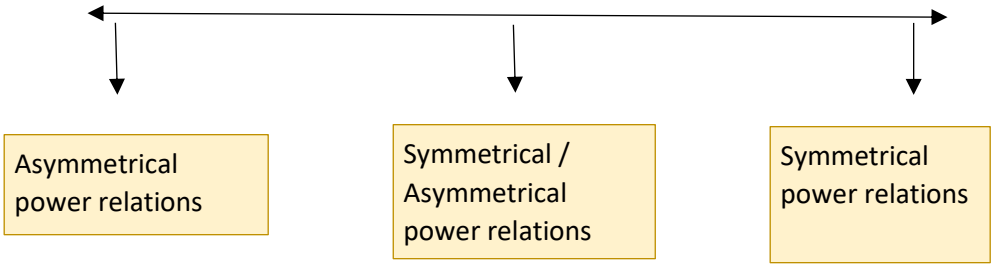
The empirical data obtained reflects such a diversity of intrahousehold dynamics that it is difficult to set a pattern on how bargaining processes take place among multi-person farms/households. It is indisputable that land ownership grants a stronger bargaining power to farm managers compared to other members. So, there are male and female farm managers that use their power to make farming decisions alone, but there are others who bargain with their spouses or other members, opening the possibility for them to influence decisions, although managers have the final word on decisions related to agricultural production.

Based on how decisions are made, and whether farm managers bargain with other members, households tend to practice certain types of power relations. The types of power relations observed can be thought of as a continuum, ranging from those households with a prevalence of asymmetrical power relations, such as those where farm managers often choose on their own without bargaining with other members, to those on the opposite side with a prominence of symmetrical power

relations, where all members usually take part in bargaining processes and have the possibility to influence farming decisions, approximating an egalitarian type of dynamic. Those in the middle are households that tend to display both types of relations, which means that some members can participate in negotiations and decision making, but others do not or cannot. Most households find themselves in the middle of the continuum, because, more often than not, farming-related negotiations include some members, but leave out others that lack both bargaining power and voice. However, there are exceptional cases of households that find themselves close to the extremes.

Figure 9: Continuum based on the type of power relations present in households.

(Produced by author)



To better understand bargaining in households composed of numerous individuals and with asymmetrical/symmetrical power relations, one of my main theoretical contributions is suggesting that it is important to look at member´s situatedness in gender, class, age, and other structures, and if their situatedness locates them in an advantaged or disadvantaged position compared to other members, because that is from where they draw their bargaining power and "voice" (Katz, 1997). Through this reasoning, it is possible to conceive that differently situated members differ on their right to take part in farming-related negotiations, as well as on their capacity to influence those

choices. In households with a prevalence of symmetrical relations, it seems that members´ differences are less significant because regardless of them, they have the right to take part in negotiations and decision making.

In households with asymmetrical/symmetrical relations, members who are involved regularly in agricultural labor acquire the right to take part in negotiations where agricultural decisions are made and this, in turn, enhances their ability to influence farming decisions; while those who don´t perform any agricultural labor or just on occasion, have less right to take part. In the face of climate change, asymmetrical power relations create uneven possibilities for members to put forward their personal views, concerns, and needs related to climate change in bargaining processes and influence the climate change responses and strategies to be implemented within the farms. While individuals who often participate in farm-related negotiations have the right and power to influence climate change-related decisions, marginalized members can be considered vulnerable, because they are at the mercy of those others choosing for them, without considering their personal needs or concerns. In male-headed farms, due to inequalities of gender and age, landless and unwaged women, as well as younger members, have fewer agricultural rights and responsibilities that constrain their possibility of participating in bargaining processes where climate change responses are decided. In female and co-managed farms, it tends to be younger members. These are the most vulnerable individuals within smallholder farms. Such findings are consistent with the study by Ravera et al (2016) in which they show that women deal differently with environmental changes depending on their intersecting positions in gender, class, and other power structures. I would add that this observation is not only valid for women, but for all individuals regarding climate change, because intrahousehold power relations restrict the capacity of some to choose and act, but at the same time give others the freedom to do so.

The uneven participation in negotiations restricts the farm/household's overall adaptation capacity. By keeping some members from sharing their knowledge and ideas, there are fewer alternatives to consider, limiting the farm as a unit from finding and putting in practice effective climate change responses. Also, these power dynamics constrain farms from building resilience since they are reproducing social inequalities. On the contrary, farms that hold more egalitarian dynamics not only diminish the vulnerabilities of members who take part in negotiations, but they also have a higher adaptation capacity because members´ ideas and knowledge are considered, leading to more alternatives that increase the farm´s chances of putting in place effective strategies. Plus, their relations contribute to building resilience based on social justice by challenging the asymmetrical nature of certain structures that produce inequalities. In short, one of the main contributions of this research is highlighting that vulnerabilities, adaptation capacities, and resilience are always dynamic and constructed relationally.

An important limitation to this study is that it was not possible to determine if, among those members who sustain symmetrical relations and negotiate (aside from the farm managers), some have more influence than others on the decisions made and what determines their greater influence. In coffee co-managed farms, for example, husbands and wives have strong bargaining powers because they are both landowners, so decisions are made jointly. But, in their case, it seems that gender norms, such as the notion that men know more about coffee, provide men with a greater influence in coffee farming-related decisions because of the outcomes of those decisions. More research is needed along these lines to understand the nuances of bargaining processes and if that has consequences on the construction of the personal vulnerabilities of members with similar bargaining powers.

Also, from the comparison of the three places, some new questions emerged, but it was not my original aim to do a comparative analysis and explore the reasons behind their differences. These questions can open new lines of inquiry that could be explored in future research. For example, one cannot help but wonder what makes Cóbano such a different case compared to the others? why is it that in Cóbano the state continues to have such a strong role? Does it have to do with specific policies for that region or does it have to do more with the state officials that work in that locality?

Finally, reflecting on Beck´s quote in the epigraph of this chapter, social inequalities, and climate change are two sides of the same coin. As this research has shown, social inequalities and power relations at the household level can lead to an uneven and unjust distribution of climate change risks and impacts among household members. Also, in some cases, household inequalities can be perpetuated due to climate change, or even, become more pronounced. But in other cases, climate change might introduce new opportunities for asymmetrical power relations to be further contested and social inequalities transformed.

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