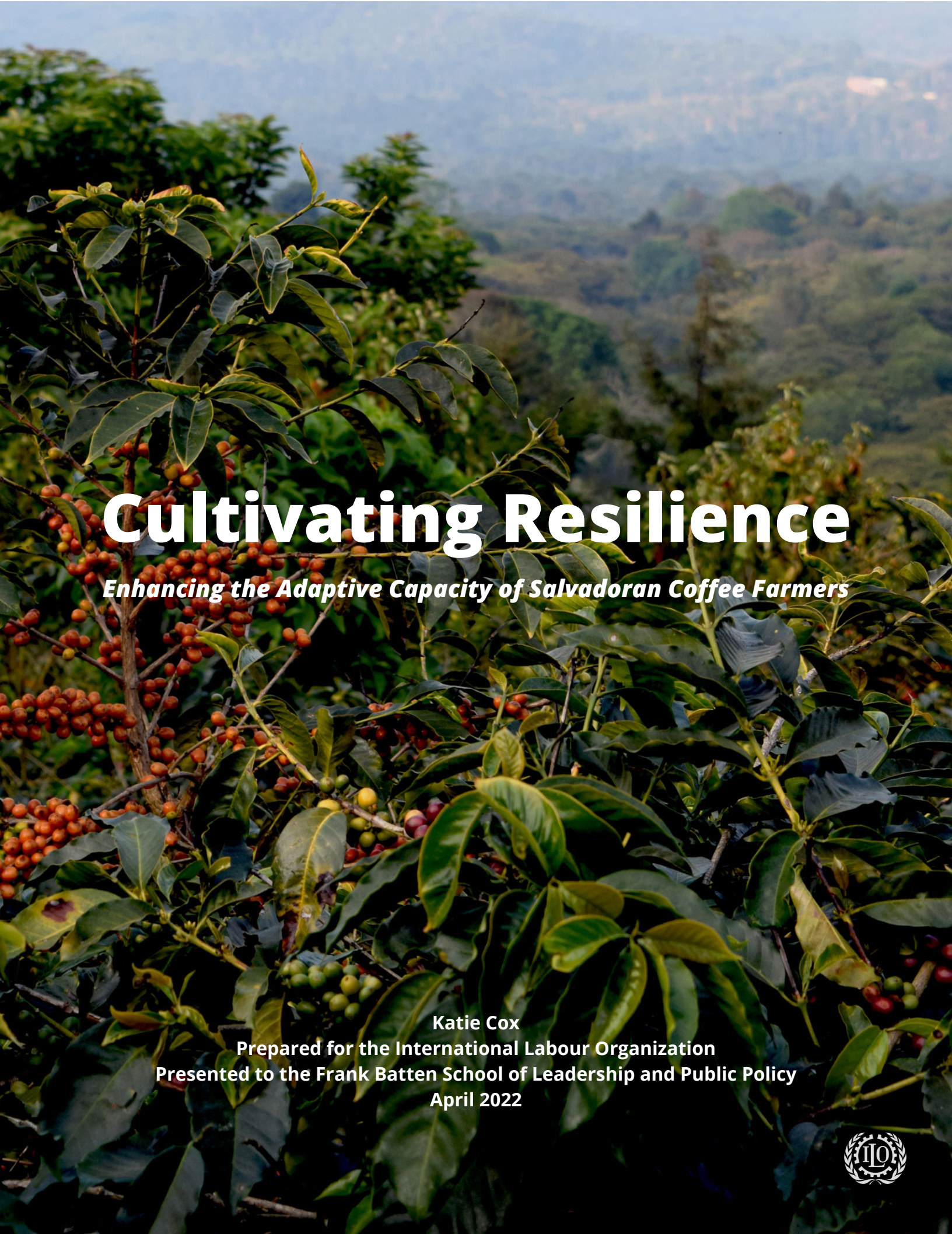

Cultivating Resilience

Enhancing the Adaptive Capacity of Salvadoran Coffee Farmers

Katie Cox

Prepared for the International Labour Organization

Presented to the Frank Batten School of Leadership and Public Policy

April 2022

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Cover image courtesy of Mercanta

FOREWORD

Acknowledgements
This report was made possible with the generous support of several key individuals. Professors Kirsten Gelsdorf and Lucy Bassett's expertise of the policy process were critical in helping me develop this project from start to finish, and I will be forever grateful for their kindness, flexibility, and guidance this past year. I am also incredibly thankful to have been able to produce this report for Noortje Denkers at the International Labour Organization and to have had the honor of collaborating with one of the most distinguished groups promoting labor rights around the world. Additionally, the research that I conducted under the supervision of Professor David Leblang and alongside Katie Mulder in 2021 deepened my interest in the broad topic of Central American climate migration. I am greatly appreciative of their enthusiasm for informing policy that supports those impacted by climate change and of the role they collectively played in laying the foundation for the early stages of this project.

I would also like to express sincere gratitude to my peers and close friendships both inside and outside of the Batten School for their constant compassion and unwavering support throughout the past two years. I am proud of their various passions and collective commitment to accelerating positive change around the world, and I know that they will continue to inspire me with the far-reaching impact that they create in the coming years.

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Disclaimer
The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency. In addition, the content of this report does not necessarily reflect the definitions, policies, or views of the International Labour Organization.

Honor Statement
On my honor as a student, I have neither given nor received unauthorized aid on this assignment.

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THE INTERNATIONAL LABOUR ORGANIZATION

Mission & Impact

The following report was produced for the International Labour Organization (ILO), the lead United Nations specialized agency promoting decent employment opportunities and working conditions for all. With its ability to bring together governments, employers, and workers representing 187 member States, the ILO is uniquely poised to enhance local employment opportunities and strengthen smallholder farmer resilience – particularly within El Salvador's climate-vulnerable coffee sector. In the spirit of achieving the objectives laid out in the ILO's Decent Work agenda, the research and policy analysis in this report is intended to support the ILO in deepening its understanding of the systemic barriers that prevent Salvadoran coffee farmers from adapting to climate change. In doing so, the ILO can oversee the training, education, and policy implementation needed to help smallholder coffee farmers build resilience to climate change and advance their economic and working conditions – both in El Salvador and in other coffee producing countries around the world.

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ACRONYMS

ABECAFE	Asociación Salvadoreña de Beneficiadores y Exportadores de Café (Salvadoran Association of Beneficiaries and Exporters of Coffee)
AMCES	La Alianza de Mujeres en Café de El Salvador (Alliance of Women in Coffee, El Salvador Chapter)
CAFECIBA	Sociedad Cooperativa de Cafetaleros de Ciudad Barrios (Cooperative Society of Coffee Growers of Ciudad Barrios)
CSC	Consejo Salvadoreño Del Café (Salvadoran Coffee Council)
ILO	International Labour Organization
MFI	Microfinance institution
USAID	United States Agency for International Development

KEY TERMS

Glossary of Key Terms

Adaptation strategy: A program, product, or approach that responds to anticipated impacts of climate change.

Adaptive capacity: The ability of a system to adjust its behavior to expand its coping range under existing climate variability or future climate conditions. In this context, adaptive capacity refers to farmers' ability to implement effective adaptation strategies so as to reduce the likelihood of harmful outcomes resulting from climate change (Brookes and Adger, 2005).

Arabica coffee: Coffee that comes from the beans of the *Coffea arabica* plant. Originating in Ethiopia, Arabica is the world's most popular type of coffee. Salvadoran coffee production consists exclusively of the Arabica variety, despite its high vulnerability to climate change.

Central America: A region of the Americas that is globally known for its coffee production. Often referred to as the "Bean Belt," Central America consists of seven countries: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

Climate change: Long-term shifts in global or regional temperatures and weather patterns; largely attributed to increased levels of atmospheric carbon dioxide produced by fossil fuels.

Climate resilience: Climate resilience refers to a system's ability to anticipate, prepare for, and respond to climate shocks in a manner that maintains the integrity of its essential characteristics and functions (Center for Climate and Energy Solutions, 2021; Zong et. al, 2016; Bianco, 2020).

Climate migration: Internal or external migration, largely due to sudden or progressive environmental changes that adversely affect one's life or living conditions (IOM, 2007).

Glossary of Key Terms (Cont.)

Crop year: A unit of time used with agricultural commodities; refers to the period from one year's harvest to the next. El Salvador's coffee crop year typically lasts from September 30 to October 1.

El Salvador: Officially the Republic of El Salvador, El Salvador is the smallest and most densely populated of the seven Central American countries. El Salvador is bordered on the northeast by Honduras and the northwest by Guatemala.

Extension services: Services that extend information to farmers, growers, and homeowners. In this context, extension services refer to agricultural advisory services that provide non-formal education and learning activities to smallholder coffee farmers. In doing so, they teach farmers skills and knowledge that help them improve their agricultural productivity, food security, and livelihoods.

Hectare: A metric unit of area that is equivalent to 10,000 square meters and is often used when discussing the size of coffee farms.

Quintal: A unit of weight that is sometimes used when measuring coffee production. One quintal is equivalent to one hundredweight (112 lbs).

Remittances: The earnings that migrants send back their homes as a means of financially supporting their families (Ratha, 2018). In this context, remittances refer to the cash transfers that migrants send to their Salvadoran households, often from popular destination countries such as the United States.

Smallholder farmers: The definition of what constitutes a smallholder farmer varies from region to region. In this context, smallholders refer to small-scale coffee farmers that cultivate less than 10 hectares of land, generally depend on family members for farm labor, and rely on agricultural production as their primary source of income (Donatti et. al, 2019).

EXECUTIVE SUMMARY

Climate change poses a significant threat to smallholder coffee farmers around the world due to the crop's high sensitivity to increases in temperature and other extreme weather shocks. Many of these roughly 475 million smallholder farmers are poor, experience food insecurity, and live in unstable sociopolitical situations. Smallholder farmers in El Salvador are projected to experience some of the worst sector-wide climate impacts than any other country in the world. This is expected to compound existing issues and undermine global progress toward poverty alleviation and sustainable development. Evidence shows that many smallholder farmers are unable to invest in the strategies necessary to be able to recover from climate shocks, placing them in a vulnerable position where the sources of their livelihoods are at stake.

The central question of this analysis is to determine how the International Labour Organization (ILO) can support small-scale farmers in Central America in building the capacity to adapt to climate change. Adaptive capacity's role in facilitating resilience to climate change is crucial, yet many farmers face systemic barriers such as limited access to financial resources, increased levels of risk-aversion, and isolation from migration channels or labor markets in urban settings.

aThe following proposal assesses three policy options concerning mechanisms that the ILO can undertake to help smallholder coffee farmers build the adaptive capacity needed to achieve climate resilience :

1. Collaborate with microfinance institutions to enhance farmers' access to credit
2. Expand smallholder farmers' access to agricultural insurance
3. Promote labor migration benefits through advocacy

In accordance with some of the ILO's policymaking values, the criteria used to evaluate these policy options are Cost, Effectiveness, and Equity. I recommend that the International Labour Organization implements Option 1: Collaborate with microfinance institutions to enhance farmers' access to credit, as it entails the development of supplementary extension services that will promote farmer take-up rate and appropriate use of loans. In addition, it will work to break down the systemic barriers that prevent farmers from implementing adaptive strategies and responding to climate change. Finally, the policy's emphasis on equity and providing loans to the most needy farmers, including women and rural smallholders, supports the ILO's mission of promoting decent work for all.

PROBLEM OVERVIEW & DEFINITION

Climate change is emerging as one of the most pervasive challenges facing coffee farmers worldwide, projected to reduce the area suitable for growth and production by up to 50 percent across the global agricultural landscape in the next 30 years (Inter-American Development Bank, n.d.). The nation of El Salvador is expected to experience some of the largest climate-induced shocks to its coffee sector than any other country in the world, with a predicted loss of more than 45 percent of its suitable coffee growing area by 2050 (Baca et. al, 2014; Ovalle-Rivera et. al, 2015; Inter-American Development Bank, n.d.). These reductions in land suitability and agricultural productivity in turn generate tens of thousands of job losses and exacerbate other confounding forces driving internal and external migration within and out of El Salvador, such as household food security, political stability, and human security (Castelli, 2018). Moreover, the consequences of climate change on coffee production disproportionately harm marginalized populations, including rural smallholder farmers, children, and women (Cox and Herrera, 2018, Viscidi, 2021

Growing evidence finds that the widespread implementation of climate adaptive strategies will be necessary to ensure the future viability of the highly climate-sensitive coffee crop. While many farmers recognize this need to implement different farm management strategies, many of them face systemic barriers in accessing financial resources that prevent them from investing in more costly climate-resilient agriculture practices. Smallholder farmers' inability to invest in the strategies necessary to be able to recover from climate shocks exacerbate existing vulnerabilities and generate tens of thousands of job losses per year. Therefore, it is critical that the ILO support the development of a policy strategy that targets the underlying issues driving the Salvadoran coffee industry's inability to effectively mitigate the devastating impacts of climate change.

Box 1.1 El Salvador at a Glance

Capital City: San Salvador
Official Language: Spanish
Population: 6,486,201 (2020)
Total Area: 8,000 mi
Population Density: 860 people/mi

BACKGROUND

The Rise of El Salvador's Coffee Republic

The fate of modern Salvadoran coffee production is inextricably linked to the country's history as a coffee republic. While coffee was originally cultivated for domestic use in the early 19th century, evidence of its commercial promise surfaced during the mid-1800s, prompting the government to promote its widespread production. The implementation of legislative incentives such as tax breaks and military exemptions (Haggarty, 1988, Kellso, 2019) resulted in the coffee industry's rise to national economic importance, and coffee surpassed indigo as the country's leading export by the 1880s (Paige, 1993; Lindo-Fuentes, 1991).

In addition to underpinning a lucrative export industry, the wealth derived from the coffee sector financed the development of national transport infrastructure. Controlled by a network of affluent, landowning "coffee elites'' (Haggarty, 1988; Paige, 1993; Lindo-Fuentes, 1991), the coffee industry and its political and economic prominence fueled national investment in the roads and railroads needed for agricultural transportation (Haggarty, 1988; Kellso, 2019). Although the coffee industry played a fundamental role in catalyzing El Salvador's domestic development, the elites' chokehold on the market exacerbated the country's existing levels of social inequality and generated an extreme wealth gap in Salvadoran society that still persists to this day (Tenzin, 2020; Paige, 1993).

By the 1920s, coffee became El Salvador's sole export crop, comprising 90% of the country's total agricultural exports (Kellso, 2019; Tenzin, 2020). Fifty years later, El Salvador rose to importance as the world's fourth largest producer of coffee (Global Coffee Report 2019; Salazar et. al, 2019). Although the coffee sector was responsible for more than 50% of the country's national GDP at the time (Tenzin, 2020), income generated from coffee exports was concentrated amongst the landed elites – despite constituting only 2% of El Salvador's total population (Lindo-Fuentes, 1991). Recurring political tensions stemming from the country's increasing reliance on coffee for economic prosperity coupled with the working class's growing frustrations with class inequality culminated in a civil war that lasted from 1979 to 1992. The aftermath of the war ushered in the beginning of a new era defined by massive land and wealth distribution. Today, 95% of coffee producers grow their coffee on less than 20 hectares and no individual can own more than 245 hectares of land (Mercanta, n.d.), a modern example of the war's lasting legacy.

While the Salvadoran Coffee Council reported coffee exports valued at $148M USD in 2015, national coffee exports have fallen by more than half in the past ten years.

Contemporary Coffee Cultivation and the Impacts of Climate Change

El Salvador continues to be a top producer in the modern global coffee market, albeit as a less robust contributor than in the 1970s. This fall from international prominence is in part due to changes in climate that pose significant challenges (e.g., falling international prices, reductions in suitable growing areas, job losses) to the country's coffee production capacity. While the Salvadoran Coffee Council reported coffee exports valued at $148M USD in 2015, national coffee exports have fallen by more than half in the past ten years (FEWS NET, 2016). This is largely due to farmers' slow progress in adapting to the rising temperatures, changing precipitation patterns, and extreme weather events associated with climate change. The remainder of this section describes the myriad of effects that climate change has had on El Salvador's coffee sector and the ways in which these consequences interact with each other to threaten the viability of future coffee production.

Reductions in Suitable Growing Area & Other Harms to Agricultural Productivity

The impacts of climate change on Salvadoran coffee growth and production are extensive, ranging from loss of suitable area for coffee cultivation and decreased agricultural yields to increased prevalence of coffee

pests and diseases (Ovalle-Rivera et. al, 2015; Lara-Estrada, 2021). Recent climate models project that across the Central American region, severe climate change will render the majority of growing areas unsuitable for future coffee production (Lara-Estrada, 2021; Baca et. al, 2014; Bunn et. al, 2019; Hannah et. al, 2016). This reduction in land suitability is primarily due to the coffee crop's high sensitivity to factors such as increasing mean annual temperature and precipitation (Lara-Estrada, 2021; Hannah et. al, 2016).

As coffee areas have become hotter and drier in the past three decades, annual mean temperatures across El Salvador have risen by roughly 0.8°C. This rise in temperatures is projected to further increase by 1.9°C by 2050 (Fernández Kolb et. al, 2019). Temperature changes driven by climate change are the main determinant of reductions in suitable land due to Arabica coffee's small thermal range and consequent high sensitivity to minor changes (Hannah et. al, 2016; Haggar and Schepp, 2012). Mean temperatures above 23°C (73.4°F) are known to accelerate the flowering and fruit development of Coffea arabica, leading to overall reductions in crop quality (Villers et. al, 2009; Haggar and Schepp, 2012; Scott, 2015). Furthermore, continuous exposure to

Figure 1: Salvadoran Coffee Exports Since 1990

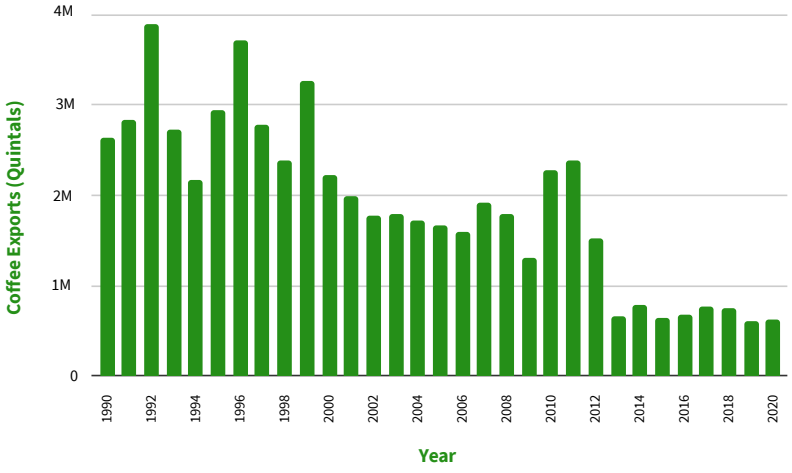
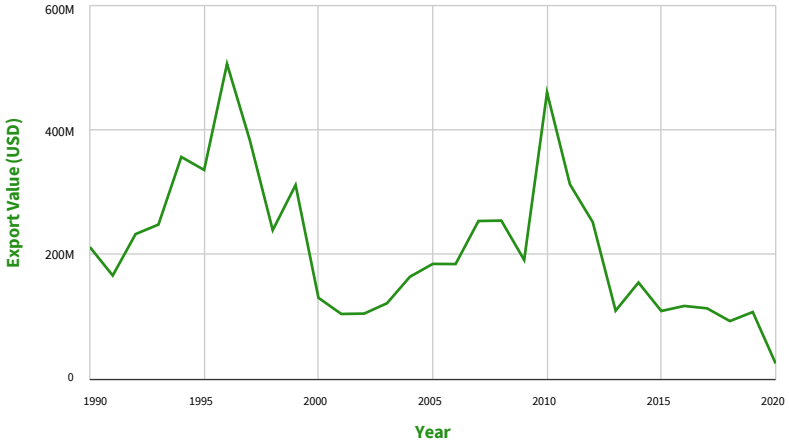


Figure 2: Value of Salvadoran Coffee Exports Since 1990 (USD)

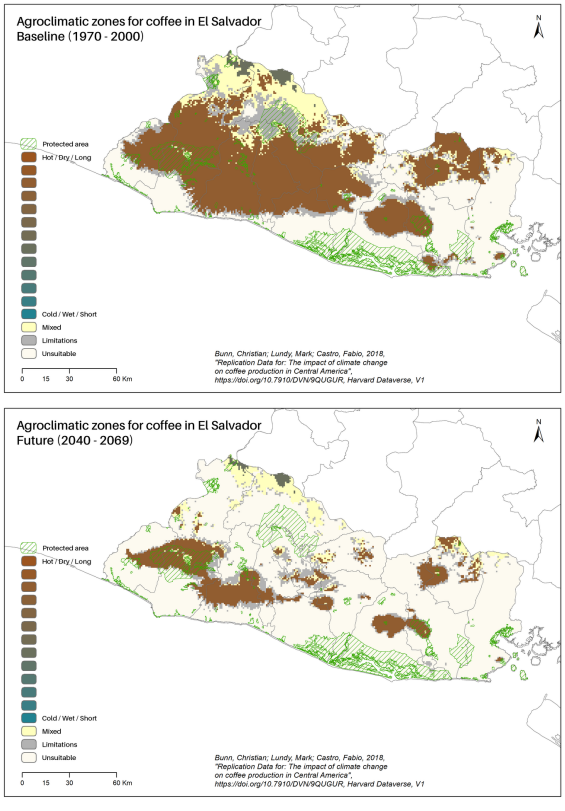


Data from the Salvadoran Coffee Council

air temperatures above 30°C (86°F) has been linked to abnormalities such as plant yellowing and loss of leaves (Haggar and Schepp, 2012). Estimated temperature increases are expected to reduce El Salvador's suitable growing area by more than 45% in the next 30 years, more than any other country in the region (Baca et. al, 2014; Hannah et. al, 2016).

Other consequences of rising air temperatures include an increase in coffee pest attacks and a heightened prevalence of coffee disease, further impairing current and future crop performance. Air temperatures consistent with climate change have been linked to intensified outbreaks of coffee rust, a leaf disease caused by the Hemileia vastatrix fungus and known for restricting coffee trees' abilities to perform photosynthesis (Avelino et. al, 2015). Between the 2010/2011 and 2013/2014 crop years, coffee rust was responsible for a 70 percent reduction in Salvadoran coffee production (FEWS NET, 2016). Disease-affected coffee plots require a crop management technique known as stumping to stimulate production again, and plots will typically not resume normal production capacity until three years after vegetative tissue is renewed (Avelino et. al, 2015). While the most recent coffee rust epidemic of 2012 has caused significant losses across all Central American coffee producers, El Salvador remains the most affected country in the region. The country's widespread lag in deploying climate-adaptive crop management strategies has severely slowed its capacity to recover from coffee disease, further contributing to drops in production (Avelino et. al, 2015; FEWS NET, 2016).

Figure 3: Projected Losses in Land Suitability for Coffee Cultivation, 2050



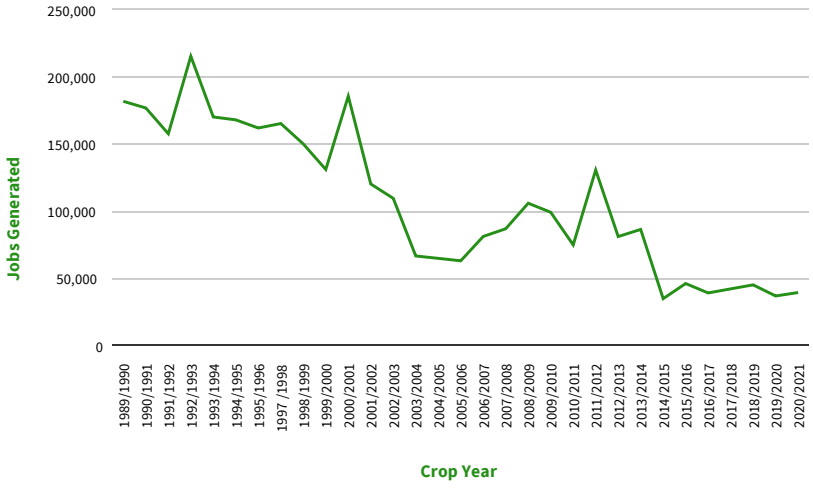
Maps courtesy of the International Center for Tropical Agriculture

Climate change is also expected to reduce crop yields by altering precipitation patterns and generating more frequent and intense extreme weather events, such as hurricanes. As rises in global temperatures cause an increase in hurricane frequency and intensity (Knutson et. al, 2021; Appendini, 2019; Harvey et. al, 2018), Salvadoran coffee farmers have experienced irreversible damage to coffee zones and harvest output (Harvey et. al, 2018) due to storm-related landslides, soil erosion, and damages to transportation and processing infrastructure. The extent of weather-related impacts on agricultural productivity were especially pronounced in November of 2020, when Hurricanes Eta and Iota placed between 15 and 20 percent of El Salvador's 2019/2020 coffee harvest at risk (Fairtrade International, 2020). Other effects of climate change on weather and precipitation patterns have included severe drought episodes and longer dry seasons, changing rainfall patterns, and higher rates of flooding – all of which harm the production of the highly sensitive coffee crop (Salazar et. al, 2019).

Job Losses

Although the Salvadoran coffee industry employs significantly less individuals today than it did during the country's peak cultivation levels of the 1990s, (Salazar et. al, 2019), it still represents a critical source of employment for Salvadorans – particularly for rural households that have limited opportunities for off-farm income (Fromm, 2022; Blackman et. al, 2006). Recently, however, climate-induced declines in coffee production have led to widespread job losses throughout the coffee sector, threatening the livelihoods of both producers and laborers. Indeed, it is estimated that for every 45,000 ton decrease in coffee production, approximately 10,000 coffee jobs are lost (Herrera, 2021). Between 2010 and 2020, declines in coffee production reduced the number of coffee jobs per year from 130,000 to just under 40,000 (Consejo Salvadoreño Del Café, 2022; Herrera, 2017; Herrera, 2021).

Figure 4: Coffee Jobs Generated per Crop Year (1989/1990 - 2020/2021)



Data from the Salvadoran Coffee Council

While disruptions in coffee production have impacted employment opportunities for medium and large-scale coffee producers, smallholder farmers are perhaps even more susceptible to climate-driven job losses. Smallholder farmers play a central role in the Salvadoran coffee production chain and in El Salvador's agricultural sector as a whole. In fact, 86% of the nation's coffee producers farm on seven or less hectares of land, contributing to 20% of the country's total coffee production (International Coffee Council, 2016). Meanwhile, 40% of the country's coffee production comes from owners of estates greater than 70 hectares, such as large companies (Fernández Kolb et. al, 2019). Losses in livelihood amongst smallholder farmers can primarily be attributed to their low capacity to adapt to environmental changes relative to these wealthier industrial-scale farms (Donatti et. al, 2019). Small growers' limited ability to modernize their farms or invest in other necessary adaptation measures – largely due to financial

constraints – has harmed their future employment prospects and led to crop abandonment, migration, and occupational changes (FEWS NET, 2016).

Falling international coffee prices also exacerbate job losses amongst smallholder farmers by lowering profits. Indeed, smallholder farmers have a tendency to stop growing coffee when the amount of income they earn per smallholder farm unit decreases (Panhuysen and Pierrot, 2018). When new production in regions such as Southeast Asia flooded the global coffee market in the early 2000s, corporations turned away from El Salvador's high-end coffee in favor of larger quantities and cheaper prices (USAID, 2002). This resulted in a 20 year fluctuation in global coffee prices, making it difficult for small-scale Salvadoran farmers to cover their costs of production (USAID, 2002). Low coffee profitability for these small growers further disincentivizes their level of farm investment and management, reinforcing their low adaptive capacity (Restrepo, 2020). While it is possible to sell small amounts of coffee at high prices, it is particularly difficult for smallholder farmers – often located in remote areas – to identify buyers (Restrepo, 2020).

Box 2.1 Employment in the Coffee Industry

Coffee farms typically employ a mix of laborers, including full-time work crews for year-round farm needs and temporary workers for the additional labor required during the busy harvest season. While minimum wage laws apply to full-time workers, pay for temporary workers depends on both the international price of coffee and on-farm production. The amount of their pay is based on the productivity of their labor, typically measured by the weight of beans picked per day (FEWS NET, 2016). As climate change decreases crop yield and quality (Pham et. al, 2019), earning potential and job opportunities for day laborers in the coffee sector have become increasingly limited (FEWS NET, 2016). The stability of year-long employment has also become more susceptible to the effects of climate change. For example, during the 2015/2016 crop year, climate change caused coffee crops to mature early and induced an early start to the harvest. The unpredicted shift in the harvest schedule and the compromised quality of the crops put many households out of work by January of 2016, especially in the lower-altitude coffee regions of western El Salvador (FEWS NET, 2016).

Unprecedented Migration Flows

Climate change impacts also contribute to higher internal migration rates within El Salvador. Most global climate-related migration occurs across short distances within countries, mainly due to internal migration's lower short-term costs relative to international migration (Stojanov et. al, 2021; Rigaud et. al, 2018). Typically, this has involved the movement of Salvadorans from rural areas with low agricultural productivity to either coffee plantations in regions of higher elevation or to urban centers where there are wider ranges of alternative employment opportunities and better services (Rigaud et. al, 2018; Falco et. al, 2018). In the past 20 years, El Salvador's rural population is estimated to have fallen from 41% of the country's total population to just over 26% (World Bank, 2018).

Environmental policy experts estimate that climate change could also compel nearly four million people to migrate from Mexico and Central America in the next 30 years (Rigaud et. al, 2018). While isolating

climate change as the primary driver of increased migration flows would oversimplify the multicausal nature of migration (Bates-Eamer, 2019), it is clear that climate change acts as a "threat multiplier" and that low coffee prices and sector-wide employment losses exacerbate the underlying social, political, and economic conditions influencing migration decisions (Viscidi, 2021; Muñoz-Pogossian and Chaves-González, 2021). In fact, a large body of Northern Triangle migrants cited factors such as climate shocks, food insecurity, and lack of economic opportunity as the primary reasons motivating their migration to the United States in 2018 (Sigelmann, 2019). Since 2019, unprecedented numbers of migrants fleeing the Northern Triangle countries of El Salvador, Guatemala, and Honduras have been apprehended at the U.S.-Mexico border (Sigelmann, 2019). Recent influxes in both regular and irregular migration have posed significant challenges for the United States, particularly in regards to migrant detention centers, treatment of migrants at the border, and general migration management (Cooley et. al, 2020; Congressional Research Service, 2022). As climate change continues to intensify preexisting levels of political corruption, food insecurity, and poverty in both El Salvador and Central America as a whole, it is likely that the United States will continue to be overwhelmed by regional surges in migration (Sigelmann, 2019).

Figure 5: The Self-Reinforcing Nature of Climate Effects

Marginalized Groups & Climate Vulnerability

The effects of climate change on agricultural productivity and employment exacerbate preexisting social grievances and resource scarcities in El Salvador, which tend to be more pronounced for marginalized groups (Bianco, 2020). The following section explains the disproportionate impacts of climate change on women, children, indigenous groups, and rural smallholders in greater detail.

Women

Climate change exacerbates the gender gap in coffee laborers' financial outcomes. Women's systematically lower access to resources such as extension services, financial assistance, and land compared to men translates to lower yields, productivity, and farm income for female coffee workers (International Coffee Organization, 2018). Women's limited access to credit perpetuates this gender gap by preventing female farm owners from attaining the financial capital necessary to invest in adaptive management practices and bolster their resilience to climate change (International Coffee Organization, 2018). In addition, women are often left alone to manage smallholder farms when men migrate in search of employment opportunities, subjecting them to the double burden of domestic tasks and farming activities (Viscidi, 2021; International Coffee Organization, 2018).

Children

Children in coffee-producing areas are vulnerable to climate change due to the correlation between child labor and climate-driven decreases in international coffee prices and farm profitability. Low levels of profits incentivize farmers to recruit child laborers as a means of cutting labor costs (Sachs et. al, 2019; International Coffee Organization, 2019; Speciality Coffee Association, 2019). In addition, El Salvador's weak enforcement of labor laws encourages children in agricultural households to work instead of attending school when their families need money (Sachs et. al, 2019). The financial impacts of reductions in agricultural productivity and employment also exacerbate national rates of food insecurity, leading to an increased incidence of chronically malnourished children in El Salvador (USAID, 2002). Finally, the deepening impacts of climate change on agricultural productivity limit the availability of economic opportunities for job-seeking youth in rural areas (Viscidi, 2021).

Box 2.2 The Critical Role of Women in the Coffee Sector

Worldwide, women are strong contributors to the coffee sector. Between 20-30% of coffee farms are female-operated, and women provide up to 70% of coffee-related labor in some regions (Sachs et. al, 2018; International Coffee Organization, 2018).

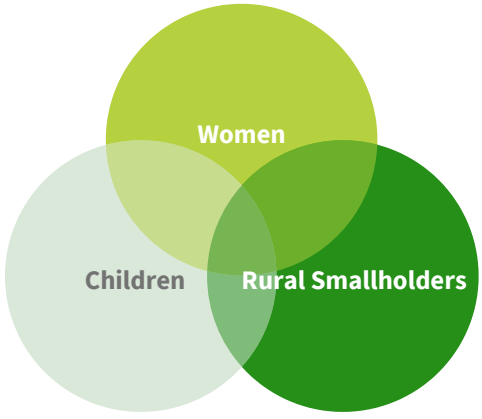


Figure 6: Marginalized Populations Vulnerable to Climate Change

Women, children, and rural smallholder farmers represent key populations that are most vulnerable to the effects of climate change in El Salvador. This is largely due to the ways in which climate-related losses in employment and income aggravate the existing social inequalities that these groups face. Coffee laborers that are members of more than one marginalized population (e.g., a female smallholder farmer) risk experiencing even higher levels of climate vulnerability.

Table 1: Marginalized Populations & Sources of Climate Vulnerability

Marginalized Group	Sources of Climate Vulnerability
Women	• Low access to extension services and land • Lower yields, productivity, and farm income compared to men • Limited access to the credit and financial capital needed to invest in climate-resilient agriculture • Often responsible for farms when men migrate in search of other employment opportunities
Children	• Increased risk of child labor • Work instead of attending school when family needs money • Increased incidence of chronic malnourishment • Limited availability of economic opportunities for job-seeking youth in rural areas
Rural Smallholders	• Lack agricultural infrastructure that can withstand variations in climate • Lower levels of formal education • Reliance on subsistence agriculture • Few alternative sources of income • Limited familiarity with price-setting mechanisms or the infrastructure needed to sell directly in local markets • Complete dependence on local middlemen to sell coffee crops • Receive payouts far below the costs of production • Shifts to urban labor markets limit accessibility to agricultural services • Limited migration opportunities due to low finances and remote isolation

Rural Smallholders

Smallholder farmers in rural communities typically face more difficulties in adapting to climate change relative to larger, wealthier farms. Oftentimes, rural farmers lack agricultural infrastructure that can withstand environmental variation, enhancing their vulnerability to the effects of climate change (Altieri et. al, 2019; Sachs et. al, 2019). Furthermore, rural communities tend to have lower levels of formal education, meaning that households whose livelihoods rely on subsistence agriculture have few alternative sources of income (Donatti et. al, 2016). Rural farmers also tend to have limited familiarity with either price-setting mechanisms or the infrastructure needed to sell their crops directly in local markets, rendering them completely dependent on local middlemen to sell their coffee crops. The prices paid out to farmers by these middlemen place smallholders at an economic disadvantage; recent payouts averaged around $60 USD/quintal, far below the costs of production (Fromm, 2022). Smallholder farmers are also at increased risk of climate-driven unemployment, since labor consolidation shifts to urban settings have limited their accessibility to markets and other agricultural services (Fromm, 2022; Fernández Kolb et. al, 2019). Finally, farmers in remote areas tend to have limited migration opportunities due to their financial situations and relative isolation from potential migration destinations (Rigaud et. al, 2018). These constraints on migration serve to further limit smallholder farmers' ability to respond to climate change.

Adaptation Strategies & Current Interventions

A wide variety of adaptive strategies exist to help coffee farmers cope with the stresses caused by climate change. These strategies range anywhere from short-term fixes, such as increasing the use of fertilizers, to long-term transformation efforts that include shade management, the use of more resistant seeds, and the promotion of agroforestry (Donatti et. al, 2016; Zong et. al, 2016).

Various national and international actors, recognizing the need for farmers to implement timely adaptation measures, have developed a multitude of interventions designed to support farmers in addressing climate change and sustaining coffee production in El Salvador. The Resilient Coffee in Central America project represents one example of an international program designed to promote a more robust coffee sector in the Central American region (Cuellar, 2020). Implemented by partners of the United States Agency for International Development (USAID) from September, 2017 to September, 2020, the Resilient Coffee in Central America project was designed to increase the livelihoods of coffee producing families in El Salvador, Guatemala, and Honduras. Through collaborative partnerships with key Salvadoran coffee institutions, including the Salvadoran Coffee Council (CSC); the Salvadoran Association of Beneficiaries and Exporters of Coffee (ABECAFE); the Alliance of Women in Coffee, El Salvador Chapter (AMCES); and the Cooperative of Coffee Producers of Ciudad Barrios (CAFECIBA), the Resilient Coffee in Central America project implemented a wide range of programming to help over 25,000 smallholder farmers generate greater incomes in the coffee sector (Cuellar, 2020).

LITERATURE REVIEW

Despite the existence of numerous strategies that support coffee producers in adapting to the short and long-term effects of climate change [See: Adaptation Strategies & Interventions], a substantial portion of El Salvador's coffee industry struggles to implement them (Sachs et. al, 2019; International Coffee Organization, 2019; van Rikxoort et. al, 2014). A growing body of literature indicates that a variety of systemic barriers prevent smallholder coffee farmers from undertaking the level of investments necessary to adequately respond to climate change (International Coffee Organization, 2019; Fromm, 2022; Sachs et. al, 2019; Altieri et. al, 2019).

The Salvadoran coffee sector's lack of effective industry-wide response to climate change suggests that there is an urgent need to increase directives that support smallholder farmers in building their capacity to adapt to future climatic conditions. This is especially critical for poor, small-scale producers, who typically experience the effects of climate shocks at higher levels than commercial farms with better access to financial resources and specialized tools (Vermeulen et. al, 2014; Bianco, 2020). By addressing the systemic obstacles that constrain smallholder farmers' ability to implement new management and production practices, reforms targeted at expanding individual farmers' access to either financial resources or technical expertise therefore have the potential to bolster smallholder farms' climatic resilience and enhance the sustainability of coffee production in El Salvador.

The following section reviews the existing research on factors that limit smallholder coffee farmers' ability to implement the adaptation strategies that are necessary for responding to climate change and protecting the future economic viability of their farms. Synthesis of this literature is followed by a review of the lessons learned from programming and stakeholder interviews in regards to developing farmers' adaptive capacities. Namely, studies indicate that best practices for cultivating climate resilience include expanding farmers' access to financial resources, increasing the availability of price risk management tools, and developing stronger migration pathways for those who choose to supplement their families' coffee income with remittances from abroad.

Figure 7: The Pathway to Climate Resilience

Defining and Measuring Climate Resilience

While there is no panacea for the multitude of climate-driven challenges affecting the Salvadoran coffee sector, it is widely recognized amongst agricultural experts that for farmers whose loss in land suitability is not prohibitive, adaptation is crucial (Stojanov et. al, 2021; Läderach et. al, 2013; Sachs et. al, 2019; Vermeulen et. al, 2014). Throughout the climate adaptation literature, a large body of research illustrates the role that effective use of climate-resilient agriculture (CRA) practices play – both in helping coffee farmers build resilience to climate shocks and in improving coffee quality and yield (Harvey et. al, 2018; Makuvaro et. al, 2018; Läderach et. al, 2013; Zong et. al, 2016; Rai et. al, 2018). Climate resilience is loosely defined as a system's ability to anticipate, prepare for, and respond to climate shocks in a manner that maintains the integrity of its essential characteristics and functions (Center for Climate and Energy Solutions, 2021; Zong et. al, 2016; Bianco, 2020). This ability to recover from disturbances spurred by climate change is associated with various benefits, such as strong economic returns to farmers, reduced social conflicts, and increased food security (U.S. Government Accountability Office, 2022; Zong et. al, 2016; Liu et. al, 2016; Rai et. al, 2018).

Building climate resilience cannot happen without farmers' use of climate adaptation strategies (World Resources Institute, n.d.). Numerous studies have linked higher levels of climate resilience to the implementation of adaptive farm management practices. While most smallholder coffee farmers in Central America recognize the negative impacts of climate change on their farms and livelihoods, less than half of them change their farm operations to adapt accordingly (Harvey et. al, 2018; Makuvaro et. al, 2018; Laderach et. al, 2013). This gap between perceptions of climate change and the consequent lack of adaptation strategy implementation is largely reflective of smallholder farmers' low capacity to adapt to changes in the first place (Harvey et. al, 2018; Tucker et. al, 2010; Burnham and Ma, 2016).

Overcoming Barriers to Building Adaptive Capacity: Lessons Learned

While both the importance of implementing adaptive strategies and the lack of climate adaptation amongst smallholder farmers is well documented, less work has been done to identify the efficacy of interventions designed to bolster farmers' ability to perform climate-resilient management practices.

Scholars of agricultural management practices are increasingly recognizing that the ability of farmers to employ CRA practices is constrained by their limited access to financial resources and their relatively low tolerance for risk. Besides low levels of capital which are even reinforced by climate change itself [See: Marginalized Groups & Climate Vulnerability], several studies have found that smallholder farmers' limited access to credit is largely due to many financial institutions' unwillingness to loan to farmers with low collateral. This is problematic for smallholder farmers, since CRA practices have been shown to require over three times as much financial capital compared to conventional farming methods (Zong et. al, 2016).

Other research expands on the notion of limited resources being a primary driver of incapacity to implement climate adaptation measures, arguing that coffee farmers possess considerable knowledge of interventions that might reduce risk (e.g. diversifying from coffee into alternative crops), but that such agricultural practices are costly in terms of time, labor, or financial resources (Eakin et. al, 2014; Shapiro-Garza et. al, 2019). This is illustrative of the common tradeoff that land-poor agricultural households face and that is widely identified in the prevailing literature: farmers can either prioritize costly, risk-averse strategies in hopes of realizing resilience to climate shocks in the long run or they can continue to pursue income from cash crops such as coffee with the chance that they could experience climatic volatility that characteristically harms agricultural productivity (Eakin et. al, 2012). Compounded by such factors as ownership of small plots of land, limited access to technological resources, and low levels of education (Harvey et. al, 2017; Harvey et. al, 2018; Shapiro-Garza et. al, 2019).

Insights surfaced from a growing body of climate adaptation literature point to several strategies that can be used to more effectively build adaptive capacity and target reduced climate vulnerability amongst Salvadoran coffee farmers. Namely, these measures include adjusting existing microfinance lending practices, developing stronger migration pathways, and expanding access to agricultural insurance schemes.

1) Adjustments to existing microfinance programs can enhance farmers' adaptive capacity and reduce vulnerability to climate risk

Growing interest in the role that microfinance institutions may be able to play in facilitating climate change adaptation has generated a wide range of studies that link microfinance to an increase in adaptive agriculture practices amongst farmers. The results of various studies have several implications for the design of strategies that build adaptive capacity for smallholder farmers across El Salvador (Harvey et. al, 2018; Braun et. al, 2000). For instance, government-organized visits of farmers from regions lacking technical expertise to areas where use of Ecosystem-based Adaptation (EbA) techniques is widespread could provide an opportunity for knowledge sharing via farmer-to-farmer exchanges and encourage the use of EbAs across smallholder farming communities (Harvey et. al, 2018; USAID, 2019).

Other authors contend that expanding access to financing through mechanisms such as the restructuring of debt or the provision of low-interest capital to finance the purchase, processing, and sale of coffee could bolster coffee production, quality, and profitability (Bacon et. al, 2008; USAID, 2019). Indeed, projects such as USAID's Resilient Coffee in Central America have included efforts to improve access to financing for small producers interested in adopting climate adaptation approaches using innovative but cost-prohibitive technologies and investments (USAID, 2019).

2) The advancement of labor migration as an adaptive strategy can strengthen climate resilience

Enhancing migration governance and capacity can redirect the prevailing narrative surrounding migration driven by climate change, which is often framed as a failure to adapt rather than as an adaptive strategy in itself (Kagan et. al, 2017). In addition to strategies such as enhancing smallholder farmers' access to human and financial capital or forging public-private partnerships, then, orderly migration can constitute an adaptive response insofar as the development of more regular migration channels for farmers forced to move can ensure decent employment opportunities and treatment elsewhere (Kagan et. al, 2017; Jha et. al, 2017).

Benefits from migration can be realized whether it occurs internally, regionally, or internationally. Research from farmer migration in India found a significant difference between internally migrating and non-migrating households responding to climate-induced livelihood risk factors (Jha et. al, 2017). The receipt of remissions and social capital from destination regions enhances migrants' adaptive capacity when household members migrate internally (Jha et. al, 2017). In addition to state-level migration adaptation, some scholars contend that Central American migration at the regional level has the advantage of 1) utilizing regulatory migration frameworks that already exist and 2) facilitating free movement of individuals between neighboring countries. In addition, the ability to coordinate among

states when shaping legislation allows the regional level to serve as laboratories for political solutions (Krieger and Panke, 2020). Indeed, the state-led process for addressing the protection of persons displaced due to climate change and disaster (as outlined in the Nansen Initiative) heavily emphasizes the role of the regional level in overseeing regulation of humanitarian protection mechanisms (Krieger and Panke, 2020; Platform on Disaster Displacement, 2016). In addition, the Nansen Initiative highlights that properly-managed migration has the potential to be an appropriate response to climate-induced effects, insofar as it can create new job opportunities and build capacity for future resilience through the transfer of remittances and other forms of capital, such as skills acquired abroad (Platform on Disaster Displacement, 2016).

Case studies specifically from El Salvador illustrate the role that enhancing channels for regular international migration will play in reckoning with environmental change (Lankenau Ahumada, 2021). Lankenau Ahumada posits that the expansion of legal pathways for international climate migrants from the Northern Triangle countries of El Salvador, Honduras, and Guatemala would increase the human security and protection of migrants in addition better respond to climate displacement in the first place, effectively positioning involved countries to advance the Sustainable Development Goals (2021).

Limitations to the Literature

The primary focus of this literature review is to survey the existing adaptation strategies that can be used to promote climate resilience amongst El Salvador's vulnerable coffee sector, identifying both effective practices and the ways in which gaps in existing frameworks can be remedied. Despite the wealth of literature pertaining to climate change and its impact on El Salvador's coffee sector, few published studies conduct thorough analyses on how climate variability interacts with labor migration. Moreover, the literature examining migration as an adaptive strategy is constrained by the prevailing narrative that views migration as a sign of failure to adapt to changing climatic conditions. Finally, additional research centered specifically on El Salvador – as opposed to Northern Triangle countries as a whole – would further inform policy alternatives and generate a richer discussion on future practices for the International Labour Organization.

EVALUATIVE CRITERIA

A final policy recommendation for the ILO will be produced by evaluating each of the three proposed policy options against the set of criteria outlined below.

Cost

Cost is assessed by estimating the upfront monetary costs associated with developing and implementing each policy option, including costs to the federal government, state governments, and hospitals at both the spending and implementation levels. When possible, cost will generate a quantitative sum that will be reflected as a total USD amount. For policy alternatives with less cost data available, a qualitative measurement will be determined according to existing qualitative research. All alternatives will receive a ranking of either High, Medium, or Low, with High indicating high estimated costs and Low indicating low estimated costs.

Effectiveness

Effectiveness is measured in terms of each policy option's projected ability to support farmers in building adaptive capacity and climate resilience. Each policy is assigned a ranking of either High, Medium, or Low. A policy with a High rating builds coffee farmers' adaptive capacity and resilience, preparing them to respond to future climate shocks. A policy with a Low rating indicates that the policy either does not address climate-driven employment losses or does so in a manner that can not be sustained in the long run. Since highly effective policies avoid running the risk of climate-driven employment losses reappearing in the future, this criterion is given a higher consideration than cost.

Equity

Equity is calculated by assessing whether the alternative is structured to provide benefits to groups that are traditionally most vulnerable to the effects of climate change, including rural smallholders, women, and children. This criterion translates to a qualitative measure rating the level of equity as either High, Medium, or Low, with High meaning that the policy supports marginalized populations, and Low meaning that the policy disproportionately harms them. While highly effective policies avoid running the risk of climate-driven employment losses reappearing in the future, if a policy is structured to ignore or even harm vulnerable populations, certain groups will never get the opportunity to reap the benefits of policies that may be effective for Salvadoran coffee farmers at large. Thus, this criterion is considered the highest priority and highly equitable policies will be viewed most favorably.

POLICY ALTERNATIVES & EVALUATION

1 Collaborate with microfinance institutions to enhance farmers' access to credit

This alternative would entail ILO collaboration with MFIs in order to increase the current levels of microfinance support (in the form of small business loans) for smallholder farmers. In theory, expanded access to financial capital will enhance smallholder farmers' adaptive capacity and increase resistance to climate-driven job losses, as evidence suggests that the lack of economic resources is one of the main constraints in their ability to adapt and respond to climate change (Castro, 2016; Ovalle-Rivera, 2015). Implementation of this alternative would involve ILO coordination with Salvadoran microfinance institutions such as Fedecredito, a cooperative consisting of 55 credit unions and banks. By encouraging the expansion of microfinance support, the ILO would help farmers begin to implement costly risk-averse agricultural strategies that would contribute to long-term resilience against climate shocks.

Cost

The costs associated with expanding microfinance support vary widely depending on the amount of financial support provided, the terms of the loans, and the number of farmers that will be granted eligibility for microfinance loans. Apart from the costs associated with the loans themselves, supply-side costs involving the personnel used to screen potential clients, prepare appraisal reports, approve or deny loans, and disburse and monitor loans must also be considered. The costs of expanded microfinance support will therefore be portrayed in a range, from least costly projections to most costly projections. Data from a study on rural financing in El Salvador suggests that just 12 percent of rural households reported access to loans from either formal or semiformal sources since 2000 (Buchenau and Meyer, 2007). Using projections from the World Bank and the International Finance Corporation, efforts to grow the portfolio of El Salvador's largest federation of credit unions by just 25% and establish a funding platform specifically targeted at rural coffee farmers would provide over 30,000 smallholder farmers and micro-, small-, and medium-scale enterprises (MSME's) with credit, but total loan costs would range anywhere from $30 million (McGuire, 2018) to $56 million (Huybrechs, 2018). Because the cost of this policy ranges between $30M to $56M, it ranks High on cost. These total costs can be diffused across various microfinance institutions.

Effectiveness

The effectiveness of expanded microfinance support for rural smallholder farmers is projected using data from a 2018 study that identified the extent to which a microfinance project titled Proyecto CAMBio influenced on-farm environmental adaptations by rural smallholder farmers in El Salvador (Huybrechs, 2018). In the study sample, Proyecto CAMBio participants received loans ranging from $2,282.9 USD to $3066.4 USD. The study found that the use of the credits was focused primarily on coffee plot renovation

and investments in larger areas of the farm and that participants designated an average of 2.07 hectares of their farm land to "intervention areas" (Huybrechs, 2018). Nearly 99% of participants claimed to have implemented environmental adaptation practices as a result of access to credit. The results of the study further suggest that access to credit for coffee farmers generated significantly different average results in terms of increased environmental performance as compared to non-credit receiving coffee farmers. At the same time, however, the study's small sample size (n = 120) makes it difficult to draw statistically powerful conclusions. Regardless, the implications of the study suggest that increasing smallholder coffee farmers' access to microfinance support leads to the increased adoption of environmental adaptations and consequently enhances farmers' capacity to adapt to climate shocks. In addition, the employment of these strategies allows farmers to build long-term resilience and prepare them for future weather-driven crises. Therefore, I rank this alternative **High in effectiveness.**

Equity
The results of several studies suggest that an expansion of microfinance loans to intentionally include rural farmers' and improve their access to credit would greatly benefit various marginalized groups (Buchenau and Meyer, 2007). Often, rural farmers are excluded from microfinance credit due to challenges associated with lending to rural people, including higher transaction costs, more volatile cash flows, complex financial environments, and greater vulnerability of rural households, which tends to encourage consumption smoothing (balancing spending and saving) during times of climate-driven agricultural losses, rather than the purchase of investment loans. The results of several studies conclude that the expansion of microfinance loans to rural farmers also has a positive impact on other marginalized populations such as women. The proportion of women borrowers on rural farms in El Salvador in 2006 was just 27%, compared to the 73% of women borrowers in urban areas (Buchenau and Meyer, 2007). By targeting rural farmers and increasing women's disproportionately low credit use, the adaptive capacity of the group most vulnerable to climate change will be developed and the provision of financial support to vulnerable populations will help them build coping capacities and the ability to adapt to the growing needs of climate change (Dowla, 2018). This alternative therefore ranks **High in equity.**

2 Expand smallholder farmers' access to agricultural insurance

Outside of loans that can be used to increase farmer investment in climate adaptation and resilience-building strategies, disaster risk insurance can play a vital role in bolstering farmers' capacity to adapt to changing climate (Viscidi and Vereen, 2022). While available agricultural insurance in El Salvador can act as a form of financial protection against extreme weather events, it is largely accessible only to large agribusinesses. For rural and smallholder farmers, common barriers to accessibility such as lack of knowledge and high premiums prevent them from obtaining insurance and place them at higher risk for employment shocks in the events of extreme weather. This policy alternative would entail the ILO endorsing both microfinance-providing NGOs and state-owned institutions such as El Banco de Fomento Agropecuario to provide financially accessible insurance plans to smallholder farmers that offer payouts in the event of weather-related disasters. In particular, insurance premiums would be made affordable to smallholder farmers and tied to institutions that they trust, with a potential campaign to promote farmer learning during early rollout stages.

Cost

Costs of agricultural insurance expansion also vary widely depending on various factors, including region, altitude, production intensity, rain, amount of land, and temperature (Capitanio, 2020). Traditionally, crop insurance is relatively expensive to administer due to policies needing to be customized to localized factors such as regional geographical conditions and weather patterns. These customizations also generate high monitoring costs and high premiums because it is difficult for companies to diversify risk throughout such a small region (International Monetary Fund, 2006). Indeed, agricultural insurance is generally much more costly than other forms of insurance, since companies have to gather significant amounts of data on climate, production, yield distributions. These costs are escalated in rural settings, where the client base is dispersed (Inter-American Development Bank, 2005). In addition, many smallholder coffee farmers in El Salvador are poor and lack financial capital, increasing transaction costs. While data pertaining to specific costs of agricultural insurance are limited, these relatively high administrative costs nonetheless ranks this policy **High in cost.**

Effectiveness

While agricultural insurance can enhance farmers' risk tolerance and incentivize them to implement climate-adaptive strategies, a growing body of literature identifies difficulties on both the supply and demand side of agricultural insurance that may impact its ability to correct climate-driven employment losses. Prospective insurers may face prohibitive start-up and monitoring costs, and smallholder farmers constrained by cash and sensitive to prices may be hesitant to trust unfamiliar financial institutions (Burke et. al, 2010). In the roughly 30 developing countries where index-based agricultural insurance schemes have been implemented, these difficulties have limited farmer take-up rates and made expansion slow. Moreover, significant impacts have only been documented when private or public sector investment is sustained and insurance payout designs continue to be innovative and responsive to local needs (Burke et. al, 2010; Feed the Future, n.d.). Since agricultural insurance has been documented to enhance farmers' capacity for risk and enable them to undertake long-term climate mitigation strategies but evidence on take-up rates is mixed, this alternative ranks **Medium in effectiveness.**

Equity

Similar to the expansion of microfinance loan support, the expansion of agricultural insurance availability to rural smallholder farmers enhances equity by targeting policy benefits at farming groups that are traditionally most vulnerable to agricultural losses caused by climate change and have historically been left out of nationwide agricultural insurance programs. Numerous studies illustrate the positive impacts of agricultural insurance for women in particular, since women farmers often find themselves in vicious cycles of low access to institutional insurance (Jain, 2021). At the same time, however, significant differences in insurance preferences between men and women farmers may hinder policy equitability. A study of gendered differences in a Bangladeshi agricultural insurance program, for example, found that gendered differences in farmers' level of trust and financial literacy were key drivers of insurance preferences between men and women (Jain, 2021). Without additional measures to strengthen insurance institutions' credibility or increase financial literacy for female farmers, then, this policy may even widen the gap between male and female farmers' adaptive capacity and increase womens' already disproportionate levels of vulnerability to climate change. This policy therefore ranks **Low in equity.**

3 Promote labor migration benefits through migration advocacy

Bolstering access to legal migration channels – both internal and external – would enhance labor migration benefits such as increased household access to social and financial capital. These labor migration benefits have been shown to reduce employment losses by increasing climate resilience in origin farming communities and catalyzing the adoption of adaptive innovations through the transfer of agricultural knowledge, remittances, and technology (Scheffran et. al, 2012). Indeed, migration pathways between destination communities and home communities can equip smallholder Salvadoran coffee farmers with the flexibility, diversity, and creative capacity needed to address climate stressors that cause job losses. Migration advocacy falls under the ILO's existing advocacy and awareness activities, including the promotion of a positive image of migrant workers and the empowerment of those who choose to migrate.

This alternative redirects the narrative that climate migration is a failure to adapt, rather than an adaptive strategy in itself. Legal migration to foreign destinations can increase farmers' access to social and financial capital and ensure decent employment elsewhere. Internally, eliminating obstacles to migration within El Salvador signals that farmers are entitled to the right to stay in their home country and obtain appropriate work elsewhere if needed. In addition, this alternative aligns with the ILO's existing strategies of working with governments, employers, and workers' organizations to improve labor migration policies that benefit both countries of origin and destination. This alternative would include policies in destination areas, policies in origin areas, and policies oriented toward the process of migration. More specifically, this alternative entails advocacy for more effective labor laws and regulations, the incorporation of relevant language to protect against deportation, and the establishment of fair recruitment mechanisms for migrant workers.

Cost

Migration at the individual or household level is associated with high costs and high barriers to entry for certain low-income families. Sending a family member abroad involves large financial sacrifices for typical households, with many families going into debt and selling assets in order to raise necessary funds (Rivera, 2022). Research finds, however, that migration costs are usually fully recovered within just 14 months and that additional remittances sent back to farming families in El Salvador represent net gains. For low-income farming families, income from remittances increases their income that they would otherwise receive by more than 200% (Rivera, 2002). Thus, even though migration is associated with large initial costs, the potential for remittances to generate net gains for migrating family members makes this alternative rank **Low on cost.**

Effectiveness

Evidence from studies of climate migration impacts indicates that explicit efforts to connect migration with disaster risk reduction and resilience can represent an effective adaptive strategy to respond to climate change (Schwerdtle et. al, 2018; McLeman and Hunter, 2010). One exploration of case studies from well-known climate migration corridors in West Africa and the Caribbean found that migration in this context was closely tied to climate adaptation processes in origin communities when individual family members sent remittances from earned income back to their rural homes (McLeman and Hunter, 2010). Other households that sent children to stay with relatives elsewhere during dry seasons where agricultural losses were abundant were able to mitigate climate-induced job losses and reduce further pressure on households by limiting household resource use (McLeman and Hunter, 2010). Additional

evidence that the labor benefits driven from climate migration can bolster resilience by enabling communities to absorb climate shocks comes from research on economic decisionmaking amongst agricultural households. These studies measured the land use allocations, agricultural input use, and agricultural asset accumulations of Salvadoran farming households where at least one household member migrated and transferred remittances back home. The findings support the notion that this alternative is effective because remittances can motivate households to pivot from commercial cash crops such as coffee towards subsistence food crops (Damon, 2011).

While migration can serve as an adaptive mechanism to respond to climate change, it addresses climate-driven employment losses in a manner that may not be able to be sustained in the long-term. Indeed, even if labor migration policies were expanded, the needs of rural farmers who are unable to afford migration or who may not want to migrate are left unattended to and they may continue to experience job loss. This policy therefore ranks **Medium in effectiveness.**

Equity

While labor migration benefits can help coffee farmers mitigate climate-driven job losses, lack of adequate resources dedicated to planning and preparing for migration could exacerbate existing economic and social inequalities and further harm marginalized farming groups. Higher migration rates are correlated with increasing numbers of natural weather disasters and declining incomes, but also higher education (Klaiber, 2014). This means that low-educated farmers face initial barriers to migration and the differential migration capacity for different farming groups needs to be accounted for. Furthermore, gender differences are also observed in migration patterns – because demand in destination areas is higher for male workers, women are excluded from adaptive migration despite being more vulnerable to environmental risk (The Government Office for Science, London, 2011). Without addressing some of the financial, gender, or educational barriers that prevent certain marginalized groups from participating in adaptive migration, these groups may be disproportionately harmed by the policy alternative as other groups who can afford to migrate are able to reap the benefits of labor migration. In addition, migrating families tend to be the ones most impacted by climate change. While migration can serve as a strategy to respond to negative income effects, recent bodies of literature are beginning to question why these most vulnerable farming populations ought to be the ones that have to leave. As a result, this policy ranks **Low in equity.**

Table 3 below summarizes the information discussed above. Cost is ranked on a Low to High scale, with high rankings corresponding with high dollar amounts. Effectiveness and equity are also ranked on a Low to High scale, with high equity and effectiveness estimates corresponding with high rankings. For effectiveness and equity, these values are then taken into deeper consideration and prioritization, due to the reasoning outlined in the Criteria section.

Table 3: Outcomes Matrix

Policy Option	Cost	Effectiveness	Equity	Total
1: Microfinance loans	High	High	High	Best
2: Agricultural insurance	High	Medium	Low	Worst
3: Migration advocacy	Low	Medium	Low	Second best

RECOMMENDATION

I recommend that the International Labour Organization implements Policy Alternative 1: Use microfinance loans to adapt smallholder farmers' adaptive capacity, as it eliminates some of the financial barriers that disincentivize poor rural farmers from investing in long-term climate adaptive strategies and remedies the disproportionate vulnerability to climate change that is experienced by marginalized farming populations. While upfront costs may be high, high effectiveness and the ability of farmers to build long-term resilience to climate change under this alternative means that costs are saved in the long run. Unlike migration, equipping farmers with the financial resources necessary to adopt climate adaptation strategies fully targets the issue underlying climate change impacts on agriculture and the lack of response amongst Salvadoran coffee farmers: the financial capital necessary to increase risk-tolerance and invest in new technologies and equipment. This will contribute to the overarching goal of building climate resilience amongst farmers and allow farmers to build the adaptive capacity needed to implement appropriate farm management strategies. The reasoning behind this recommendation can be seen in Figure 8 below.

Figure 8: Targeting Systemic Barriers as a Critical First Step in Building Climate Resilience

IMPLEMENTATION & KEY CONSIDERATIONS

As climate migration is unlikely to occur uniformly across rural livelihood zones, regional differences must be taken into account to strengthen adaptive capacity and avoid distress migration.

As part of the implementation process for increasing microfinance loan support to Salvadoran coffee farmers, the ILO should collaborate with MFIs in El Salvador to educate MFI leadership about the importance of using microfinance to enable farmers to adopt necessary climate adaptation strategies. While some MFIs may be resistant to increasing loan availability to low-income coffee farmers who may be viewed as high-risk borrowers, the ILO can overcome potential MFI buy-in issues by emphasizing how the lack of climate adaptation may impact their own portfolios (Dowla, 2018). The ILO can also assist MFIs in securing extra funding from other major global funds or institutions, which would defray anticipated costs for MFIs and further increase buy-in (Dowla, 2018). Additional steps that the ILO should take include teaching MFIs how to "climate-proof" their existing financial services, meaning that MFIs would change the delivery of their loan products to ensure that borrowers can still sustain income once climate change impacts begin to take place. Typically, this would mean that MFIs would incorporate flexible loan repayment schedules into their lending contracts.

Indeed, climate-proofing loan products has worked to increase loan take-up rates in cases where traditionally rigid repayment schemes would otherwise discourage borrowers from participating (Dowla, 2018; Shoji, 2010). In Bangladesh, for example, most MFIs allow borrowers to reschedule payment installments during flooding seasons or to renegotiate contracts when they face repayment problems (Dowla, 2018).

Finally, the ILO should collaborate with MFIs to develop training sessions and awareness campaigns for potential borrowers. MFIs in Brazil, Nicaragua, and Mali offer such complementary services to their loan products and have been successful in fostering environmental adaptation education amongst borrowers (Moser and Farias, 2014).

Potential Pitfalls

Other potential pitfalls for this policy include lack of buy-in from the farmers themselves. While research on microfinance efficacy indicates that farmers may be resistant to microfinance loans if trust between farmers and microfinance lending institutions is not established, the ILO can mitigate this resistance and

generate farmer take-up by encouraging MFIs to scale up existing outreach to target groups of farmers rather than individuals. Evidence from other MFIs finds that group lending can mitigate information gaps between borrowers and lenders to encourage loan take-up (Barr et. al, 2007; Schurmann and Johnston, 2009). In addition, group pressure has even been shown to increase loan repayment rates (Barr et. al, 2007), generating a win-win situation for MFIs and farmers.

In addition, research shows that women are traditionally excluded from access to extension services and are less likely to attend trainings or receive visits from extension agents (International Coffee Organization, 2018). Therefore, a gender-sensitive approach to supporting increased farmer productivity might include using women agronomists and trainers, and scheduling training sessions at times and locations that are accessible for women (Sachs et. al, 2019).

Suggested Timeline for Policy Rollout & Evaluation

Necessary steps for the ILO to take to move this recommendation forward therefore include coordinating with MFI leadership and management, teaching MFIs how to climate-proof their products, and developing training sessions and awareness campaigns for potential borrowers at both individual and group levels. In order to measure and track microfinance impact and identify challenges that may arise, monitoring and evaluation procedures should be conducted throughout the duration of the policy timeline. An outline for the suggested policy rollout sequence can be found below.

Figure 9: Suggested Sequence for Policy Rollout

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