

Between Power, Relationships and Landscape in Puerto Rico's Coffee Sector

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ABSTRACT

BETWEEN POWER, RELATIONSHIPS AND LANDSCAPE IN PUERTO RICO'S COFFEE SECTOR

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Hurricane Maria hit Puerto Rico in September 2017 and devastated the island's agricultural industries, most notably the coffee sector. Since the hurricane, there has been growing public and private sector interest in replanting coffee trees and revitalizing the coffee industry. Both the public and private sectors have contributed to the replanting of Puerto Rico's coffee lands in various development projects. Many actors have become involved in the replanting activities, but with limited collaboration and excessive bureaucracy. This thesis investigates how power in Puerto Rico's coffeelands has been renegotiated due to the multi-sectoral replanting project and the implications of this power reorganization on the future sustainability of Puerto Rico's coffee landscape. Through a qualitative analysis using Actor-Network theory, I posit that Puerto Rico's coffeelands are experiencing a reorganization of power between human and nonhuman actors and have become the site of political and social tension. Since their early stages, the coffee sector revitalization efforts have been fractured and bureaucratic, and the introduction of new coffee seeds has intensified this. Public and private actors operate within a complex network of power relations and frequently work at odds or against each other. I conclude the thesis with recommendations for greater collaboration between actors and future coffee varietal selections for farmers.

RESUMEN

El huracán María impactó a Puerto Rico en septiembre del 2017 causando la muerte de casi 3,000 personas, la destrucción de infraestructuras críticas, dejando a millones sin electricidad y destruyendo las industrias agrícolas de la isla (George Washington University, 2018). A través de la historia, las siembras de café han sido vulnerables ante las catástrofes naturales y cambios climáticos y los estimados iniciales luego del huracán María encontraron que aproximadamente 80 por ciento de las cosechas fueron afectadas (Robles & Ferré-Sadurní, 2017). Desde el huracán, los sectores públicos y privados han tenido un crecimiento en su interés de volver a sembrar café lo cual incluye la revitalización de la industria del café con un enfoque en el desarrollo sostenible y la agricultura frente al cambio climático y los desastres naturales. Tanto el sector público como el privado han contribuido en la replantación de las tierras cafeteras de Puerto Rico en varios proyectos de desarrollo. Muchos actores se han involucrado en las actividades de replantación, pero con una colaboración limitada y una burocracia excesiva. La importación y la siembra de una nueva variedad de café en Puerto Rico ha generado conflictos entre estos actores.

Esta tesis investiga la reestructuración y la renegociación del poder en los cafetales de Puerto Rico como resultado del proyecto de replantación multisectorial y sus implicaciones en la sostenibilidad futura de la industria cafetalera de Puerto Rico. La tesis explora las transformaciones del poder en los cafetales a través de la distribución y el cultivo de plántulas de café donadas. Los objetivos de la investigación son: a) Comprender e identificar eventos y actantes humanos y no humanos en el proyecto de replantación de café en Puerto Rico entre 2017 y 2020 a través de un análisis horizontal; b) Determinar y analizar los principales actores y

iv transformaciones en las relaciones de poder, intereses, legitimidad y colaboración en el proyecto de replantación; c) Hacer recomendaciones para un mejor funcionamiento de los esfuerzos de colaboración entre actores públicos y privados. Los datos se recopilaron a través de una combinación de fuentes de noticias primarias, revistas especializadas y literatura gris. En este proyecto, se realiza una evaluación y análisis cualitativo de las relaciones de poder utilizando la teoría Actor-Network.

En la tesis postulo que los cafetales de Puerto Rico están experimentando una reorganización del poder entre actores humanos y no humanos y se han convertido en un lugar de tensión política y social. Los esfuerzos del proyecto de revitalización del sector cafetero han sido fracturados y burocratizados desde sus primeras etapas, y esto se ha intensificado con la introducción de nuevas plántulas de café. Los actores públicos y privados operan dentro de una compleja red de relaciones de poder, y frecuentemente trabajan en desacuerdo o enfrentados unos contra otros. La falta de organización y colaboración entre los actores del proyecto de replantación no ha brindado una ayuda significativa a los productores de café. Además, los cultivares de café seleccionados para ser cultivados en los cafetales de Puerto Rico después del huracán son representativos de las ideologías del desarrollo y la modernización agrícola de la isla. La tesis concluye con recomendaciones para un mayor apoyo público y cohesión de la industria, así como futuras selecciones de variedades de café para los agricultores.

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TABLE OF CONTENTS

Abstract	ii
Resumen.....	iii
Acknowledgements	v
Table of Contents	vi
List of Tables	vii
List of Figures	viii
Chapter 1: Introduction	1
Chapter 2: Theoretical Framework & Literature Review	5
Coffeelands through an Interdisciplinary Lens	6
Actor-Network Theory	8
Theories of Power	9
The Global Coffee Industry: Events and Trends	11
<i>Modernization of Production</i>	12
<i>Industry Vulnerability</i>	16
Coffee Production in the Neoliberal Era	19
Chapter 3: Contextual Overview	22
Chapter 4: Methodological Considerations	28
Theorizing Power and Relationships in the Coffee Value Chain	29
Power, Positionality & Reflexivity	30
Data Selection, Collection and Analysis	31
Overview of Data and Networks	34
Chapter 5: Analysis of Power and Cropscales	49
After the Hurricane: An Outline of Fragmented Actor Responses	49
Situating the Puerto Rican Replanting Initiatives	53
Coffee Cultivars as Non-Human Actors and Sources of Contention	55
<i>Coffee Varieties in Puerto Rico</i>	59
<i>Selection of the Marsellesa Variety</i>	62
The Emergence of Complex Power Relations	63
<i>The Role of the Federal Government</i>	64
<i>Excessive Bureaucracy in el Departamento De Agricultura</i>	65
<i>Private Sector & Non-Government Organizations</i>	69
Chapter 6: Recommendations & Conclusion	76
Works Cited	81

LIST OF TABLES

<i>Table 4.1: Key Themes in Puerto Rico’s Coffee Sector Replanting Project</i>	33
<i>Table 4.2: Nominal Identification of Actors and Networks in Replanting Project</i>	35
<i>Table 4.3: Nominal Identification of Actors and Networks Outside of Replanting Project</i>	45

LIST OF FIGURES

<i>Figure 3.1:</i> Coffee Production in Puerto Rico 1961-2019	25
<i>Figure 3.2:</i> Coffee Producing Zones of Puerto Rico.	26
<i>Figure 4.1:</i> Actors & Networks in Puerto Rico's Coffee Replanting Project	48

Chapter 1: Introduction

In September of 2017, Hurricane Maria wreaked havoc on the island of Puerto Rico and was the strongest storm to hit the island in nearly a century (Acevedo, 2020; Fritz, 2017). The hurricane destroyed critical infrastructures, left millions without electricity, and caused the death of almost 3 000 people (George Washington University, 2018). Hurricane Maria also devastated Puerto Rico's agricultural infrastructure, notably the coffee industry. Various reports cite the damage to coffee plants to vary amongst farms, ranging from 20 to greater than 80 percent of coffee plants damaged or destroyed (Mariño *et al.*, 2018; Perfecto *et al.*, 2019).

In Puerto Rico, as in much of the Global South, after a natural disaster occurs, the post-disaster landscape is often a space for change and transformations of power (Blackburn, 2018; Cretney, 2019; Pelling & Dill, 2010). The landscape often changes because the impacts of natural disasters and climate shocks frequently exacerbate pre-existing cumulative vulnerabilities and resiliencies from complex socio-environmental relations (Bacon *et al.*, 2017; Eakin *et al.*, 2009; Guido *et al.*, 2020; Pelling & Dill, 2010).

Due to the widespread destruction of the hurricane on Puerto Rico's agriculture, there has been growing public and private sector interest in coffee sector replanting and revitalization, focused on sustainable development and farming in the face of climate change and natural disasters. Both the Government of Puerto Rico and multinational corporate actors have turned to the donation of funding and coffee seeds and replanting of coffeelands as a response to this industry vulnerability. How have public and private endeavours to ensure coffee sector

sustainability and recovery contributed to the transformation of landscape and power in Puerto Rico's coffee sector?

This thesis explores the transformations of power and place in Puerto Rico's coffee landscape post-hurricane Maria through the distribution and cultivation of donated coffee seeds in public and private replanting projects. Specifically, I argue that Puerto Rico's coffeelands are experiencing a reorganization of power between human and nonhuman actors and have become the site of political and social tension. The replanting efforts have been fractured and bureaucratic from the start, and introducing a new coffee varietal to the island has compounded this fragmentation. Both public and private actors operate in a complicated power matrix and frequently work against each other. These findings have important implications for the future sustainability and longevity of Puerto Rico's coffee sector in the wake of climate change and natural disasters.

I begin with an outline of the roles of various actors and situate the Puerto Rican replanting initiative within the broader context of coffee replanting and development projects. I discuss the role of nonhuman actors in the changing coffee landscape and analyze the complex power matrices that have emerged with the coffeelands revival initiatives. This chapter explores the complex and varied ways the replanting project and coffee cultivars are conceptualized through political agendas and social struggles by using a combination of information and primary data from Puerto Rican news sources, grey literature and academic articles. My central research question for this study asks: How has power in Puerto Rico's coffeelands been restructured and renegotiated as a result of the multi-sectoral replanting project, and what are the implications of this power reorganization on the future sustainability of Puerto Rico's coffee

industry? This research aims to gain a deeper understanding of the power dynamics in the Puerto Rican coffee and coffee replanting initiative, aiming to identify the mechanisms and partnerships that may enhance collaborations between the public and private actors in Puerto Rico's coffee industry. The specific objectives of my research are a) to understand and identify events and human and nonhuman actants in Puerto Rico's coffee replanting project from 2017 – 2020 through a horizontal analysis; b) to determine and analyze the main actors and transformations of power relations, interests, legitimacy, and collaboration in the replanting project; c) to make recommendations for better functioning of collaborative efforts between public and private actors.

However, to attend to my research questions and objectives, it is essential to explore the compound and interconnected topics of landscape transformation, agricultural systems, and development projects in greater depth. Thus, Chapter Two evaluates the existing literature and theoretical frameworks, creating a foundation for my research project. Specifically, I utilize an interdisciplinary approach to understanding the coffee landscape that incorporates perspectives from historical geography, political ecology, political economy, and Development studies.

Chapter Three provides a contextual overview of historical power dynamics in Puerto Rico's agricultural sector and the impact of Hurricane Maria on the coffeelands. The chapter considers continuing divisions between government, multinational corporations and coffee producers. I conclude with a brief overview of the present situation concerning the donation of seeds and the main actors involved.

Chapter Four provides a comprehensive explanation of the theoretical and methodological challenges I faced while collecting and analyzing data for my research project. This thesis employs an interdisciplinary framework as a strategy for research. This chapter considers my experiences engaging in data collection and inquiry from primary news sources and grey literature, the main research techniques I used for this study. In this chapter, I also engage in a reflexive process examining my positionality as a researcher and representing the issues at hand.

Chapter Five explores the foundation of the multi-sectoral recovery initiative and the donation, promotion, and coded meanings of different types of coffee cultivars by public and private actors. A complex network of actors and power has emerged due to the donation and planting of coffee seedlings. The discussion is centred on the debates between human and nonhuman actors and the implications for Puerto Rico's future coffee land-use decisions and agricultural practices. Bureaucratic dimensions and roadblocks hamper the distribution and management of the coffee seedlings. Additionally, issues of contention are raised about introducing a new varietal into the island and the inaction and criticism of the local government.

Finally, Chapter Six closes my thesis by recommending enhanced collaboration between public and private actors and policy measures to improve replanting outcomes.

Chapter 2: Theoretical Framework & Literature Review

My research seeks to understand how the coffee replanting project in Puerto Rico after Hurricane Maia has become a site for reorganizing and restructuring power relations in the coffee landscape between human and nonhuman actors. In this development project, public and private agendas and donations of coffee seedlings are changing the future of Puerto Rico's coffee farms. The island's coffee industry is embedded in a system influenced by relationships determined by human and nonhuman actors and networks of power. To further explore Puerto Rico's coffee sector revival initiative and to determine the historical, social and political context of relationships between stakeholders, I utilize a combination of conceptual frameworks. These multiple theoretical perspectives inform my interpretation of matters within the global coffee industry, agricultural modernization and development while focusing on my research project's objectives.

Global value chains and agrifood systems involve the intersection of the economy, environment, politics, and society (Alarcon *et al.*, 2021, Schutter, 2019). My research draws upon multiple discourses and theoretical perspectives to provide an interdisciplinary and inclusive analysis of these interactions. Thus, to create a comprehensive theoretical framework, I draw upon literature from Historical Geography (Pred, 1984), Political Ecology (Méndez, 2008; Murdoch, 1998; Paulson *et al.*, 2003; Perfecto *et al.*, 2019; Rice, 1999; Watts & Scales, 2015), Political Economy (Grabs & Ponte, 2019; Raynolds, 2002), and Development Studies (Bebbington 2000, Escobar, 2011). Within this body of literature, I rely on analytical frameworks utilizing Actor-Network theory and theories of power as a tool to systematically

examine relationships and interactions in the coffeelands between human and nonhuman actants (Bray *et al.*, 2019; Grabs & Ponte, 2019; Watts & Scales, 2015).

In the subsequent section, I present an extensive review of the significant literature associated with my research topic. I begin by positioning my thesis within an interdisciplinary theoretical framework that analyzes institutional processes and the transformation of landscapes and power in global value chains. I follow with an overview of the literature on events, trends and themes in the contemporary global coffee industry, focusing on green revolution coffee production, vulnerability, and sustainable development. I conclude the chapter with a review of power and analysis theories for stakeholder interactions in the global value chain. Through this examination, I address the gaps that have been identified in the literature on these interrelated discourses.

Coffeelands through an Interdisciplinary Lens

Scholars from various disciplines advocate for interdisciplinary approaches to coffee landscape research (Méndez, 2008; Westphal, 2008). As the topic is continually discussed in various discourses and disciplines, coffee production and related matters can be understood as a significantly interdisciplinary subject relevant to scholarly research and analysis. Based on this call for an interdisciplinary approach to the study of coffeelands, utilizing a singular discipline or conceptual framework would result in a study that does not consider all aspects of the research problem (Méndez, 2008; Westphal, 2008).

According to seminal works by Pred (1984), the coffeelands can be understood as “linking the appropriation and transformation of space and nature, and that is inseparable from the reproduction and transformation of society in time and space” (p. 279). Thus, by considering the

coffee landscape as a historically contingent “place of process,” utilizing a theoretical framework will best capture the depth of analysis necessary for this study (Pred, 1984; Rice, 1999). Various research identifies the nature of the landscape mosaic as embedded within social and ecological relations between people and nature (Bray *et al.*, 2019; Méndez, 2008; Pred, 1984; Perfecto *et al.*, 2019; Rice, 1999). Landscapes are built upon resources struggles, shifting interhuman power relations, and are not timeless or natural (Bray *et al.*, 2019; p. 27). Originally from the discipline of geography, this place of process framework has been expanded upon by scholars across the disciplines of history, historical geography, anthropology, and the political ecology of agriculture.

My research on the revitalization of Puerto Rico’s coffee sector is rooted within this broad framework of understanding, focusing on examining human and non-human interactions and power relationships between actors and networks (Pred, 1984; Watts & Scales, 2015). Within this understanding, I draw upon a combination of Actor-Network theory based on political ecology (Méndez, 2008; Murdoch, 1998; Watts & Scales, 2015), political economy (Raynolds, 2002) and theories of power dynamics and negotiation (Bebbington, 2000; Cavanagh, 2018; Grabs & Ponte, 2019) to analyze the mosaic of social and ecological relationships and processes taking place. These approaches have been utilized to analyze coffee commodity networks and how actors construct, transform, and negotiate networks (Grabs & Ponte, 2019; Raynolds, 2002) and changing agricultural landscapes and practices (Méndez, 2008; Westphal, 2008). I also consider historically contingent processes in the global coffee history related to neoliberalism and development (Bebbington, 2000; Grabs & Ponte, 2019). Not all theoretical elements and concepts from each of the previously listed disciplines fit the research question and scope of the

study. By drawing on these specific elements from each discipline listed, I have built an inclusive theoretical framework of analysis that applies to the contextual situation of the coffee sector in Puerto Rico. In doing so, I merge my academic analysis with broader perspectives on coffee production and modernization and highlight social, ecological, and historical issues related to the current coffee development project in Puerto Rico.

Actor-Network Theory

Actor-Network theory provides a framework of analysis to navigate systems of relations and conduct time-space analyses to build upon the understanding of the coffeelands as a place of process (Murdoch, 1998). A critical element to using this theory in my research project is the capacity of Actor-Network analyses to bundle together interdisciplinary elements of economic and political structures, social processes and science and technological relations within complex sets of associations (Murdoch, 1998; Watts & Scales, 2015).

To analyze the role of global agribusinesses in transnational agriculture, Watts and Scales (2015) apply a blend of Actor-Network Theory and political ecology agricultural networks. Under this approach, agricultural systems may be considered the product of interactions between land managers such as agribusinesses and farmers and nonhuman actants such as seeds, animals, and farming inputs (Watts & Scales, 2015). The authors raise significant questions for analysis related to seeds as technologies determining farm practices and the scalar dynamics of the global value chain. The Actor-Network Theory framework is also employed by Méndez (2008) and Reynolds (2002) to research negotiations and transformations of coffee landscapes and value chains from the disciplines of political ecology and political economy.

Bray et al. (2019) developed a similar framework to examine the transformations of the *Cropscape*, the linkages between crop flows and matrices, to analyze agricultural reproduction and human and nonhuman actions. Thus, evidence from the previous research shows that the application of Actor-Network Theory is well suited for my analysis of historically contingent processes of coffeelands. I apply Actor-Network theory in my research to guide my understanding and analysis of relationships between human and nonhuman actors in Puerto Rico's coffee sector.

However, some studies utilizing Actor-Network Theory are criticized for giving more attention to networks and less to the individual actors and excessively focusing on nonhuman actants (Watts & Scales, 2015). This framework continues to be debated by scholars but is often given greater validity when used alongside a synthesis of approaches. To address these gaps in the structure, I consider alternative theories of power as a part of my theoretical framework.

Theories of Power

The majority of recent prior research in the social sciences has acknowledged or applied Foucauldian theories of power and biopower to understand the relationships between human and non-human populations (Cavanagh, 2018). Seminal works by Foucault (1982) examine the ways power is exercised and comes into being through social networks systems. Power may be understood broadly as being located in the interactions and processes of people, places, and resources (Paulson *et al.*, 2003). Paulson et al. (2003) contend that political ecology frameworks utilizing theories of power must locate politics within the practices and mechanisms through which power is circulated in multiscale models. Cavanagh (2018) also examines political

dimensions of power and expands on Foucault's theories to include biopolitics and human-environment relations. The author further argues that biopolitical inquiry must include multiple modes of governmentality and biopower, environmental history and colonialism, and critical infrastructure.

Escobar (2011) also applies Foucauldian theories of power to the unequal relationship between the Global North and South, arguing that the Global North has purposefully wielded exploitative power through development discourse and strategy. These historical and structural inequities must be considered in a framework and analysis of development trajectories (Escobar, 2011). Escobar's discussion of exploitative power in the Global South is a source of contention in the literature on power and development. It is frequently criticized for generalizing complex interactions between actors. In contrast, Bebbington (2000) argues that place transformations and power cannot be reduced solely to a post-structural or neoliberal interpretation of development. Bebbington (2000) criticizes Escobar's early works on power and development and instead calls for a theoretical framework that is more inclusive of the complexities of rural place transformations and emphasizes human agency and the coproduction of place.

Within coffee literature, several studies have been conducted examining market power (Daviron & Ponte, 2008) and intensities of power wielded by the Global North at micro and macro levels of the global value chain (Grabs & Ponte, 2019; Talbot, 1997; Topik *et al.*, 2010). Thus, to further my understanding of the relationships and interactions between actors and networks, it is critical to consider dimensions of power in my research. By combining both Actor-Network theory and understandings of power relationships, I attend to the gap of utilizing a singular framework. Actor-Network Theory is useful for mapping and understanding the

relationships between individual actors and their networks. By complementing this framework with an investigation of historical, social, and political power dynamics in Puerto Rico, I add depth to my research findings and understanding of power matrices and networks.

In the subsequent section, I provide background and context for my research subject by examining recent events and trends in the global coffee industry. Specifically, I discuss significant themes within the coffee literature related to the modernization of production and industry vulnerability.

The Global Coffee Industry: Events and Trends

Although originating in Africa, coffee cultivation and production has become a historically, culturally, and economically significant practice in Latin America and around the world. The colonial coffee industry of Latin America began as early as the 18th century in the Caribbean and grew significantly under colonial power alongside sugar, cacao, and rubber (Clarence-Smith & Topik, 2003). The modern coffee industry has been profoundly shaped by the International Coffee Agreement, signed in 1962. Its marked breakdown in 1989 has fundamentally changed the modern coffee industry (Daviron & Ponte, 2008; Grabs & Ponte, 2019). It has decreased market regulation and state presence within the coffee industry (Bacon, 2005; Grabs & Ponte, 2019; Talbot, 1997; Topik et al., 2010). This section of the literature review will provide an up-to-date critical analysis of the coffee literature from post-ICA collapse to the present and how these subjects will inform my research in Puerto Rico's coffeelands.

Modernization of Production

The literature on coffee production written over the past few decades can be situated within a broader green revolution and modernization narrative of agricultural production (Rice, 1999; Perfecto *et al.*, 2019). This section reviews literature pertaining broadly to the ideologies of agricultural modernization and varying methods of intensive and sustainable coffee production. Furthermore, previous studies have suggested that agricultural practices are intertwined with political and natural histories (Fullilove, 2017; Kloppenburg, 2004; Perfecto *et al.*, 2019). A critical examination of this literature, beginning with seeds and extending to cultivation, is essential to understanding nuances in my research project. Furthermore, Chapter Five of my thesis discusses the relevance of Green Revolution ideologies to the rural Development project in question.

Studies have demonstrated that plant seeds are artifacts of capitalism and institutional contention (Fullilove, 2017; Kloppenburg, 2004; Watts & Scales, 2015). Primary contributions by Kloppenburg (2004) suggest that the social history of seeds and plant breeding in the 20th century is embedded within a narrative of private industry evading biological and institutional obstacles and competing with public breeders and regulations. Agricultural production is being transformed, and this is evident in distancing farmers from specific means of production such as seeds and fuel and the rise of capitalist agribusinesses and production processes of commodities (Kloppenburg, 2004). Fullilove (2017) reinforces this sentiment by analyzing the relationship developments between modern agriculture, science, and political systems of organization, arguing that plant breeding and crop transfers are entrenched in rural development projects. Similar conclusions are drawn by Watts and Scales (2015), hypothesizing that seeds will

continue to be a source of tension and conflict and play a significant part in the politics of agricultural change. Bray et al. (2019; p. 23) also find that crops may be understood as products of environmental conditions and human intervention related to production techniques, values, tastes, and desires. Several questions regarding coffee seeds and the social, environmental, and economic implications of these non-human actants on the coffee landscape remain to be addressed in social science literature.

Additionally, most Green Revolution literature on the natural and social characteristics of crops and agriculture focuses on crops cultivated annually. There is a gap between traditional Green Revolution literature and the literature on coffee cultivation and intensification, as coffee shrubs grow for many years and are harvested annually. These sources inform my viewpoint on coffee varieties selected for this Development project in Chapter Five of my research. In particular, I employ the understanding of seeds and crops as objects of political and institutional conflict between public and private actors and levels of government in Puerto Rico.

The practices of growing coffee and coffee production have become sources of contention in literature. Coffee may be cultivated through traditional (shade), intensive, specialty, organic, or fair trade and certified practices. Conventionally, coffee has been grown in shaded environments, using few inputs from outside, protecting biodiversity, and reducing vulnerability to shocks (Rice, 1999). This process began to change in the late twentieth century due to neoliberal policies of agricultural modernization and trade liberalization, changing the cultivation process to a more intensified or "technified" practice (Perfecto *et al.*, 2019; Rice, 1999). Intensification practices include increased use of inputs such as fertilizer and pesticides, planting higher-yielding coffee varieties and monocropping, and reducing shade coverage (Perfecto *et*

al., 2019). Not only did this intensification process affect the environment, but it has changed the social and physical landscapes associated with coffee (Rice, 1999). The varying practices of coffee growing and their socio-ecological implications are relevant in all parts of my analysis, particularly in Chapter Five of my thesis, where I discuss the implications of the selection of dwarf coffee varieties in replicating the coffeelands.

The specialty coffee market emerged as a response to the declining quality of coffee in the United States, focusing on the growth of high-quality Arabicas and stigmatizing Robusta producers (McCook, 2013). The explosion of the specialty coffee market has led to the creation of sustainable, fair trade and certification practices and challenged dominant roasters (Grabs & Ponte, 2019). Product certifications such as Organic, Fairtrade, Rainforest Alliance, UTZ, 4C and Starbucks CAFE practices have become increasingly popular to provide producers with sustainable livelihoods and decrease environmental degradation associated with intensive production. Many multinational corporations have implemented corporate social responsibility initiatives related to certifications and production standards, attempting to verify their production through associated certification schemes. An understanding of the role of specialty coffee and multinational corporations' certification schemes and social responsibility initiatives informs my analysis of the role of the private sector in Puerto Rico's replanting project.

Many existing studies in the broader literature have examined organic, certified, and shade coffee as a response to environmental degradation from agricultural intensification from modernization policies (Lin *et al.*, 2008; Perfecto *et al.*, 2019; Rice, 1999; Westphal, 2008). As a pioneer in production and modernization literature, Rice (1999) states that the ideology of coffee growth and production has shifted to a more capitalistic and productionist mentality, changing

the social organization of industry production. Management intensification processes reducing shade cover have been found to exacerbate vulnerability to coffee rust and the effects of climate change (Lin *et al.*, 2008; Perfecto *et al.*, 2019).

There have also been several studies examining certification schemes and market-driven regulatory governance initiatives and their impacts on production. However, there is not currently a consensus amongst scholars on whether these endeavours have been practical or not. A recent study by Ibanez and Blackman (2016) concluded that there is an association between certification and changes in farm practices linked to environmental outcomes in Colombia, but economic benefits are not discernable. Similarly, Rueda and Guillermo (2011) have found through their fieldwork in Nicaragua that fair trade certified production improved pricing for producers. Still, private labels have higher yield and quality performance.

Furthermore, Bacon (2005) writes about the vulnerability of small-scale farmers in Nicaragua due to the global coffee market. Through the surveys of 228 smallholder farmers, Bacon (2005) concludes that participation in Fair Trade networks can reduce farmer vulnerability in Northern Nicaragua and may offset other conditions aggravating economic and social decline. These understandings of farmer vulnerability and strengthening capacity for resilience are central to my understanding of the effectiveness of Puerto Rico's coffeelands revitalization initiative and future avenues of collaboration to enhance the strength of the coffee sector.

Moreover, Jaffee (2007) examines the paradoxical relationship between free and fair-trade coffee in the global market. Based on two years of interviews in research in Oaxaca, Mexico, and more extensive macro analysis and a systematic comparison, Jaffee (2007) argues that fair trade coffee must operate within neoliberal capitalist market structures, creating an

identity crisis at both the producer and consumer levels. The researcher finds that fair trade has brought significant benefits and advantages to coffee farmers in Mexico because it protects them from market volatility and shocks. However, the impacts of fair-trade coffee are not significant enough to lift peasant producers out of poverty, and producers face many barriers and limitations to entry, such as the costs of certification and high-quality standards (Jaffee, 2007). Grabs (2020) also assesses the functionality of private sustainability standards and eco-labels, ultimately refuting the claim that standards may be effective if scaled up effectively. Instead, Grabs (2020) argues that the forces allowing for the emergence of market-driven governance initiatives have undermined the abilities and capacities to create long-lasting, sustainable change. Furthermore, in a study of the corporate social responsibility programs and certification schemes of major coffee companies Tim Horton's, Dunkin' Donuts, Tchibo, and Starbucks, Bianco (2020) finds that actions to reduce climate vulnerability are mainly absent. I employ this understanding of corporate actors and neoliberal market structures in my analysis of the transformations of power and landscape in Chapter Five of my thesis, where I examine the actions of Starbucks and Nespresso.

At present, there is a lack of consensus in the coffee literature about the best practices and cultivation methods—critical questions at the nexus of sharing values of profits and farmer vulnerability remain.

Industry Vulnerability

Another major trend in the modern coffee industry literature is the vulnerability of producers and the industry. A lack of consensus in scholarship at the intersection of best

production practices, volatile coffee market, and climate change has left the entire value chain vulnerable, but most notably smallholder producers (Daviron & Ponte, 2008).

Several authors have recognized that climate-related events leave producers extremely vulnerable. Previous research by Bacon (2005) demonstrates that climate-related events such as natural disasters have played a vital role in the coffee crisis and industry vulnerability. Furthermore, vulnerability is exacerbated by global market shifts, commodity price crashes, and rapid devaluations (Bacon, 2005). In the case of smallholders in Nicaragua, resiliency is dependent on access to assets such as credit, land, and employment. These findings are corroborated by Lin *et al.* (2008)'s study of the vulnerability of agricultural systems to climate events. However, instead of focusing on fair trade certification as an adaptation to vulnerability, Lin *et al.* (2008) focus on changes in agricultural management and changing intensification patterns as a solution to vulnerability. The author concludes that processes of agricultural intensification have made producers more vulnerable to climate-related shocks.

McCook (2019) also examines the environmental vulnerability of the industry and argues that one of the coffee industry's most significant vulnerabilities lies in the relationship between people, plants, pathogens, and climate. The coffee leaf rust has previously decimated crops worldwide, and most recently, the Big Rust beginning in 2008 has significantly impacted producers. Future shocks from the coffee leaf rust will only be aggravated by global climate change, altering temperature and precipitation patterns (Lin *et al.*, 2008). Many authors advocate for a return to traditional forms of production and shade cultivation to reduce vulnerability to environmental hazards (Lin *et al.*, 2008; Rice, 1999; Westphal, 2008). Acosta-Alba et al. (2020) find that diversified coffee cropping systems impact potential environmental influences at farm

gate and that variances found may be influenced by shading in traditional coffee systems. However, this is not necessarily a viable long-term economic solution for all producers (Westphal, 2008). This literature on industry vulnerability informs my analysis of critical issues that the Development project in Puerto Rico succeeds in or fails to address and whether the actions of key stakeholders are transforming the coffeelands into something that will be sustainable in the long term.

The coffee market post-1989 ICA collapse has been highly volatile, resulting in increased economic vulnerability for producers and exporters (Goodman, 2008). The literature commonly accepts that most profits from the industry have historically gone to corporations in the Global North, with poor benefits to local producers in the Global South (Goodman, 2008; Daviron & Ponte, 2008; Talbot, 1997; Topik *et al.*, 2010). Through a theoretical perspective of the historical political economy and value chain analysis, Daviron and Ponte (2008) determine that development for coffee farming is thus an elusive promise because of the power and control of the coffee industry from the Global North. Ultimately, coffee producers in the Global South will continue to receive little benefits from trade and remain increasingly vulnerable to the global market until this commodity problem is solved. The most common solutions proposed are fair trade and eco-certification schemes. Still, as previously discussed, there is a lack of agreement within the literature about the effectiveness of such certifications.

Therefore, to better understand the greater causes of vulnerability in the coffee industry, further research must be conducted on how power can be transferred to producers. Furthermore, power must also emerge from producers and their land-use decisions to avoid top-down approaches to development. In the subsequent section, I address power inequities in the global

coffee industry that contribute to vulnerabilities and perpetuate neoliberal development trajectories.

Coffee Production in the Neoliberal Era

Since the collapse of the ICA, the global coffee industry has followed neoliberal development paths promoted by governments in the Global North and multilateral funding agencies (Daviron & Ponte, 2008; Goodman, 2008; Fridell, 2014; Topik *et al.*, 2010). As previously mentioned, there is a consensus in coffee literature that neoliberal, capitalist and globalization ideologies and policies have rearranged power dynamics in the industry, with most profits allocated to the Global North instead of producing countries.

Authors argue that multinational corporations have hegemony over the coffee industry and cause current economic and ecological sustainability crises (Talbot, 1997; Topik *et al.*, 2010). Seminal contributions to research on the division of income and profit in the coffee commodity chain post-ICA have been made by Talbot (1997) on disparities in power between producers and transnational corporations. Talbot (1997) argues that multinational corporations and the Global North receive most coffee profits and have market control and that producers have had a significant loss in power due to neoliberal policies transferring surpluses out of producing countries. This initial investigation is corroborated by other research emphasizing the domination of multinational corporations in the coffee industry as a result of United States' anti-state and deregulatory pressures (Topik *et al.*, 2010), and power now primarily being wielded by roasters and corporations, ultimately increasing farmer vulnerability (Bacon, 2005).

Other studies have suggested increasing focus on governmental and institutional changes post-ICA have impacted the industry and caused the coffee crisis (Goodman, 2008; Fridell, 2014). Both Goodman (2008) and Fridell (2014) conclude that current market conditions result from a crisis of governance and institutional structures and that the relationship between state and industry, guided by neoliberal ideologies and western governments, steers development outcomes. Vietnam's rapid coffee sector growth during the 1990s due to the state's pressure to develop the industry is cited as a critical example by both authors. At the same time, Latin American governments' industrial roles became weaker.

However, these themes of neoliberal development have pervaded the coffee industry beyond the period of ICA collapse (Bacon, 2005; Daviron & Ponte, 2008; Grabs & Ponte, 2019; Jaffee, 2007; Rice, 1999). These issues are coupled with chronic oversupply from technification and modernization and increased future market speculation in the 1990s, leading to low coffee prices and high market volatility (Daviron & Ponte, 2008). Thus, coffee price crises and market expansions and contractions have continually reoccurred since then, and issues related to modernization of production, vulnerability and sustainability endure. Daviron and Ponte (2008) analyze the simultaneous coffee boom in the Global South and the crisis in the Global North, the *coffee paradox*, arguing that the problem with the global coffee value chain is that consumers pay for symbolic quality and in-person services and that this does not benefit the farmer.

A recent study conducted by Grabs and Ponte (2019) concluded that these power asymmetries continue today. Their research identifies a distinction between the post-ICA liberalization phase from 1989-2007 and the diversification and reconsolidation phase from 2008-present. The main differences between the two phases are that the latter includes a shift

towards the reconsolidation of large roasters, increasing supply chain management tools, declining sustainability premiums, and a new movement by producing countries to counter the continual power of large roasters (Grabs and Ponte, 2019). This research can only be considered a first step towards a more profound understanding of power dynamics in the global coffee value chain, as the most recent research is focused on an analysis of modernization of agricultural practices and sustainable development initiatives. A more systematic and theoretical analysis is required to understand how power is wielded at a macro scale and the impacts of changing power dynamics on producers. Furthermore, through the application of Actor-Network theory and theories of power, research will move beyond assuming the dominance of capitalist master processes and recognize the role of non-human actants (Watts & Scales, 2015). The literature on power in the coffee industry as a whole informs my analysis of the networks of actors in Puerto Rico's situation. Furthermore, the neoliberal era coffee literature and themes of agricultural development situate the coffee sector revitalization project in question within a broader global narrative of power imbalances and offer insight into the future of Puerto Rico's coffee industry.

This section has specified my literature review's theoretical framework and background as a base for my research on Puerto Rico's coffee sector recovery initiative. In the following section, I provide a contextual and historical overview of Puerto Rico's coffee industry, highlighting the island's political, economic, and environmental agriculture issues.

Chapter 3: Contextual Overview

Puerto Rico's coffee landscape is tied into broader agrarian histories of colonialism, politics, and export agriculture (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990). In this chapter, I situate Puerto Rico's contemporary coffee landscape within a broader historical context by investigating some of the main periods of agricultural transformation that have occurred throughout Puerto Rico's agricultural history. In addition, I draw attention to the impact of Hurricane Maria on the island's agricultural sector.

Coffee was introduced to Puerto Rico in 1736, following the patterns of the spread of plants to the Antilles in the early eighteenth century (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990). By the end of the century, main production areas had been established in the western parts of the island accessible to ports (Berghad, 1978). Coffee production overtook tobacco production in the 1780s and became an export staple (Pumarada O'Neill & Pumarada, 1990). The coffee produced on the island was mainly exported to the Spanish market and was recognized for its superior quality among cafes from the Americas (Pumarada O'Neill & Pumarada, 1990). Pumarada O'Neill & Pumarada highlight the beginning of a transformation of social organization and capital and land organization as a result of coffee cultivation during this period. Puerto Rico's subsistence agricultural systems were beginning to change into class systems characterized by stratification (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990). In the 1830s, global price structure changes resulted in coffee exports lagging behind sugar (Pumarada O'Neill & Pumarada, 1990). Coffee production was secondary in the sugar boom during the nineteenth century until about 1870 (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990).

Berghad (1978) highlights that the prosperity of Puerto Rico's coffee industry was directly entwined with external market conditions. In the 1870s, the United States opened the market to duty-free coffee imports. Puerto Rican exporters met European demand that was not satisfied by Brazil's coffee production (Berghad, 1978). Puerto Rican coffee was world-renowned at this time, intending to sell gourmet coffee to the European consumer (Pumarada O'Neill & Pumarada, 1990). Smallholders made up approximately 87 percent of farms, but *hacendados* controlled 2.2 percent of farms and 35.9 percent of farmland (Berghad, 1978; p. 69).

Manufacturing and urbanization processes began to increase quickly at the beginning of the twentieth century under the hegemony of the United States (Berghad, 1978). Coffee production had swiftly declined due to Hurricane San Ciriaco in 1899, foreign investment patterns, and the United States legal framework creating new tariffs on coffee (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990). Berghad (1978; p. 83) writes that the coffee industry was "dislocated" during this time. Cultivation had shifted from small-scale intensive production to large-scale operations, and many farmers diversified their agricultural production (Berghad, 1978; Pumarada O'Neill & Pumarada, 1990). The coffeelands were once again hit by hurricane San Felipe in 1928, and the beginning of the Great Depression signalled the downfall of Puerto Rico's once-booming coffee industry. It also solidified the existence of a national bourgeoisie and the separation of social classes (Berghad, 1978). Sugar cultivation expanded under these new U.S. regulations while total coffeelands and yields declined (Berghad, 1978). With this political change, coffee trade connections with Europe were slowly eroded. Furthermore, the island

became principally focused on sugar production as a principal crop. Tobacco production also expanded in the early twentieth century (Berghad, 1978).

Operation Bootstrap (*Operación Manos a la Obra*), an agricultural modernization policy, was implemented in 1947 to diversify Puerto Rico's mono-crop economy (Alaya, 1996). Under U.S. control, the island of Puerto Rico went through significant industrial changes and became the primary source for U.S. textile companies (Caban, 1989). Industrialization programs were supported by the Partido Popular Democrático, the political party in power from the mid-1940s to 1968 (Alaya, 1996). The workforce of the agricultural industry significantly declined as many workers left sugar mills for factory positions. The implementation of Operation Bootstrap and industrialization policies signified a shift in Puerto Rico to a more modern, capitalist island.

Despite efforts to industrialize, coffee culture has persisted in Puerto Rico, which may be attributed to government support and the development of the University of Puerto Rico's Agricultural Experiment Station (Borkhataria *et al.*, 2012). Sun coffee farming techniques have been encouraged by the local government since the 1960s, and the government provided incentives to apply modern farming techniques (Borkhataria *et al.*, 2012). Widespread conversion to sun coffee cultivation occurred in the late 1980s (Borkhataria *et al.*, 2012). Between 1982 and 2007, there has been a 70 percent decrease in shade farming. In Puerto Rico, approximately half of shade-grown coffee and some old coffee plants have been replaced with new sun-loving varieties and monocultures designed to produce higher yields (Miller & Lugo, 2009). These cultivation techniques are reminiscent of broader green revolution ideals.

Puerto Rico was briefly the most economically important crop in Puerto Rico again from 1982 to 1998 (Borkhataria *et al.*, 2012). However, the total market value of coffee declined after

Hurricane Georges in 1998 and low international prices and never truly recovered. When Hurricane Georges hit the island in 1998, it significantly disrupted the upward growth of coffee in Puerto Rico (Fain et al., 2018). Borkhataria *et al.* (2012) identify the main challenges to Puerto Rican coffee producers as being hurricanes, lack of capital and workers, erosion, insect and fungal damage, and nutrient deficiencies.

The government of Puerto Rico has provided economic incentives to farmers in the form of fertilizers and herbicides and technical advice from government agencies (Borkhataria *et al.*, 2012; Perfecto *et al.*, 1996). Significantly more farmers who grow sun coffee have crop insurance than shade farmers (Borkhataria *et al.*, 2012). As a result of this government support, increased agrochemical inputs, and new higher-yielding varieties, production and harvests increased considerably in the early 1990s (Fain *et al.*, 2018). However, despite a temporary increase, overall trends of growth in the coffee sector since the turn of the century have been negative (FAO, 2021) (*Figure 3.1*). In 1961, Puerto Rico produced 15 876 tonnes of green coffee. In 1998, the production of green coffee was estimated at 13 393 tonnes and subsequently

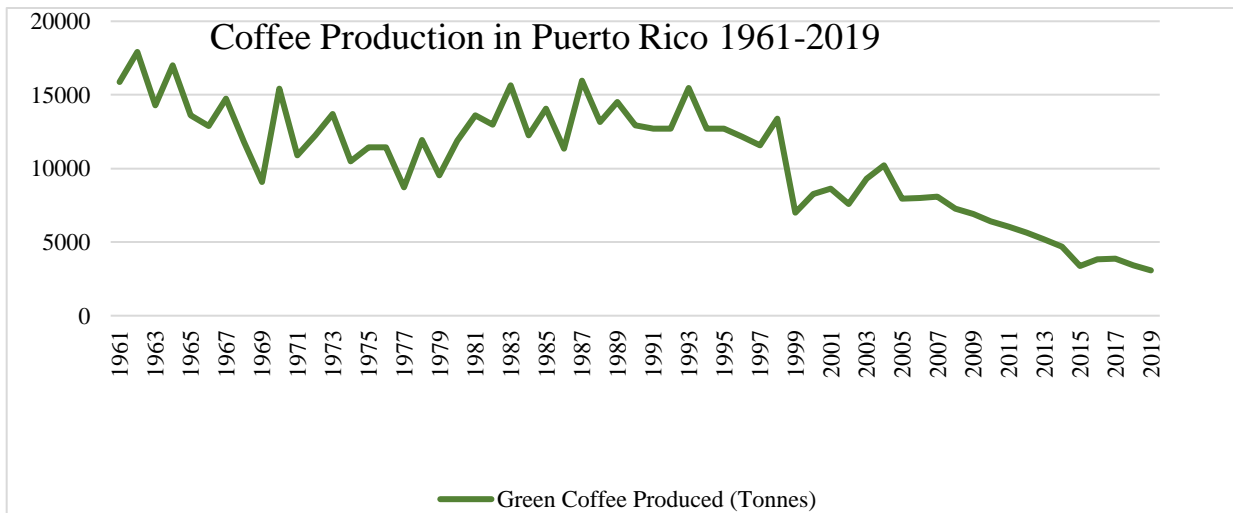


Figure 3.1: Coffee Production in Puerto Rico 1961-2019. Data from Food and Agriculture Organization (2021).



Figure 3.2: Coffee Producing Zones of Puerto Rico. Map from Muñiz & Monroig (1994) *Figura 1* “Municipios y barrios que comprenden la Zona Cafetera” (p. 4).

dropped to 7 000 tonnes in 1999. This number has steadily decreased since the arrival of Hurricane Georges. Since at least the 1990s, coffee production in Puerto Rico has taken place in the municipalities of Adjuntas, Ciales, Jayuya, Las Marías, Lares, Maricao, San Sebastián, and Utuado, as well as areas in Añasco, Guayanilla, Juana Díaz, Mayagüez, Moca, Peñuelas, Ponce, Sabana Gande, San Germán Villalba, and Yauco (Muñiz and Monroig, 1994) (*Figure 3.2*).

In September 2017, Hurricanes Irma and Maria passed over Puerto Rico. Hurricane Maria was the deadliest hurricane in Puerto Rico since 1899 and caused significant damage to critical infrastructure and the death of almost 3 000 people (George Washington University, 2018). Initial estimates by the Department of Agriculture found that approximately 80 percent of Puerto

Rico's crops were lost, and approximately \$780 million in agricultural yields (Robles & Ferré-Sadurní, 2017).

The coffeelands of Puerto Rico were significantly impacted by Hurricane Maria. Although harvesting began before the hurricane, most of the 2017 coffee crop was lost (Mariño *et al.*, 2018). Perfecto *et al.* (2019) find that management styles had little effect on resistance or resilience to the storm and that the socio-political context of farms was a more suitable indicator of resilience. The farm-level management, or the ability to manage weeds and pests, is reflected in the socio-economic and political abilities of the farmers. Furthermore, most farms lost a significant amount of canopy coverage which may be considered one of the most critical issues in post-hurricane resilience, despite trees commonly acting as a windbreak (Perfecto *et al.*, 2018). Mariño *et al.* similarly find that damage varied on a farm-by-farm basis. At least half of farms had approximately 20 percent of coffee plants damaged, and some plots had greater than 80 percent of plants damaged (2019; p. 12).

Hurricane Maria's impact on the coffee industry has prompted international attention and a public and private sector response in recovery endeavours. Aid and relief have been sources of political and institutional contention beyond the realm of the coffee sector. The socio-ecological and political transformations of the coffeelands are discussed in subsequent chapters.

Chapter 4: Methodological Considerations

Development concerns and studies have created a demand for interdisciplinary research approaches and methods (Mikkelsen, 2005). A holistic and interdisciplinary approach is necessary to understand multiple layers of causal relationships and the complexity of development issues (Mikkelsen, 2005). As previously mentioned in Chapter 2, research in the coffee sector is often undertaken from an interdisciplinary perspective (Méndez, 2008; Westphal, 2008). I will continue to employ this interdisciplinary and inclusive framework and methodology to add rigor to my findings in my research.

There are many different initiatives and projects taking place in Puerto Rico's coffee industry after Hurricane Maria. My research focuses specifically on the replanting initiatives undertaken by the public and private sectors to narrow the scope of my study. My research investigates the following questions: (a) How has power in Puerto Rico's coffeelands been restructured and renegotiated due to the replanting development project; and (b) What are the implications of this power reorganization on the future of Puerto Rico's coffee industry? The study aims to understand the power dynamics and landscape transformations in Puerto Rico's coffee replanting initiative. The purpose and intended outcomes are to identify mechanisms and partnerships that may enhance collaborations between actors in the coffee sector. The specific objectives of my research are: (a) to understand and identify events and human and non-human actants in Puerto Rico's coffee sector recovery initiative from 2017 – 2020 through a horizontal analysis; (b) to determine and analyze the main actors and transformations of power relations,

interests, legitimacy and collaboration in the coffeelands; (c) to make recommendations for better functioning of collaborative efforts between public and private actors.

This chapter will focus on the research methods used in this study, exploring the theoretical foundations of power and Actor-Network theory and emphasizing questions of positionality and representation as they translate into my work. This chapter also considers the specific methods I used for this research project, including analysis of primary documents and news sources and grey literature.

Theorizing Power and Relationships in the Coffee Value Chain

Combining understandings of power and Actor-Network Theory can be used as a helpful framework and strategy for untangling the complexity of development issues through qualitative studies. This framework also promotes the analysis of socio-ecological mosaics and processes of powers by considering socio-ecological landscape transformations over time and has been employed by scholars from various disciplines. Additionally, theories of power have been successfully applied by Daviron & Ponte (2008), Grabs & Ponte (2019), Talbot (1997) and Topic *et al.* (2010) in both micro and macro levels of the coffee value chain. My research into Puerto Rico's coffee sector recovery initiative is informed by theories of power, combined with Actor-Network Theory. From discussions of power in literature, my research draws explicitly on the multiple ways in which power is wielded and negotiated in complex relationships (Bebbington, 2000; Cavanagh, 2018; Grabs & Ponte, 2019). Actor-Network Theory provides a guide for methodological mapping and understanding relationships between human and non-human actors and their networks. From the literature on the Actor-Network Theory, I focus

mainly on understanding and navigating systems of relations between multiple actors and landscapes (Murdoch, 1998; Watts & Scales, 2015). By combining these two frameworks, I attend to the limitations of a singular discipline and methodology.

Using this framework, I sought to develop an understanding of changing power relationships through content and discourse analysis of primary documents and grey literature. However, a constraint to my methodology is that I could not conduct research in the field and interview participants. Beyond impacting my ability to travel, it is reasonable to assume that COVID-19 has added new dimensions to the burdens faced by local and regional actors in the present coffee price crisis and in the wake of Hurricanes Maria and Irma. During the time I collected data for my study, I was unable to ethically solicit participation and engagement in studies without exploiting vulnerable communities (Pacheco-Vega and Parizeau, 2018). Therefore, my data collection focused more on macro-level transformations of the landscape and power dynamics between actors.

Power, Positionality & Reflexivity

While considering dimensions of power, I must also consider the power I hold as a researcher in representing data. A researcher's multiple subjectivities can create challenges to research design, methods, and engagement. The researcher and organizational institutions exert power during the research process due to their positionalities (Sato, 2004). Many scholars have called for greater researcher reflexivity in the social sciences throughout all parts of the research process (Pacheco-Vega & Parizeau, 2018; Sato, 2004; Sultana, 2007).

From an epistemological perspective, my knowledge of the world and how I view my research is based on the "assumptions that were passed on to me as a white person" (McIntosh

1988, p. 5). Racial attitudes and socioeconomic inequalities between Puerto Rico and the United States have historically contributed to contention and divided opinions. Throughout the research process, I have been conscious about how my *Americanisation* might impact how I view the situation, how my research is perceived by coffee producers and co-operations, and the public. I am also not a coffee farmer and have not had the opportunity to work in the field.

Data Selection, Collection and Analysis

Throughout the research process, data is constructed by the researcher by selection, categorization and summarization, and systematic investigation and analysis (Mikkelsen, 2005). The purpose of my study has guided my selection of appropriate and relevant data, but access to data has partially constructed the scope of my study. The COVID-19 pandemic has limited my ability to conduct fieldwork and participant interviews safely. Therefore, data for my study has been collected through news articles, corporate social responsibility reports, government documents, and grey literature such as trade journals. Through a combination of these sources, I have been able to collect data that informs about the topic in question, with clear origins, and includes first-hand information. Documentary analysis is also commonly undertaken in Development Studies in relation to planning and evaluation (Mikkelsen, 2005), making it a fitting choice for my research.

I collected and cataloged data during the summer of 2020. I began by collecting data from articles from two popular Puerto Rican news sources, *El Vocero* and *El Nuevo Día*. Any political and social bias would be very clear in the articles, as *El Vocero* is a pro-libre asociación source, and *El Nuevo Día* is a pro-statehood source.

My search criteria were broad enough to include all sources relevant to the coffee sector, from the dates 2017-01-01 to 2020-09-28 (the time I finished collecting data). The beginning of 2017 was selected as a starting date to gain an understanding of what was happening in Puerto Rico's coffee sector before the hurricane hit the island. I sorted through 2,000+ articles to catalogue approximately 100 most relevant to my research topic. I sorted articles by date and tracked the content of the articles, main themes, and important quotations. After collecting articles from news sources, I moved on to examine key government documents, press releases, and corporate social responsibility reports based on data from the articles. I also collected and catalogued articles from coffee and commodity trade journals relating to my study. In the collection of these non-newspaper documents, I included a broader range of dates depending on the availability of data.

After I established my dataset, I initially followed methodologies of discourse analysis and horizontal analysis to strategically sort through key events and actors in the coffee sector, including the replanting project. This process attended to my research objective (a): to understand and identify events, and human and non-human actants in Puerto Rico's coffee sector replanting initiative from 2017 – 2020 through a horizontal analysis. Discourse analysis methodologies have become popular in recent years as a form of content analysis for more modern sources (Mikkelsen, 2005). Based on this methodology, I adopted a critical stance towards understanding the data and a concern for the interpretation of actions, focusing on *how* events were happening (Mikkelsen, 2005). The goal of this initial pass of the data was to gain an understanding of central themes and concepts in the data, as well as key actors. Horizontal analysis using discourse analysis works to create an iterative interpretation of the whole material

(Gaudet & Robert, 2018). First, I compared my general thoughts and first impressions from each source to determine what the sources have in common, or what distinguishes them (Gaudet & Robert, 2018). As per Gaudet and Robert’s (2018) recommendations on horizontal and discourse analyses, I integrated different sources and material into repertoires. Next, I began to reflect on the themes and concepts in the data in relation to historical and structural transformations. The key themes that emerged through my initial round of discourse and horizontal analysis are listed below (*Table 4.1*).

Table 4.1: Key Themes in Puerto Rico’s Coffee Sector Replanting Project (Horizontal Analysis)	
Themes	Notes
A complex network of actors with differing agendas and power for development in Puerto Rico’s post-hurricane coffee industry	The most notable theme throughout this research was the number of actors and initiatives at all levels in the coffee sector post-hurricane. The need for replanting and attempts by various actors to do so is also highlighted here.
Most endeavours by different actors are related to the idea of a replanting project	The replanting project took a centre stage in much of the primary data. This reinforced my original hypothesis that the replanting project was significant, and a source of differences between actors.
Government support for farmers is a bureaucratic process	The support that farmers received for insurance, and the replanting endeavours have been slow from the government. This theme has continued throughout all aspects of the replanting project.
A lack of and/or slow advancement planting new coffee seedlings post-hurricane	An additional but separate theme to the bureaucracy of the replanting project is the slow progress in importing and planting coffee seeds.

To further analyze the changes in the landscape and attend to my research objective (b): to determine and analyze the main actors and transformations of power relations, interests, legitimacy, and collaboration in the replanting project, I employed Actor-Network theory and understandings of power. From its beginnings, the Actor-Network Theory has been positioned as

a methodology to learn from actors and interpret networks through various qualitative methods (Latour, 1999). We can understand actor-networks as chains that give rise to natural and social realities, and therefore the Actor-Network Theory methodologies support the tracing of these interactions (Ruming, 2009). The Actor-Network Theory is an appropriate methodology in this context as it is helpful to analyze situations that are *messy* (Ruming, 2009) and for policy-oriented research goals (Holbrook, 2012). Ruming (2009) finds that the Actor-Network theory methodologies must account for the following: (1) identities that are not fixed, where differential power-geometries are provided; and (2) that networked readings illustrate a translation of the multiplicity of network relations extending beyond the spatial confines of one location. In developing a network methodology, Robbins (2015) suggests that a multiple network (multilevel) design with clear boundaries between networks is useful to make inferences across units. My area of research is geographically bound, with a focus on the macro and regional (meso) levels.

Overview of Data and Networks

Through my horizontal analysis of data, I was able to clearly distinguish different networks and relationships between actors within the broader context of Puerto Rico's post-hurricane recovery. In Table 4.2 below, I identify the actors and networks involved directly in the replanting projects in Puerto Rico. The actors and their networks are identified nominally and organized by macro, meso and micro levels, then according to their various networks and organizations. I follow with a summary of the functions of each organization and actor in the replanting project to demonstrate the complex roles and powers at play in the coffee landscape.

As demonstrated below, the table reveals a complex list of actors and networks, with most organizational activities and power at the macro level. Furthermore, based on Actor-Network Theory's inclusion of non-human actors in landscape analysis, I have included coffee seeds as non-human actors and objects of contention.

Table 4.2: Nominal Identification of Actors and Networks in Replanting Project				
Level	Network	Organization	Individual Actors (if applicable)	Functions & Projects
Macro Level – International and National	Public Sector (Puerto Rico)	Departamento de Agricultura		Prevention of importing coffee seeds despite previous approval by federal government. Responsible for implementation of Programa de Recuperación del Cafetal – program established through the ADEA and implemented by el Departamento de Agricultura for fiscal year 2019-2020. Additionally responsible for the Programa de Semillas de Café with the ADEA to deliver more than 1 million small coffee trees to farmers and promote growth of coffee seedlings with new tube technology.
			Carlos Flores Ortega (Secretary of Departamento de Agricultura)	Responsible for oversight of coffee sector and increasing production, as well as fertilizer voucher bonuses. Frequently accompanied volunteers with planting of coffee seedlings for press.

				<p>Shared that \$3 million were invested by el Departamento de Agricultura in order to plant the first Marsellesa seed in Puerto Rico which was planted December 2018 since the four nurseries were originally chosen for Starbucks' donation of Marsellesa seeds were expected to incur in an infrastructure investment in order to accommodate the seeds. Also, under investigation by the Asociación de Agricultores for mismanagement of coffee seedlings, amongst other lawsuits. Stated that it is expected that the coffee sector will not produce for at least 3 years. (August 2019)</p> <p>Collaborated with the private sector planting 4,500 Marsellesa coffee seeds in Adjuntas (September 2019).</p>
		Government of Puerto Rico	Ricardo Rosselló (Governor 2017 – 2019)	<p>Oversight of and collaboration with el Departamento de Agricultura de Puerto Rico, management of international and U.S. aid and grants.</p> <p>Indirect involvement in coffee sector who promoted agricultural products in the Plan for Puerto Rico, co-created with Carlos Flores Ortega.</p>

				<p>Also initiated the plan to consolidate el Departamento de Agricultura into less departments and create la Oficina de Cafés de Puerto Rico. Rosselló was later charged with misuse of aid funding and defrauding the federal government through misuse of contracts.</p> <p>Wanda Vasquez Garced (Governor 2019 – 2021)</p> <p>Carmelo Ríos (Senate spokesperson)</p> <p>Referred Secretary Flores Ortega to Department of Justice for allegations of improper conduct. Also worked on Pon Pa'l Cafetal initiative.</p> <p>Informed that the Government of Puerto Rico had not received tariff payments for the importation of coffee into Puerto Rico since 2019. Addressed Alfonso Robles the director Operaciones de Campo de Aduanas y Protección de Fronteras for an explanation</p>
		Administración para el Desarrollo de Empresas Agropecuarias (ADEA)		<p>Programa de Recuperación del Cafetal</p> <p>Programa de Semillas de Café</p>
		la Oficina de Cafés de Puerto Rico (OCPR)		<p>Initially created in 2017 with Senate Bill 574 to consolidate el Departamento de Agricultura, with the intention of integrating coffee pricing functions</p>

				and centralize activities. La OPCR was supposed to intervene in the rehabilitation of the industry, and address previously existing bureaucracy in el Departamento de Agricultura. Plans to create la OCPR were still not finalized in 2019.
Public Sector (United States)	United States Department of Agriculture			Required el Departamento de Agricultura to comply with certain requirements before planting seeds donated by Starbucks into Puerto Rican soil. Required plants to go through a six-month observation period prior to plantation in order to ensure that no illnesses or plagues would be introduced to the Puerto Rican ecosystem. Allocated \$1,395,000 in funds for el Departamento de Agricultura
	Department of Justice Federal Tribunal			Prohibited el Departamento de Agricultura from intervening with coffee seed importation
Private sector	Nespresso			Working with the Hispanic Federation, World Coffee Research and Puerto Rico Coffee Roasters. Nespresso’s initial investment is \$1 million and 50 000 coffee trees. Nespresso is also working to launch “Cafecito de Puerto Rico”,

		George Clooney	<p>an all-Puerto Rican coffee line.</p> <p>Nespresso global ambassador, not directly involved with replanting initiative but has joined forces with Hispanic Federation</p>
	Puerto Rico Coffee Roasters		<p>Brand owned by the Coca Cola Company, owning most of Puerto Rico's popular coffee brands including Yaucono, Café Crema, Café Rico, Café Rioja, Alto Grande, Yaucono Selecto, Café Garrido Expreso and Encantos de Puerto Rico. Offering training and extension services to growers and invested in nurseries with World Coffee Research and the Hispanic Federation to establish a seed import and planting initiative, as well as management of new varieties on the island. PRCR also operates the island's largest nurseries, with a capacity for over 2 million new plants. Produces Nespresso machine compatible pods of Puerto Rican coffee.</p>
	Panamerican Grain	José González Freyre	<p>Agro-industrial company that imports, processes and manufactures food products.</p> <p>Openly shared objections to Flores Ortega's involvement in the</p>

			(company president)	Department of Agriculture. Has also implied that the Puerto Rican government should investigate Flores Ortega
	NGO	Hispanic Federation	<p>José Calderón (President)</p> <p>Lin-Manuel Miranda</p> <p>Luis Miranda, Jr.</p>	<p>Spearheading a three-year initiative, announced in October 2018, to revitalize Puerto Rico’s coffee industry. As a part of this endeavour, have created the Revive el Cafetal Puertorriqueño initiative to subsidize the cost of 2.25 million coffee seedlings with Technoserve.</p> <p>Shared the news that the Hispanic Federation in collaboration with other institutions had donated seedlings to local farmers</p> <p>Actor, playwright and spokesperson with his father on the endeavour to revitalize the coffee industry, with a focus on Puerto Rico’s rich coffee culture.</p> <p>Father to Lin-Manuel Miranda, former politician with services to both public and private sectors, and founder of Hispanic Federation. Miranda’s work in the coffee sector with his son has proved controversial and has been contested by some local audiences.</p>

		<p>la Asociación de Agricultores de Puerto Rico</p> <p>Productores de Café de Puerto Rico (Procafé)</p>	<p>Héctor Cordero Toledo (President of association)</p> <p>Iris Jannette Rodríguez (president of el sector de café - Procafé)</p>	<p>Works with the Tribunal Federal to prohibit el Departamento de Agricultura from intervening with coffee seed importation, as well as issues with the Departamento de Agricultura in many other sectors (notably dairy).</p> <p>Created in 2017 as a part of the Asociación de Agricultores de Puerto Rico to promote the production of crops.</p> <p>Held an assembly where it was explained that the association had solicited an investigation for the missing agricultural funds (September 2019). Stated that it will take 8-10 years for the coffee sector to recuperate.</p> <p>Responsible for the organization and leadership of la Asociación de Agricultores. Outspoken to press on the failure of Flores Ortega to do his ministerial duties. Spoke about missing funds for the recovery of the coffee sector (\$57 million) and the missing 1.7 million seeds that Starbucks donated. Outspoken on actions of Flores Ortega and actions of Departamento de</p>
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				Agricultura on preventing seeds from entering Puerto Rico.
		World Coffee Research		<p>Global non-profit organization that works in cooperation to help grow, protect, and better the production of coffee while bettering the livelihoods of the families that produce it.</p> <p>Contributed with Puerto Rico Coffee Roasters with seeds for their nurseries (May 2018).</p> <p>Planted the first seeds in collaboration with the Starbucks Foundation (September 2018).</p> <p>Led workshops for farmers on coffee production in alliance with Puerto Rico Coffee Task Force (December 2018).</p> <p>Collaborated with the Department of Agriculture planting 4 500 Marsellesa coffee seeds in Adjuntas in September 2019.</p>
		Rockefeller Foundation		Donated \$500 000 in partnership with the Hispanic Federation to revitalize coffee sector.
		Technoserve		Manage the technical support for Hispanic Federation's Revive el Cafetal Puertorriqueño program subsidizing coffee seedlings.
		Fonalledas Foundation		Licencing partner of Starbucks Foundation in Puerto Rico working with World Coffee Research

				Collaborated with the Department of Agriculture planting 4 500 Marsellesa coffee seeds in Adjuntas in September 2019
		The Mission Continues Foundation		Supplied volunteer workers for seedling planting (September 2019) Collaborated with the Department of Agriculture planting 4 500 Marsellesa coffee seeds in Adjuntas in September 2019.
		Fundacion Colibri		Supporting work of Hispanic Federation and affiliates.
		Starbucks Foundation	Jaime Fonadellas (president of Baristas del Caribe)	Donation of 2 million coffee seeds of the Marsellesa variety. Four nurseries were originally chosen for Starbucks' donation of Marsellesa seeds, but the nurseries were expected to incur in an infrastructure investment in order to accommodate the seeds. Operator of Starbucks stores in Puerto Rico. Collaborated with the Department of Agriculture planting 4 500 Marsellesa coffee seeds in Adjuntas in September 2019
Meso (Regional) Level	NGO	Hecho en Morovis	José Javier Marreo (Advisor)	Participated with the Mayor of Morovis, Carmen Maldonado González, in the donation of 25 000 coffee seeds.
		ComPRometidos		Participated with the Mayor of Morovis,

				Carmen Maldonado González, in the donation of 25,000 coffee seeds.
	Farmers	22 Farmers with nurseries under contract with the ADEA		Responsible for the housing of coffee seedlings (Frontón, Limaní and Marsellesa varieties) in nurseries in municipalities of Las Marías, Lares, Maricao, San Sebastián, Juana Diaz, Yauco, Adjuntas, Utuado, Morovis, Orocovis, Juncos, Comerío and Caguas.
	Volunteer Planters	Starbucks Foundation & The Mission Continues Foundation		Volunteer group (150 people) from Puerto Rico and Florida working with coffee growers to plant Marsellesa coffee seedlings (September 2019). Varying sources report between 3 600 – 4 500 seedlings planted in Adjuntas.
Micro Level – Municipalities, Towns	Municipal	Yauco	Angel Luis Torres Ortiz (Mayor)	In alliance with Gustos Café and Finca La Montaña, handed out 50 000 coffee trees which required a \$40 000 municipal investment
Non-Human Actors		Coffee seedlings		Three types of coffee varieties donated by public and private actors: Limaní, Frontón and Marsellesa. Due to el Departamento de Agricultura’s regulations and restrictions, the Marsellesa seeds donated by Starbucks were unable to be distributed until December 2018.

Table 4.3 identifies the main actors and networks outside of the replanting project that are still heavily involved in the coffee industry. In the same manner as the previous table, I nominally identify the level of power and activity, the networks the organizations and actors belong to, and provide any relevant information related to the functions and projects of the actors. The table below is not the focus of research but illustrates the complex network of actors and initiatives within Puerto Rico’s coffee industry. Furthermore, the list of actors demonstrates a fragmented organization of the coffee industry that is both bureaucratic and a source of tension between actors.

Table 4.3: Nominal Identification of Actors and Networks Outside of Replanting Project				
Level	Network	Organization	Individual Actors (if applicable)	Functions & Projects
Macro Level – International and National	Public Sector (Puerto Rico)	Government of Puerto Rico	Wanda Vasquez Garced (Governor 2019 – 2021)	Pon pa’l cafetal with Departamento de Agricultura
		El Senado de Puerto Rico		Senate Bill 1629 (Bill approved to modify el Código de Incentivos de Puerto Rico to change the wage subsidy received by farmers, due to damage from Hurricane Maria in June 2020)
		Departamento de Agricultura de Puerto Rico		Pon pa’l cafetal - Initiative to offer worker transportation during the coffee harvest of 2020
		Corporación de Seguros Agrícolas		Coverage of agricultural insurance claims post-Maria. Insurance policies with la Corporación de Seguros Agrícolas was voluntary but required to receive

				incentives from el Departamento de Agricultura. Later consolidated as a program of el Departamento de Agricultura.
		Comisión de Agricultura del Senado	Luis Berdiel Rivera and Senador Miguel Romero Lugo	Presented Senate Resolution 175, proposing that el Departamento de Agricultura make annual payments to farmers who have lost harvests from hurricane Maria.
		Departamento de Desarrollo Económico (DDEC)	Manuel A. Laboy Rivera (secretario de Desarrollo Económico)	Defender of project converting tax subsidies into incentives in the agricultural sector with Law 225.
Public Sector (United States)		American Farm Bureau Federation	(in collaboration with Texas Farm Bureau)	Partnered with la Asociación de Agricultores de Puerto Rico for agricultural aid (March 2018)
		United States Department of Agriculture (USDA)		Coronavirus Food Assistance Program (CFAP) – USDA initiative to provide assistance to farmers struggling with the impacts of COVID-19; petitioned to be inclusive of specialty crops and coffee farmers by Jenniffer González Colón, Carlos Flores Ortega, Farm Service Agency administrator Bruce Summers (June – August 2020)
Private Sector		Puerto Rico Coffee Roasters (PRCR)	Iván “Pudge” Rodríguez	Former baseball star, partnering with PRCR to produce a 100% Puerto Rican Coffee Brand compatible with Nespresso machines

		Nescafé		Implementation of Nestlé Professional to invest \$1.5 million and Nescafé coffee machines in local Wendy's restaurants
	Farmer Associations	La Asociación de Agricultores de Puerto Rico	Héctor Cordero (president)	Partnered with the American Farm Bureau Federation and the Texas Agricultural Research and Education Foundation Farm Bureau to establish el Fondo de Ayuda Agrícola de Puerto Rico.

As demonstrated in the data, most actors working on the replanting project with decision-making or influential power are concentrated at the macro level. In Figure 4.1, Actors & Networks in Puerto Rico's Coffee Replanting Project: (Macro Level), I display the leading associations between human macro-level networks and actors. This web of actors demonstrates the complex relationships between different groups of actors and tensions related to the types of coffee seeds planted.



Figure 4.1: Actors & Networks in Puerto Rico’s Coffee Replanting Project (Macro Level)

This chapter has presented the results and nominally identified actors, their networks and relationships in Puerto Rico’s coffeelands. An abundance of actors, primarily at the macro and meso levels, are frequently working at odds with each other despite a common goal of replanting. The conclusion will address my third research goal, (c) to make recommendations for better functioning of collaborative efforts between public and private actors. The following chapter will draw on the data that arose from my research and explore how power and relationships between actors transform the coffee landscape.

Chapter 5: Analysis of Power and Cropsapes

This chapter presents an analysis of the response to Hurricane Maria by the public and private sectors in Puerto Rico's coffee industry. The coffee sector revitalization efforts have been fractured and bureaucratic since their beginnings and that the introduction of new coffee seeds and varieties has compounded this. Institutional and private actors work within a complex matrix of power relations and have been operating at odds with each other since the beginning of replanting endeavours.

I begin with an outline of the roles of various actors and situate the Puerto Rican replanting initiative within the broader context of coffee replanting and development projects. I discuss the role of non-human actors in the changing coffee landscape and the complex power matrices that have emerged with the coffeelands revival initiatives. This chapter explores the complex and varied ways the replanting project and coffee cultivars are conceptualized through political agendas and social struggles.

After the Hurricane: An Outline of Fragmented Actor Responses

Hurricane Maria hit Puerto Rico in September 2017. The peak coffee harvest of that year was said to take place at the end of September and in October (Gómez, 2017). The damage to the coffee harvest, plantations, and agricultural infrastructure has been previously discussed in Chapter 3: Contextual Overview.

The Corporación de Seguros Agrícolas (CSA) reported hundreds of claims filed within the first few weeks after the hurricane, and that checks for policyholders were issued beginning September 20th (Ortega Marrero, 2017; Sanjuero, 2017). Many news sources cite difficulties in

securing agricultural loans from private banks, despite the delays in issuing cheques being one of the primary concerns of farmers at the time (Sanjuro, 2017). Furthermore, Puerto Rico Farm Credit and the federal agency for Agricultural Services require proof of denial from other banking institutions (Ortega Marrero, 2017). To compound this difficulty, Carlos Flores Ortega, Secretary of the Department of Agriculture, stated in an interview that only approximately one-third of agricultural producers had insurance against natural disasters and phenomena (Carmona, 2017).

Generally, the applications of fertilizers, pest management, and labour for farm husbandry decrease when coffee producers cannot receive insurance payments, incentives, or profit from sales. Both Puerto Rican coffee producers and the CSA have echoed these sentiments (Sanjuro, 2017). Interviews with producers from October 2017 indicate that farmers already received minimal incentives and insurance, and some began to diversify production after the hurricane (Cabán, 2017). In November, the Comisión de Agricultura del Senado announced that through the proposal of Resolution 175, the Department of Agriculture would issue annual payments of \$300 per quintal of coffee for the next four years to farmers who had lost their harvest as a result of Hurricane Maria (InterNewsService, 2017). Secretary Flores Ortega expressed his opposition to Resolution 175 aid growers in a 2018 interview due to a lack of financing (Saker, 2018). In January 2018, the Asociación de Agricultores de Puerto Rico also announced the establishment of the Fondo de Ayuda Agrícola de Puerto Rico in partnership with the Texas Farm Bureau and the American Farm Bureau Federation (Agencia EFE, 2018). At the end of 2017 and the beginning of 2018, private and non-government initiatives to assist coffee and other agricultural producers started taking place. For example, the restaurants of

Grupo Colón Gerena began raising money through the initiative Juntos Se Cultiva by donating a percentage of sales from select menu items (Carmona, 2017b). Other marketing initiatives, such as the Latitude 18° Coffee project and the Proyecto de la Cámara 1564 creating the “Ruta Aroma de Café,” were launched to promote the Puerto Rican coffee industry and gastronomic tourism (Agencia EFE, 2018b; InterNewsService, 2017b). Famous Puerto Rican baseball player, Iván “Pudge” Rodríguez also announced an alliance with Puerto Rico Coffee Roasters (PRCR) to market his own 100 percent Puerto Rican coffee brand.

The coffee sector issue reached legislative ears again at the beginning of 2018. Senate Bill 574 was drafted to create the Puerto Rico Coffee Office, addressing issues of centralization and consolidation of coffee services (Saker, 2018). Senate Joint Resolution 153 was also drafted to demand the United States Customs and Border Protection Office pay the money owed to the Puerto Rican government since 2014 for taxes on coffee importation, an estimated \$10.4 million (Saker, 2018). Additionally, the Rosselló administration crafted plans to reorganize and reduce the number of agencies in the Department of Agriculture and officially created la Oficina de Café de Puerto Rico. Governor Ricardo Rosselló would later be charged for his attempts to defraud the federal government by misusing contracts for aid funding after the hurricane (Ortiz, 2019; Stein & Dawsey, 2019). Just months after Hurricane Maria hit the island, the fractured and exceptionally bureaucratic response is already evident.

Both Germán Negrón, General Manager of Puerto Rico Coffee Roasters, and Iris Jannette Rodríguez, President of the Coffee Sector of the Asociación de Agricultores, highlighted the issue of coffee seed scarcity in multiple news interviews. Estimates from 2017 found that Hurricane Maria destroyed approximately 18 million coffee plants, and at least 6-8 million

seedlings were needed as of 2019 to ensure immediate industry sustainability (Vera Rosado, 2019). Hector Cordero, president of la Asociación de Agricultores de Puerto Rico, estimated in an interview that it would take at least five to ten years to recover fifteen percent of production (Agencia EFE, 2018).

To meet the immediate demand for trees, the government of Puerto Rico and el Departamento de Agricultura supported the donation of 2 million seeds of the Frontón and Limaní varieties, as well as incentives for compost, fungicides, and machinery (López Cabán, 2017). The seedlings had already begun germinating in the island's nurseries by December 2018. Nursery infrastructure was already in place from previous projects in 2016, where el Departamento de Agricultura de Puerto Rico contracted local farmers with la Administración para el Desarrollo de Empresas Agropecuarias (ADEA). The farmers were contracted to plant mostly Frontón and Limaní varieties for their rust-resistant properties (Agencia EFE, 2016). In May of 2018, Puerto Rico Coffee Roasters publicized a new investment in nurseries and equipment in partnership with World Coffee Research (WCR) (Gómez, 2018). Initially, the plan was to invest \$300 000 into the Hacienda Encantos farm nursery in Jayuya, to expand the capacity to produce 1.5 million coffee plants and introduce varieties of Arabica identified by WCR (Gómez, 2018). This investment and collaboration with WCR mark the beginnings of the replanting initiative in Puerto Rico. Many additional private actors have come to the fore, with monetary and seedling donations by the Hispanic Federation, the Rockefeller Foundation, the Starbucks Foundation, the Fonadellas Foundation, Nespresso, and Technoserve. The Hispanic Federation is leading the coffee development initiative and collaborating with all these private and non-government organizations based on the available data. The Hispanic Federation

provided funding and is subsidizing most of the cost for 2.25 million high-quality coffee seedlings in the Revive el Cafetal Puertorriqueño program. The varieties available in this program are Limaní, Frontón, and Obatá PR, which are available in nurseries and are supported technically by Technoserve in the field. The Hispanic Federation has also committed \$1 million to develop the coffee sector, with Nespresso donating \$1 million and the Rockefeller Foundation donating \$500 000. The Starbucks Foundation donated \$470 000 and seeds of the Marsellesa variety, with genetic testing conducted by World Coffee Research. The consideration and development of new coffee seeds of the Marsellesa variety have also led to political and industrial tension surrounding the future cultivation of Puerto Rico's coffee landscape.

Situating the Puerto Rican Replanting Initiatives

The idea of replanting projects after natural disasters or phenomena is not unique to Puerto Rico after Hurricane Maria. Many smallholders often struggle to replant coffee fields as a result of a lack of access to credit, land titles, and financially sustainable coffee prices (Harper, 2020). Similar initiatives have taken place in many other coffee-producing nations and have been successful with support from government and multinational actors and corporations.

As a part of a collective action network formed through the Sustainable Coffee Challenge and Conservation International, Starbucks pledged in 2017 to replant 1 billion coffee trees (Flandreau, 2017). Most famously, the One Tree for Every Bag initiative started in 2015 promised to plant one coffee tree for every bag of coffee sold at Starbucks' stores after the coffee rust epidemic. Starbucks contributed funds to Conservation International to plant 30 million rust-resistant coffee trees, and distribution took place with the assistance of ECOM Agroindustrial

Corporation in El Salvador, Guatemala, and Mexico (Flandreau, 2017). This program was remarkably successful, and 10 million trees were distributed within the project's first phase. Starbucks is not the only private enterprise to donate coffee seeds and money to replant sustainable farms, and the idea of large-scale replanting projects has been around for some time. ICAFE, the Costa Rican Coffee Institute, signed an agreement in 2010 with the Development Banking System to allocate \$12 million to smallholder farm renovations and to replant (USDA, 2010). Nestlé Vietnam has donated breeding coffee trees to farmers in Vietnam and has received awards for their environmental achievements in this endeavour (USDA, 2014). As of last year in Nicaragua, the French agricultural research centre CIRAD is testing a new prototype replanting style: the "coffee agroforestry business-driven clusters" model. The replanting project is guided by CIRAD but driven by outside investors loaning smallholders money to replant, with commitments from roasters to buy coffee at above-market prices (Harper, 2020). Replanting projects have also taken place after the rust outbreak in Chiapas, Mexico, and in the coffee-growing areas of El Salvador.

In a similar situation to Puerto Rico, a 2015 estimate by the Salvadoran Coffee Association (SCA) found that the coffee sector needed upwards of thirty million rust-resistant trees per year for the next decade to renovate the national coffee area. The replanting initiative by the Ministry of Agriculture and CENTA café to provide 7 million rust-resistant plants is not enough. It will not account for more than ten percent of the planted area (USDA, 2015). El Salvador's coffee sector also faces a lack of institutional framework incorporating both public and private actors. This is attributed to be one of the main reasons for the lack of support in replanting and assisting farmers with debt (USDA, 2015).

Planting and replanting initiatives and coffee farm revitalization projects are standard practices for public and private actors. With coordination and collaboration between actors, these projects can be successful in refreshing coffeelands and providing farmers with income. What is most remarkable in the case of Puerto Rico's coffeelands replanting is the conflict and continued issues between actors that have resulted over non-human actors, the coffee seedlings.

Coffee Cultivars as Non-Human Actors and Sources of Contention

The types of coffee varieties selected to be planted after Hurricane Maria will shape the future of Puerto Rico's coffee industry. The planting of coffee seedlings and the introduction of a new variety has become a major source of political and industrial tension. The debates between public and private actors over the replanting of Puerto Rico's coffeelands begin with the importing of the Marsellesa coffee seeds donated by the Starbucks Foundation. Many farmers and co-operations have expressed their frustrations in press interviews over the delay in importing and quarantining the Marsellesa coffee seeds. Once the Marsellesa seeds arrived, they were originally supposed to be quarantined for a period of 40 days (Ramos Segarra, 2018). The seeds arrived in September 2018 and were supposed to be transported to four nurseries for germination with the goal of being distributed in December 2018 (Gómez, 2018). However, news sources from December 2018 note that the Marsellesa seeds were still complying with the regulatory observation period by el Departamento de Agricultura. These seeds would need to be observed for a period of six months to avoid diseases and pests, but farmers could begin to sow the Limaní and Frontón varieties that were available to them. The timeline for the Marsellesa seeds would be adjusted to begin germination processes by March, and be available for growers

by October 2019 (Otero, 2018). As time passed, only a small number of the Marsellesa seedlings were planted and industry tensions grow around these varieties and the way in which power is wielded surrounding their importation, distribution, and cultivation. Further questions are raised regarding the motives of Puerto Rican government bodies such as el Departamento de Agricultura and the Secretary of Agriculture, Carlos Flores Ortega.

To analyze the transformations of power and landscape as a result of this debate over coffee varieties, it is necessary to understand the role of coffee seeds and plants as nonhuman actors that interact with human stakeholders from the public and private sectors, as well as the significance of the movement of coffee plants. As previously discussed in Chapter 2: Literature Review, seeds can be understood as coded artifacts of capitalism and institutional contention (Fullilove, 2017; Kloppenburg, 2004; Watts & Scales, 2015). Concerns related to seed varieties are entrenched in rural development projects (Fullilove, 2017), much like the coffee tree development project in Puerto Rico. In this chapter, the donation and promotion of coffee seeds lends itself well to Bray *et al.*'s (2019) discussion of the movement and rootedness of crops. The cultivars have been deliberately selected by human actors and located in chosen sites by human actors and illustrate differentials of power between human and non-human actors. Each coffee subspecies is a lifeform rooted in its environment and has its own agency and capacity for resistance (Bray *et al.*, 2019).

In addition to environmental factors, part of the cultivars' capacity for resistance and the predetermination of characteristics can be attributed to its genetic history and coffee breeding programs. A key difference in the case of coffee versus many single-year crops discussed in the Green Revolution literature is that research and genetic breeding are almost exclusively

conducted by public institutions in producing countries (Vossen *et al.*, 2015), and by far fewer institutions than other crops (McCook, forthcoming). Most historic coffee varieties introduced to Latin America are either Bourbon or Typica varieties, which are relatively similar (Bertrand *et al.*, 2012). Breeding for disease resistance began in India in the 1920s, but comprehensive breeding programs emerged around the world in the second half of the twentieth century (Vossen *et al.*, 2015). Scientists were able to develop varieties well-suited for agricultural intensification and with good cupping quality from the 1950s-1980s (Bertrand *et al.*, 2012). These varieties are mostly ‘dwarf’ varieties, with the key characteristic of being able to be planted more densely. The most popular of these varieties are the Caturra, Catuai, and Villa Sarchi, the parents of the main cultivars involved in Puerto Rico’s replanting endeavours.

Disease-resistant species called Timor Hybrids combining *C. arabica* with *C. canephora* genes naturally developed and were expanded upon with the onset of the coffee rust from the 1970s – 1990s (Bertrand *et al.*, 2012; Vossen *et al.*, 2015). The Timor Hybrid has become the basis of most rust-resistant varieties in Latin America (Bertrand *et al.*, 2012). Caturra, Catuai, and Villa Sarchi varieties were crossed with Timor Hybrids to produce rust-resistant coffees combined with intensive production known as the Catimors and Sarchimors. From 1990 onwards, research and genetic development have been focused on the advancement of hybrid F₁ varieties, which have higher yield potentials and use fewer inputs, while being disease-resistant (Bertrand *et al.*, 2012).

There is also a significant disconnect between this genetic technology developed at the institutional level, and the dissemination of this technology and growing information and benefits to farmers (Bertrand *et al.*, 2012). Many socio-economic considerations influence

farmer's choice of coffee varieties, including environmental and weather-related concerns, cultivation practices and economic benefits (McCook, forthcoming; Ward *et al.*, 2017). Based on the data collected for my research project, some major concerns of coffee growers include access to insurance and financial assistance to recover from losses, protection against climate shocks and natural disasters, industry profitability and sustainability. Furthermore, studies indicate that the pre-hurricane agricultural policies and subsidies from Government of Puerto Rico and Department of Agriculture have played a significant role in coffee farmer varietal selection (Gladkikh *et al.*, 2020). Gladkikh *et al.* (2020) find that many farmers thought that sun farming, and inherently utilizing more sun tolerant, often 'dwarf' varieties, was a prerequisite for receiving agricultural incentives.

There are also many issues related to the dissemination of both traditional and modern cultivars of coffee, limiting access to smallholders (Vossen *et al.*, 2015). These issues include the changing conditions of diseases, pests, and climate, sharing of scientific information and technologies, and breeding of cultivars well-adapted to local climates (Vossen *et al.*, 2015). In the case of Puerto Rico, the United States Department of Agriculture and el Departamento de Agricultura de Puerto Rico regulations further limit this access with their strict quarantine and importation laws for coffee plant matter. Additionally, these issues of dissemination and cultivation are related to lack of awareness of the advantages of new cultivars, limited credit, ineffective systems of distribution, and skepticism of new cultivars (Vossen *et al.*, 2015).

Coffee Varieties in Puerto Rico

The coffee cultivars to be grown in the post-hurricane Maria landscape represent ideologies about development and agricultural modernization and shape Puerto Rico's future coffee landscape. Much of the debate about importing the new varietal and subsequent delays expresses the issues faced in Puerto Rico's coffee revitalization project. All the issues related to the management and dissemination of these seedlings, discussed in subsequent sections, are connected to this context. The disputes about the varieties promoted by government versus private organizations embody a debate about the sustainable development of coffee in the coming years. This debate also reflects broader notions of agricultural modernism and the power of the Puerto Rican state.

In Puerto Rico, varieties of *C. arabica* are most commonly grown. Typica is a traditional cultivar in Puerto Rico and was introduced to the island in the 1800s (Brown, 2020). Despite being one of the earlier cultivars, Typica is less cultivated in Latin America now, and the focus has shifted to disease and pest resistant varieties of Bourbon and Caturra. Seminal field reports from McClelland (1924) also identify "Porto Rican Padang, Bourbon and Pointed Bourbon, Erecta, Columnaris, Maragogipe, San Ramón, Mocha and Murta" as traditional varieties of *C. arabica* cultivated on the island (p. 1). This report indicates that Puerto Rico has historically been involved in global seed commerce and received high-quality varieties. As of 2015, the most common cultivars planted in Puerto Rico were Limaní, Catuai, Frontón, Bourbon, and Caturra (Vega et al., 2020). Bourbon is a more traditional variety of *C. arabica* and is of the most culturally and genetically essential varieties (World Coffee Research, 2021a). Bourbon trees are susceptible to rust and pests but provide excellent cupping quality. The Limaní and Frontón

varieties are more contemporary and embody modern agricultural intensification and genetic selection ideas.

The Frontón varietal promoted by the government is a Catimor variety and is a cross between Timor Hybrid and Caturra (World Coffee Research, 2021b). This variety was initially developed in Brazil but was selected by the Estación Experimental Agrícola en Adjuntas for use in Puerto Rico. The variety was developed for early production and high yields and to be resistant to coffee leaf rust. World Coffee Research finds that this variety is not homogenous in Puerto Rico.

The Limaní varietal promoted by the government is a Sarchimor variety developed in Puerto Rico at the Estación Experimental Agrícola (World Coffee Research, 2021c). After initial evaluations demonstrated rust resistance, this Timor Hybrid and Villa Sarchi cross was released in 1994. The Limaní variety was developed for growth at altitudes of 1 000m or higher, with excellent quality potential at high altitudes.

However, World Coffee Research has highlighted that it is difficult to trace the Limaní variety from its Puerto Rican origins genetically. This indicates that it is difficult to predict how the Limaní variety will perform on the island. This is supported by a study conducted in 2011 by Boot Coffee and the USDA in Adjuntas, which found that the Frontón and Limaní varieties and Catimor barely qualified for specialty grade as a group. The study indicates that Bourbon, Caturra and Pacas varietals consistently scored higher for quality. Additionally, producers who grow the latter three varieties had a much better return for high-altitude planting. These findings subtly speak to farmers' decisions in choosing varietals regarding productivity, disease resistance, altitudes, and cup quality. Still, this data does not account for issues related to the cost

of inputs and labour for each varietal – additional factors that farmers must consider in their decision for varietal selection.

Although there are debates about what is considered a traditional or modern cultivar, these varieties may be considered inherently Puerto Rican. The choice of Puerto Rico's Department of Agriculture to promote the cultivation of these varietals after Hurricane Maria is representative of an exercise of power to keep a more Puerto Rican cropscape (Bray et al., 2019). This may be exemplified because both the Limaní and Frontón varieties are dwarf varieties, and the Marsellesa variety, which is new to Puerto Rico, is a dwarf/compact cultivar. Most coffee produced in Puerto Rico is sun-grown, and most subsidies and incentives by el Departamento de Agricultura pre-hurricane were for sun coffee farming. According to farmers interviewed by Gladkikh et al. (2020), fertilizer was given in exchange for practicing sun farming. However, federal agencies such as the U.S. Fish and Wildlife Service and USDA Natural Resources Conservation Service have a shade coffee program (Gladkikh et al., 2020). These survey participants were suspicious of Puerto Rican government support for shade-grown coffee programs and policies (Gladkikh et al., 2020). This varietal selection by el Departamento de Agricultura de Puerto Rico indicates what the Department would like future cultivation and land-use practices to look like. The selection also signifies that the local government and its agricultural branch continue to wield power over farmers and the coffee landscape. The decision to promote the cultivation of dwarf varietals is also reflective of green revolution narratives of agricultural intensification and yield maximization. The government's choice to select dwarf, high-density planting varieties indicates a continued capitalist and productionist line of thinking (Rice, 1999). The trade-off of increasing future profits comes at the expense of increased

vulnerability to coffee rust and climate change, exemplified in the works of Lin et al. (2008) and Perfecto et al. (2019). High-density planting, even of rust-resistant varieties, may increase vulnerability to disease and climate change. For example, some rust-resistant varieties are susceptible to Ojo de Gallo, and other rust "resistant" varieties are showing signs of rust infections (Perfecto et al., 2019). Perfecto et al. (2019) also find that after the most recent rust epidemic, the coffee landscape was further simplified by replanting rust-resistant varieties. The decision to promote sun farming rejects a significant body of literature detailing the negative impacts of this style of cultivation practices and modernization policies. However, intensification and maximization of land support greater profits for farmers and the coffee industry. Farmers also may not have a clear voice in the choice of variety selection, and government policies and incentives may not be well-defined. It is also interesting that this decision was made, despite research indicating that shade trees help buffer the impacts of hurricanes on coffee farms, and the loss of shade trees after hurricanes increases future susceptibility to storms (Lin et al., 2015; Mariño et al., 2018).

Selection of the Marsellesa Variety

In terms of the flow of crops and seedlings, the Fronton and Limaní cultivars were already present on the island. The movement and flow of the varieties remain local. However, these varieties are at risk. In the study of seed lots conducted by World Coffee Research (2019 in 2017), data indicated that these varieties are now genetic blends, crossing with other varieties and decreasing resistance to coffee leaf rust. The study also found that between the mixing, genetic

erosion, and damage to farms from hurricanes, the existing Frontón and Limaní seed lots will be unable to meet the demand for new trees in the rebuilding effort (World Coffee Research, 2019). In contrast to the Puerto Rican varieties, the Marsellesa variety was cross-created in Nicaragua (World Coffee Research, 2021d) and is a cross between a Timor Hybrid and Villa Sarchi Hybrid. Therefore, it is also a Sarchimor and was selected for its rust-resistant traits and high yield potential by ECOM-CIRAD. It has a similar genetic makeup to Puerto Rico's Limaní variety and was most likely selected for this reason. However, surprisingly little data is available about the decision-making process between World Coffee Research, Starbucks Foundation, Puerto Rican Coffee Roasters, and the Puerto Rico Department of Agriculture. These three selected varieties are all modern, high-yielding, technified coffees. The varieties should not be conflated with tall coffees. Therefore, the debates surrounding these coffees are centred on questions of different ideas of modernity in Puerto Rico's coffee sector, and the disconnects between public and private actors.

The Emergence of Complex Power Relations

The difficulty of selecting and promoting coffee varieties suggests the emergence of a complex matrix of power struggles between Puerto Rican coffee farmers, the Puerto Rican State, multinational corporations, NGOs, and the USDA. There appear to be competing visions of what Puerto Rico's coffee landscape will look like in the future by public and private actors, despite a common goal of replanting. As in many other crops, coffee varieties and seeds play a critical role as non-human actors in broader political and ecological networks. The flow of these artifacts has led to conflict and tension in the politics of agrarian change in Puerto Rico. This

section will discuss the roles and power of prominent human actors, including the United States Federal government, el Departamento de Agricultura de Puerto Rico, and the private and non-government sectors.

The Role of the Federal Government

The first network of actors to emerge in this matrix of power struggling over coffee varieties are the United States government and the Department of Agriculture. The United States Department of Agriculture has a strict restriction policy in place for importing coffee seeds to Puerto Rico and other U.S. islands. These restrictions intend to limit the spread of diseases and pests (Rochman, 2018; USDA, 2020). In multiple news sources, as well as corporate and non-governmental organization reports. The USDA prohibits the entry of unroasted green coffee in Hawaii and Puerto Rico specifically to mitigate the risk of entry of the Mediterranean fruit fly, coffee berry borer, and coffee rust (USDA, 2020). Any articles from the coffee plant are only allowed entry if there is no risk of introducing pests or diseases (USDA, 2020). It is unknown what other varieties were under consideration for entry.

The severity of the restrictions speaks to the silent power that the USDA holds in Puerto Rico's agricultural landscape, despite taking a back seat in incentivization and subsidy policies for coffee growers. The selection of the Marsellesa variety over hundreds of others represents a distinctive dimension of power in Puerto Rico's agricultural landscape: the domination and authority of the United States as an actor in all aspects of the decision-making process. In regulating the selection and flow of seeds into Puerto Rico, the United States government continues to engage in a type of 'science diplomacy,' asserting a bio-hegemony over the island

(Dowd-Uribe *et al.*, 2014). However, the USDA did approve the Marsellesa variety for entry into Puerto Rico's coffee sector, despite a rigorous selection process to prevent further introduction and spread of diseases and pests.

An additional aspect to consider in the complex power relations between the United States government and Puerto Rican agriculture is the *lack of support* in replanting. The United States Department of Agriculture has mostly stayed out of the coffee replanting initiatives, aside from outlining the seed quarantine procedures and allocating general funding to el Departamento de Agricultura de Puerto Rico (DAPR). The USDA has allocated funding for Puerto Rican agriculture but failed to include Puerto Rico's coffee industry in the Coronavirus Food Assistance Program. However, all official tribunals and efforts must go through federal processes to protest el Departamento de Agricultura's mismanagement of the Marsellesa seeds.

The U.S. development and political agenda also become apparent in the seed selection process. The introduction of the Marsellesa varietal may be a reassembling of desired cropscales (Bray *et al.*, 2019; p. 26) in the sense that it reproduces a social landscape of values and trajectories of Puerto Rico's agricultural development on U.S. terms. The United States has long promoted modernization policies in Puerto Rico and played a significant role in the development of the agricultural landscape (McCune *et al.*, 2018). The selection of the Marsellesa variety echoes broader processes of U.S. environmental, agricultural and disaster colonialism in Puerto Rico.

This cultivar selection also raises questions about the power of Puerto Rican coffee farmers to exercise agency in the varietal selection and land-use practices. Moreover, it draws attention to the disconnect between research institutions, coffee technology, and local coffee

farmers. A study conducted by World Coffee Research revealed similar conclusions about seed scarcity and determined that there had been significant genetic erosion and mixing of Puerto Rico's coffee varieties (World Coffee Research, 2019). The data collected from primary sources do not indicate the value that coffee farmers place on the genetic purity of planted varieties and if research institutions ask the appropriate questions during an agricultural crisis. It is unclear if genetic erosion or varietal mixing problems are of concern to coffee growers or if this is mainly viewed as a problem in the eyes of research institutions. The data also does not suggest farmer preference in variety selection in Puerto Rico and whether producers were consulted in the decision-making processes. This project's scope is focused on the various macro-level and institutional actors and the power they hold. The available data does not allow for a great deal of discussion on why farmers select the varieties they do or their choices in land-use and cultivation styles.

Excessive Bureaucracy in el Departamento De Agricultura

The main delays in quarantining and distributing the Marsellese seeds and the coffee sector's recovery may also be attributed to another network of actors, the Puerto Rican government and el DAPR. A 2021 survey conducted by Rodríguez-Cruz *et al.* found that Puerto Rican farmers perceived issues with the government and bureaucracy, insufficient support from the government and lack of aid to be the most prevalent obstacle in the recovery of their adaptive capacity after hurricane Maria. Additionally, these issues were related to a lack of economic resources and access to material resources and technology (Rodríguez-Cruz *et al.*, 2021).

Another obstacle faced by farmers is the difficulty obtaining payment by la Corporación de Seguros Agrícolas of the DAPR post-Maria (Rodríguez-Cruz *et al.*, 2021).

In 2017, Governor Ricardo Rosselló supported the reorganization of many government departments, including el DAPR. This action intended to consolidate and streamline departments and to make these departments more economically efficient. Within this reorganization included the creation of la Oficina de Cafés de Puerto Rico (OCPR) under Senate Bill 574, designed to integrate coffee pricing functions and centralize activities while assisting with the rehabilitation of the coffee industry. A primary goal of its establishment was to eliminate the excessive bureaucracy of the departments. However, la OCPR was still not established and functioning as of 2019.

Rosselló was later charged with defrauding the federal government by misusing disaster aid funds. Flores Ortega was also investigated separately by la Asociación de Agricultores de Puerto Rico for allegations of misconduct and lack of support to the agricultural sector. Héctor Cordero Toledo, president of la Asociación de Agricultores de Puerto Rico, highlighted a delay in receiving \$4.8 million to the dairy sector and \$57 million and two million seeds to the coffee sector as the main reasons for the investigation (Rivera Clemente, 2019). Secretary Flores Ortega also publicly opposed Senate Joint Resolution 175 to order el DAPR to issue annual payments to coffee farmers who lost their crops from hurricane Maria, stating “porque no hay dinero para eso” (Saker, 2018).

As of January 2019, the government handed out approximately 425 000 coffee plants, with 3 million left available for planting during the rest of the year (El Nuevo Día, 2019). The first Marsellesa seedlings were sown in Adjuntas in September 2019. A press conference was

called, and Flores Ortega attended with the Starbucks Foundation and the Hispanic Federation to inaugurate the first planting of 4 500 Marsellesa seedlings. Records from January 2020 indicate that 1 214 674 coffee trees of the Frontón, Limaní and Marsellesa varieties were delivered to growers (InterNewsService, 2020). The data collected does not indicate the percentage of each variety planted or how many more Marsellesa seedlings were planted. The data also does not indicate if any of the seeds were no longer viable by the time they finished quarantine.

In this case, a gap in the data on dates the Marsellesa seedlings were planted may indicate further stalling of the replanting endeavours by the DAPR. The Marsellesa seedlings complied with federal regulations and were quarantined until December 2018. However, there is no formal press release explaining why the DAPR did not distribute these seedlings until September 2019, over a year after their donation, and why only the Limaní and Frontón seedlings were distributed.

The lack of Marsellesa coffee seedling distribution and replanting by the DAPR indicates growing tensions and power struggles between el DAPR, the USDA, and private and non-government actors. The DAPR very clearly struggles to receive support from the federal government, as evidenced by the lack of payment by the United States Customs and Border Protection Office for coffee importation taxes and in support of Coronavirus relief. After the hurricane, the government also struggled with corruption and the rebuilding of critical infrastructure. Nonetheless, el DAPR is not a powerless entity.

It appears that the DAPR does hold a significant amount of power in the replanting project, as the organization stalled the planting of the Marsellesa seedlings for over a year. Given the amount of social and media-related pressure to plant the Marsellesa seedlings while Limaní

and Frontón varieties were planted and the investigation by la Asociación de Agricultores de Puerto Rico, it appears that this was intentional and not the result of bureaucratic institutional structures. The various offices within the DAPR, including but not limited to la OCPR and la Corporación de Seguros Agrícolas, struggle with excessive bureaucracy and are largely unproductive. Like many domestic regulatory bodies governing in the present diversification and reconsolidation phase, la OCPR remains underfunded and has limited responsibilities (Grabs & Ponte, 2019). La OCPR took more than two years to establish, while coffee growers struggled to receive insurance payments and adapt to post-Maria circumstances and continued shocks. The same office that was created to address issues of bureaucracy has become unnecessarily bureaucratic. Héctor Cordero, president of la Asociación de Agricultores stated that la Oficina “se ha convertido en letra muerta” (Rivera Giusti, 2019). The coffee industry does not appear to be a priority of the DAPR, despite the cultural and social significance of coffee on the island, its economic importance, and the media coverage of the industry after the hurricane.

Private Sector & Non-Government Organizations

Another aspect that must be considered in the coffee landscape is the role that private and nongovernmental organizations play in creating change, and the power that they hold. A major challenge in the replanting projects is aligning private actors in the absence of a solid state presence in the coffee sector. For over a decade, Puerto Rico Coffee Roasters have held a monopoly on most Puerto Rican domestic coffee brands. The Hispanic Federation and its associated nonprofits have maneuvered themselves to become key players in Puerto Rico’s agricultural future.

Puerto Rico Coffee Roasters works with and supports Procafé, one of the main critics of el DAPR. Puerto Rico Coffee Roasters is also a major supporter of private replanting initiatives and is a subsidiary of Coca-Cola Company. The company also owns almost all of the most popular coffee brands in Puerto Rico and has a major say in the control of production. Despite the profits of this company going towards the mainland U.S., Puerto Rican baseball player Iván ‘Pudge’ Rodríguez is the face of a 100 percent Puerto Rican Coffee brand, conveniently compatible with Nespresso Machines. Perfecto and Vandermeer (2018) have argued that Puerto Rico Coffee Roasters is “actively engaged in taking over the coffee industry” and is a threat to farms existing post-Maria. However, Puerto Rico Coffee Roasters has become an advocate for replanting and accountability of the coffee industry. The company has expanded its existing coffee nursery in Vega Baja and constructed a new nursery in Jayuya and works with Procafé and ConPRometidos (Grupo de Diarios Americana, 2018).

The involvement of Puerto Rico Coffee Roasters in replanting is a double-edged sword. On one side, the massive support of replanting ensures that the island will have a coffee industry for the years to come, with public sector accountability. On the other side, Puerto Rico Coffee Roasters secures its hold on Puerto Rico’s coffee market and ensures its own future supply. Grabs and Ponte (2019) find that in the most modern phase of coffee global value chain restructuring, financialization of the coffee sector has increased, as well as the domination in price-setting and storage capacity of international actors. Puerto Rico Coffee Roasters has positioned itself to be one of the main brokers of the coffee trade on the island.

The Hispanic Federation has spearheaded the organization and funding of the Starbucks Foundation, the Rockefeller Foundation, the Fonadellas Foundation, Nespresso, and the technical

expertise of World Coffee Research and Technoserve, amongst other organizations. The nongovernment sector has played a surprisingly political role in the replanting project and is not a passive actor by any means. The group of organizations working together has been surprisingly well organized on the funding side of planning, but not necessarily on the nursery and planting side.

As a part of their Revive el Cafetal Puertorriqueño initiative, the Hispanic Federation has subsidized the cost of 2.25 million Frontón, Limaní and Obatá PR coffee seedlings in partnership with Technoserve. As of September 2020, the Hispanic Federation had distributed more than half a million coffee trees as a part of the Revive el Puerto Rican Cafetal program (CE Noticias Financieras, 2020). Although this is not the entire amount promised, it is a significant effort on behalf of the Hispanic Federation. Nonetheless, despite partnering with the Starbucks Foundation to bring in the Marsellesa seeds, the Hispanic Federation has not included the Marsellesa variety in this offer.

The political and social history of the Hispanic Federations founder further complicates its position in the industry. The Hispanic Federation was founded by Luis A. Miranda, Jr., former politician and father to Lin-Manuel Miranda, famous playwright, and actor. The Mirandas were advocates for PROMESA, the Puerto Rico Oversight, Management, and Economic Stability Act which established a Fiscal Control Board to oversee debt restructuring after hurricane Maria. This act, and Miranda's presence in the island's coffee sector and economy have proven controversial. Luis Miranda has worked for both public and private sectors in the past and has managed the senate campaigns of Hillary Rodham Clinton, amongst others (Rodriguez *et al.*, 2019). His son, Lin-Manuel Miranda's performance of *Hamilton* was protested at the University

of Puerto Rico for his advocacy of the PROMESA bill (Jackson, 2019; Paulson, 2018; Pollack-Pelzner, 2019; Rodriguez *et al.*, 2019). Lin-Manuel was also quoted comparing the assistance of these organizations to “the ‘Avengers’ of coffee,” superheroes called in “when things are difficult,” implying that outside aid was necessary to resolve Puerto Rico’s coffee industry issues (Wyss, 2018).

The Hispanic Federation has previously been met with criticism over its relationships with corporate leaders, and notably its past relationship with Coca-Cola (Cohen, 2014). Some critics of the Miranda family and the Hispanic Federation argue that by introducing more corporations into Puerto Rico’s coffee sector, the Hispanic Federation has given Luis Miranda new power and influence in the struggling coffee industry (Jackson, 2019; Rodriguez *et al.* 2019). In an op-ed titled “Disaster Act,” Rodriguez *et al.* (2019) go so far as to argue that Miranda and the associates of the Hispanic Federation are “pulling off a soft coup on the archipelago”. Although this sentiment seems extreme, it prompts a call for further research into the policies of the private and non-profit actors in Puerto Rico’s coffee sector and their hidden relationships. The full extent of these relationships is not available within the data set for this project.

A silver lining to the Puerto Rico replanting projects has been the work of Technoserve, World Coffee Research, and Procafé. As a part of the Revivamos Nuestro Café program, another program in partnership with Nespresso, the Hispanic Federation, and Colibri Foundation, TechnoServe has been providing training on agricultural practices that boost resilience to future climate threats (TechnoServe, 2021). The training also offers methods to help farmers increase their yields and access better supplies and markets. The assistance to farmers will be a critical

aspect of the success of all of the varieties planted. In Chiapas, Mexico, after the coffee rust, extension and transitional organizations and cooperatives have become an important part of private coffee regeneration programmes (Ruiz-de-Oña & Merlín-Urbe, 2021). Ruiz-de-Oña and Merlín-Urbe (2021) find that insufficient capacity of government programs in Chiapas, Mexico, hampered the successful management of new hybrid coffee varieties. The authors also highlight the potential risk of introducing a new variety and strategy without the essential resources to support the conversion. However, seedling supply and donations from NGOs in the area assisted farmers when government programs could not support them. In a similar manner, working with NGOs or organizations outside of the government may be a more supportive opportunity for Puerto Rican coffee growers.

World Coffee Research, a research nonprofit, has conducted genetic testing on the island's coffee varieties and works with local farmers to provide training and materials. World Coffee Research has partnered with the same organizations, and Puerto Rico Coffee Roasters to accomplish these goals. Although TechnoServe and World Coffee Research may have their own agendas in the project, these two organizations work closely with coffee growers. The challenge with so many different private and NGO actors is to align all values and agendas to successfully accomplish the project. As the project is still in the planting stages, limited data is available thus far on the return for coffee growers as a result of these programs.

As previously discussed, Iris J. Rodriguez, Procafé, and la Asociación de Agricultores de Puerto Rico have been essential in calling for the accountability of el DAPR and advocating for the rights and defense of coffee growers. Without the calls from la Asociación de Agricultores for an investigation into agricultural incentives and funding, el DAPR's negligence and the

failure of la OCPR may not have reached Federal ears. Based on the data, Procafé appears to be the strongest coffee growers associations on the island. Nevertheless, Procafé does not necessarily represent the opinions of all coffee farmers in Puerto Rico. Procafé also does not have the same amount of power as coffee grower associations in other major coffee producing countries like Brazil and Colombia. In Brazil, coffee farmer associations such as the Brazilian Coffee Industry Association (ABIC), the Brazil Specialty Coffee Association (BSCA) and the Cerrado Mineiro Coffee Growers Federation have played a significant role in coffee agribusiness, and frequently work with the Brazilian government to benefit farmers (Barra, 2020). The Coffee Federation of Colombia (FNC) has historically held great political influence, and is backed by the federal government (Thorp and Durand, 1992). Two of the most successful coffee producing nations have very strong farmer associations that are able to mobilize the state. Procafé does not hold the same level of research and institutional power, and is frequently working at odds with the Puerto Rican state.

Puerto Rico's coffeelands are in a process of transformation, with many new actors coming into play. Each actor is focused on a different piece of a very large puzzle. The goals of public agricultural institutions are different than the private and non-government actors. However, all of these actors are working within a complex network, both with each other, and at times against each other, to determine what the future of Puerto Rico's coffee industry will look like. The lack of consensus between actors indicates competing visions for development in the coffeelands. Ultimately, these social and political tensions have impacted farmers the most. It will be the farmers who lack the necessary subsidies, benefits, extension services and inputs from

the state in the upcoming years to be successful. Despite this impact, coffee growers have hardly been involved in the decision making processes between public and private industry.

This chapter has presented an analysis of actors, their respective networks, and power in Puerto Rico's coffee landscape. I have argued that the replanting efforts are bureaucratic, fragmented, and complex. Non-human actors, the coffee seedlings, represent competing visions for the development and modernity of Puerto Rico's future cropscape and political agendas. Institutional actors have created barriers to coffee growers and industry sustainability. The actions of private industry and non-governmental organizations are not passive and represent a power grab for Puerto Rico's coffeelands. In the subsequent chapter, I make recommendations for ways to enhance collaboration between public and private actors in the coffee industry.

Chapter 6: Recommendations & Conclusion

Since Hurricane Maria hit Puerto Rico in September 2017, the island has experienced a reorganization of power in the coffee sector. The coffeelands have become a site of political and social tension between human and nonhuman actors. These actors operate within a complex matrix of power, resulting in a fragmented industry response. Despite a common goal of replanting coffee seedlings, public and private actors have been working at odds. Most of the industry tension has surrounded the importing, dissemination and planting of donated coffee seeds and a lack of support to coffee growers. The U.S. Department of Agriculture holds power over el Departamento de Agricultura and influences its capacity to respond to climate shocks and import coffee plant matter. El Departamento de Agricultura and its relevant offices are excessively bureaucratic and fail to provide adequate support and services for coffee farmers. The private sector interests in replanting Puerto Rico's coffeelands indicate an opportunistic power grab made possible by the hurricane and weak state power. Non-governmental organization and farmer association efforts are noteworthy but do not address larger institutional issues. Greater collaboration between all actors is sorely needed in the replanting project and the coffee industry.

To address the fragmentation and bureaucracy in Puerto Rico's coffee sector, and attend to my final research goal, to make recommendations for better functioning of collaborative efforts between public and private actors, I recommend: that a formal organizational body or institute is established to oversee the coffee sector; that there is greater accountability and

transparency of Puerto Rican and Federal Agricultural Departments; the immediate funding and planting of coffee seedlings; and changes in cultivation techniques at the farmer level.

1. **Establish a formal organizational body or institute to oversee coffee sector**

sustainability and collaborative efforts between public and private actors. At present, no formal regulatory body adequately oversees the more outstanding issues of the island's coffeelands. All actors involved in the coffee sector focus on different parts of the issues related to coffee sector sustainability. There must be a formal organizational body with representation from both public and private industry that is inclusive of farmer perspectives and representation. Puerto Rico's coffee sector is much smaller than major producers such as Brazil and Colombia, with several farmer associations, cooperatives, and regulatory bodies. I recommend that an institution similar to the Instituto del Café de Costa Rica (ICAFFE) be established to defend coffee growers and mobilize government support. ICAFFE has a board of directors from both public and private institutions and has successfully established Costa Rica's place in the specialty coffee market (Inter-American Development Bank, 2014). Private sector representatives and their selection are outlined by law to ensure fair and democratic representation of all market participants (Inter-American Development Bank, 2014). In the case of Puerto Rico's coffee sector, this would be beneficial to regulate the power of private actors. Furthermore, ICAFFE is self-governing and is considerably independent of political authority (Inter-American Development Bank, 2014). This may also help mitigate the bureaucracy of el Departamento de Agricultura and la Oficina de Cafés de Puerto Rico. Another factor critical to the success of ICAFFE is the strong representation of small producers and their

exceptional organization (Inter-American Development Bank, 2014). Some producers in Puerto Rico are already a part of Procafé, which may be expanded upon or connected to a coffee institution.

2. Greater accountability, transparency and cooperation of el Departamento de Agricultura and the Federal Department of Agriculture.

To an extent, Puerto Rico's coffee landscape is an expression of its policy. The lack of coffee replanting and sectorial support is a result of lacking public agricultural policy. El Departamento de Agricultura must be held accountable for its actions and funding, and insurance promises. Further federal investigation should be launched by the Asociación de Agricultores or other organizations into the coffee sector mismanagement at the Puerto Rico and U.S. government levels. The U.S. Department of Agriculture should also be held accountable for money owed to the local department and for their exclusionary agricultural policies, such as the Coronavirus Food Assistance Program (CFAP). Additionally, Gladkikh et al. (2020) and Rodriguez-Cruz et al. (2021) have highlighted institutional obstacles in receiving subsidies for agricultural practices and adaptation to climate shocks and natural disasters. Insurance and subsidies must be made more accessible to farmers, with greater transparency in the requirements for these subsidies. Specifically, agricultural insurance for coffee growers must be more accessible for all cultivation methods and with payments for impacts of natural phenomena.

3. The immediate funding and planting of at least 6-8 million coffee seedlings and expansion of nursery capacities.

As previously mentioned, at least 6-8 million seedlings were needed immediately as of 2019 to ensure Puerto Rico's coffee industry sustainability. Hurricane Maria damaged and destroyed almost three times this amount of coffee trees in 2017. The private sector and actors such as Puerto Rico Coffee Roasters and the Hispanic Federation may be more helpful in securing funding and resources than the government for these coffee seedlings, despite their challenging positions in the industry. Nursery capacities will also have to be expanded to germinate coffee seeds. Varietal selections should be made in partnership with Procafé and local farmers, and the U.S. Department of Agriculture must play a more supportive role in the importing process.

4. **Changes in cultivation practices at the farmer level.**

This project has focused primarily on the macro-level actors in Puerto Rico's coffee industry. However, under current circumstances, coffee growers cannot expect support from the public sector. If the previous recommendations are not met and farmer business models depend on sustained public support from the Puerto Rican government, they may encounter future difficulties. In this situation, coffee farmers have multiple possibilities to continue to make an income despite a glaring lack of public support. Crop diversification may be an option for some farmers. Notably, the diversification of fruit tree species may contribute to a broadening of income, provide shade for coffee plants and sustainable forest use (Fujisawa *et al.*, 2012). If coffee growers prefer to grow only coffee, switching from dwarf, sun-intensive varieties to a taller cultivar such as Bourbon may be an alternative solution. This would also take the form of de-intensification and de-technification. Taller varieties such as Bourbon require less agricultural inputs and still

produce high-quality coffee (Ruiz-de-Oña & Merlín-Urbe, 2021). Intensive organic production that does not require pesticides or fertilizer may be another opportunity for de-technification.

This research has focused primarily on a macro-level analysis of public and private actors. Future research on this topic might address the local and regional perspectives of these issues through surveys of Puerto Rican coffee growers on the replanting project and coffee industry. My study has also referenced the lack of public support and fragmented responses in the case of El Salvador's coffee sector. A comparative study between Puerto Rican and Salvadoran farmers and their institutional challenges may yield significant results for future opportunities for coffee growers outside of the state.

Puerto Rico's coffee industry issues and vulnerabilities are further exacerbated in the face of climate change and natural disasters. Without industry cohesion and supportive public policy, coffee growers have less adaptive capacity to these shocks. Despite its cultural significance, the present coffee landscape is at risk of disappearing from the island. If these industry issues are not addressed, the future of Puerto Rico's coffee sector will be in jeopardy.

Ultimately, I hope that this thesis will encourage further research on coffee industry sustainability and development issues, and that it will be utilized by various nongovernment agencies and government bodies to enhance public-private collaboration and policy development. Lastly, it is my hope that this thesis will contribute to a broader understanding of political and socio-ecological issues in coffee agroforestry systems.

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