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Agrarian Dreams, Agricultural Realities:
Agricultural land conversion in Mexico's Chihuahuan Desert

by

Tracy V Hruska

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Environmental Science, Policy, and Management

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Lynn Huntsinger, Chair

Professor Nancy Lee Peluso

Professor Nathan Sayre

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Abstract

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Doctor of Philosophy in Environmental Science, Policy, and Management

University of California, Berkeley

Professor Lynn Huntsinger, Chair

This dissertation examines the drivers and socioeconomic process of the conversion of rangeland to irrigated crops in Janos County, Chihuahua since 1970. The research was motivated by a desire to understand why irrigated agriculture was expanding in this site when there were no such expansions in adjacent regions. I analyze the historical roots of agricultural expansion as well as the contemporary social and economic dynamics that propel it today. Data came from 166 interviews with landowners, ex-landowners, laborers, and local officials, as well as from historical land records. Results reveal the importance Mexico's national land reform (~1920-1992) in breaking up large ranches and creating opportunities for small farms to become established, even if many of those small farms—especially on ejidos—ultimately failed. I attribute the majority of rangeland-to-cropland conversion to Mennonites, whose commodity farms have proliferated through both in-migration and capitalist investment of agricultural profits.

My research contributes to the wide-ranging literature on Mexico's ejido system through the analysis of dynamics on the arid lands ejidos in Janos County. The Janos ejidos differ from the preponderance of cases in the literature in that they were founded through very different mechanisms and have seen far higher rates of land sales and consolidation. I contribute to the literature on agricultural frontiers by discussing agricultural expansion in arid rangelands rather than in tropical forests, where most of the literature is centered. The contrast between stagnating agriculture on the ejidos and expanding agriculture by Mennonites reveals both the importance of capital access in desert farming and the prominent role that social and cultural capital play in improving access to agriculture. In Janos, addressing the 'agrarian question' entails a close examination of capital access as well as intragroup social dynamics.

Commercial cattle grazing has been the dominant land use there for at least 300 years, though the percentage of land under crops has expanded significantly in recent decades, irrigated with groundwater from a declining aquifer. The proliferation of irrigated agriculture has roots in Mexico's national land reform, which ran nearly from the end of the Revolution in 1920 until

1992. The land reform fractured the vast cattle ranches that had previously dominated Janos County and redistributed a third of the land area in the form of 14 ejidos. The land reform also incentivized ranchers to sell land rather than have it expropriated by the government, which enabled groups of Mennonites from central Chihuahua to buy thousands of hectares at a time starting in the 1950s. Those parcels became the first four Mennonite colonies in Janos County and the hubs of ongoing cropland expansion.

The process of ejido formation in Janos County was different than in most studies of central and southern Mexico, with profound impacts for land use and rights ownership. Ejidos here were not formed through restitution of land rights to long-term residents, indigenous communities, or even occupiers. Instead, land rights on new ejidos were given to landless laborers who had signed petitions demanding land through the land reform process, laborers who were most often living more than hundred kilometers from Janos County and had never been there. The freshly minted ejidatarios who came to Janos County to begin their new agrarian lives lacked the equipment, the investment capital, the farming expertise, and the social relations with each other needed to establish farms. While government support for these communities was significant, it was only sporadically sufficient to establish agricultural livelihoods. Out-migration and land sales were rampant, particularly after Mexico's neoliberal policy reforms of the late 1980s and 1990s. There has been significant consolidation of land control on the ejidos since the 1990s, which has facilitated the ability of some households to earn a modest living from cattle or crops. On nearly every ejido, there remains land officially designated for farming that is still used only for cattle grazing.

Founders of the first four Mennonite colonies in Janos County had come from Mennonite communities in west-central Chihuahua, and those communities had been founded by Mennonites immigrating from Canada in the 1920s. Mennonites in Janos County are Mexican citizens or dual Mexican-Canadian citizens but are in nearly every way deliberately distinct from mainstream Mexican society. They still speak Spanish as a second language, if at all, and they live in clearly defined colonies with their own churches, schools, businesses, and minute governmental institutions. They are also farmers first and foremost, though there is some economic diversification. Mennonite settlers arrived to Janos with sufficient economic means to establish irrigated farms – mostly modest – and construct functioning community centers with minimal state support.

Mennonite colonies are ethnic enclaves that maintain high stocks of social and cultural capital that improve access to farming and foster loyalty to the home community and to farming as a livelihood. Social practices of cooperation and preferential treatment reduce the economic burden of establishing new farms or expanding existing farms, such as sharing farm machinery and paying each other for land or expensive services in annual installments without interest. Mennonites also have their own sources of formal and informal credit that are difficult for outsiders to access. The Mennonite agricultural access regime has enabled farmers to gradually intensify and expand their farming operations over time. Mennonites now routinely tap into international markets to grow genetically modified cotton, in addition to chili peppers, onions,

and other crops that are planted, weeded, and harvested by migrant workers from southern and central Mexico.

Agricultural production in my focal communities was always of ubiquitous commodities produced primarily for the market, but since the 1990s there has been something of an agrarian transformation underway. The area of irrigated crops has expanded rapidly, driven in part by economic differentiation of farmers and consolidation of landownership. The national neoliberal policy changes in the 1990s enabled these changes, as they served to increase the costs of agricultural production, significantly alter credit access, open new agricultural markets, and legalize the sale and rental of ejido land rights. While rising production costs drove some ejidatario and Mennonite farmers to sell out and migrate, new markets and sources of credit enabled wealthier Mennonite farmers to intensify and expand their operations. Increased farm profits among the emerging Mennonite elite were plowed back into purchases of ejido parcels and new blocks of ranchland outside the original colonies. The expansion drove up property values, further incentivizing ejidatarios and ranchers alike to sell land to Mennonites. High property values and competition for land are major barriers to entry for young would-be farmers, breeding new concerns over social justice and community values. Meanwhile, irrigated agriculture continues to expand outward from the original Mennonite colonies and the aquifer continues to fall.

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Chapter 1: Introduction

The story of agricultural expansion in Janos County is about property rights and land sales, farming technology, cultural values, and migration. To understand the complete picture, we have to look at three different groups of actors who are all entwined in creating the patterns of landownership and land use that have evolved so radically over the last half century. I present the following three portraits of men I interviewed as archetypes whose histories reflect the dynamics of the groups they belong to and the relationships between those groups and the land. Their individual stories are, of course, unique but also share much in common with their peers and together offer a view into the dynamics at play.

Miguel Willam has owned his ranch for more than 40 years now, and the decades of hard work are visible in his slow and careful gait. He is tall, pale except for his hands, and white-haired. During our interviews, he speaks most of the time in Spanish, but follows any side conversations in English between me and my assistant, and sometimes responds in English. His father was from the US, and had crossed into the Mexican state of Chihuahua from Texas as a young man with his parents, his brother, three cousins, and a herd of cattle in the 1920s, not long after the Mexican Revolution had come to an uneasy close. The Willam family rented land as they went, always moving west across northern Chihuahua. Along the way Miguel's dad met and married a young Mexican woman from the desert area of northeastern Chihuahua.

The Willam family settled in Janos County [properly Municipio Janos, with a municipio being largely equivalent to a US county] in 1930, and Miguel was born shortly thereafter. For a time the family rented rangeland from the families of generals who had received it for their part in the Revolution. Such generals often had thousands of hectares of land but not necessarily any interest in ranching. Most of the land had previously been part of either the Corralitos Land and Cattle Company or the Palomas Land and Cattle Company, which together had comprised well over a million hectares. Both ranches had been built up by American tycoons and both were gradually whittled down after the Revolution by government expropriations and mandated sales. Over time, Miguel's grandfather, and then father and uncle, earned enough cattle profits to buy their own ranches, and then to expand. The family came to own most of the southern part of the county, perhaps 100,000 ha (by my estimates, based on existing ranches), but not managed together and not all owned at the same time.

As part of the long-running land reform that was created in the post-Revolution constitution, Miguel's grandfather lost a portion of his holdings to government expropriations and forced sales in the 1950s. Then Miguel's father – who by that time had bought his brother's properties as well – was again forced to subdivide his holdings in the early 1970s. Some land was expropriated and became an extension to Ejido Casa de Janos [ejidos are a form of communal land ownership endemic to Mexico, to be explained later], one parcel was sold to a Mennonite colony for farming, some sold to ranchers, and the remainder legally divided and distributed among all the members of the Willem family, plus their lawyer. Today Miguel's ranch is about 10,000 ha but it has never been in his name. Having learned from his family's

experience that American-born ranchers are more likely to be targeted for expropriations, Miguel's land is officially in the name of his wife and kids.

Don Rafa, while not the eldest resident, is the elder statesman of Ejido San Pedro. Like most other houses in the village, his is made of hand-made adobe bricks and roofed with corrugated steel, but it stands out as being better maintained and more freshly painted than most. By village standards, he is doing well: he runs about 80 mother cows in conjunction with one of his sons, and also rents out farmland irrigated with a well to a Mennonite from the neighboring Colonia Buenos Aires. His land holdings – all part of the ejido – were purchased over time from other ejidatarios [rights-holding members of an ejido] who were either in need of money or, more often, emigrating to the United States. Emigration is part of his family's story too, as four of his five sons live in the US, and the remaining son is only in Mexico because his US visa was (illegally, from what I can tell) confiscated by US Customs and Border Patrol officials.

Don Rafa is originally from the state of Zacatecas, to the south. He had been working as a miner in Chihuahua in the mid-1960s when he signed a petition requesting land. He received a parcel in Ejido San Pedro and moved his wife up from Zacatecas to homestead it in 1972. Initially he worked odd jobs in the area for cash, as he could not afford to start farming or raising cattle. Around 1980, the government drilled a couple of irrigation wells in the ejido, and for a few years some 30 ejidatarios farmed cooperatively, using the best well. Eventually they received a few more wells and split into smaller groups. When government farm support programs for ejidos ended in the early 1990s, most ejidatarios could no longer afford to farm and began emigrating. Don Rafa stuck it out for nearly a decade, farming without credit. By the early 2000s, he could not earn enough from crop sales to earn a profit, in part due to rising electricity costs for his irrigation pump. He began renting out his land and well to a Mennonite who does earn a profit. Don Rafa now concentrates on his cattle instead, and the earnings from calf sales make up most of the income for his son's family and him.

Johan grew up in Colonia Buenos Aires, one of the five Mennonite colonies in Janos County. His parents gave him five hectares of land with a good irrigation well and two cows when he got married. Even that small parcel was hard for him to farm initially, and without his dad's help and use of his dad's tractor, he never would have gotten on his feet. His parents both moved to Bolivia in the early 1990s, when about half the colony moved away in protest of the arrival of electricity, selling their land to other Mennonites in Janos County. It was too hot and humid in Bolivia for Johan, so he stayed in Janos.

To grow his operation, Johan took out a five-year loan with no collateral from someone who knew his father. With it, Johan bought four contiguous 20-ha parcels on a neighboring ejido that were designated for farming but had never been tilled. He cleared the land himself and irrigated it with a pipe he ran from the well his parents had given him. He made no payments on the loan for the first two years but paid it off entirely in the following three. In following years, he earned enough money from his fields to buy another 80 ha of virgin land, drill a new well on it, and put it into production growing mostly cotton and beans. With farm profits he also built a new cinderblock house on the ejido next to his fields, which meant he also had to pay to run nearly a mile of new dirt road, plus half the cost of a kilometer of power lines and a transformer (his brother paid the other half). He also owns a second house with 10 ha of farmland that is for

his full-time worker. Recently, Johan started renting another 40 ha on a different ejido from four different ejidatarios who all live in Ciudad Juarez.

Johan's house is simple but fairly large and comfortable, furnished much like any home in the US, with a few notable exceptions. We held our interview in a room with couches and easy chairs specifically laid out for conversation. The room had nothing on the walls and was devoid of electronics except for the overhead light. Johan described a comfortable life for himself in Janos but hopes one day to move to one of the new Mennonite colonies in Colombia. There is basically no more land available in Janos, so he doesn't think he will be able to expand his operation much more. If he cannot expand, there is nothing to spend his farm profits on, and less land available to pass on to his sons. In Colombia, there is plenty of land available for expansion and plenty of rain, which means no more worrying about electricity costs for water pumps or about wells going dry. If you farm land for four years there, you earn legal residency. If he does leave Janos, he plans to sell his land to another Mennonite farmer, probably on a ten-year installment plan (a payment period that, I know from other interviews, is quite generous).

Introduction

In the past forty years, irrigated agriculture has exploded in an unlikely corner of the Chihuahuan Desert. Janos County, in the very northwestern corner of the state of Chihuahua (Figure 1), has seen the native grasslands and shrublands bulldozed and perforated with increasingly deep irrigation wells. Where cattle ranching was once the dominant economic activity, there is now a booming regional and international trade in chili peppers, onions, maize, and genetically-modified (GM) cotton. Yet there is no such crop boom just across the United States (US) border in New Mexico, nor west across the state border in Sonora. Why agriculture was booming in Janos but not across either political border was the puzzle that drove my research. The three characters that introduced this chapter represent the three principle groups of actors in this account, each of which had an important part to play in the expansion of agriculture: ranchers, ejidatarios, and Mennonites. This is a study of that agricultural expansion: how it happened, who did it, and why. The conversion of the desert landscape in Janos has radically altered the local economy and generated thousands of livelihood opportunities, though with significant inequality in pay and upward mobility. It also has profound ecological ramifications and is utterly reliant on an aquifer that is declining at an alarming rate.

The western border of Janos County and the western edge of the Chihuahuan Desert is the Sierra Madre, a mountain range that divides the Mexican states of Chihuahua to the east and Sonora to the west. At the northern end of the range, it fractures into basin and range country with small, isolated mountain ranges called the Sky Islands or, occasionally, the Madrean Archipelago. The Sky Islands span the US—Mexico border, and in the US they span the Arizona—New Mexico border. In the arable basins of southern New Mexico, still well within the Chihuahuan Desert, irrigated farming began in earnest in the 1950s but has long since stagnated. Many old farms have been idle for decades, often grazed by cattle. The population of this county, Hidalgo, has declined by more than 25% (about 1,700 people) since 2000, shortly before the largest employer in the area, the Freeport-MacMoRan copper smelter, shut down

for good. It is, in other words, a vivid but perhaps unremarkable example of America’s rural decline.

The climate and the landscape of Janos County are, for practical purposes, identical to southwestern New Mexico. Cattle ranching is still the dominant land use in the county but irrigated crops are gradually replacing the grass and scrub. The Chihuahuan Desert has largely resisted intensive farming since long before the Spanish arrived in the late 16th century, and agrarian settlement has historically been marginal and usually short-lived. The difference between Hidalgo County and Janos County is not biophysical, it is political economic and demographic. Understanding what conditions drove the agricultural expansion in Janos County – where a biosphere reserve was declared in 2009 specifically to constrain it – offers important insights for studying how agricultural economies develop and how land use decisions are made.

Figure 1. Janos County (*Municipio Janos*) is located in northwestern Chihuahua, bordering the Mexican state of Sonora to the west and the United States state of New Mexico to the north. The Sierra Madre mountains run through the western edge of the county, while the eastern portion is Chihuahuan Desert basin and range.



After the Mexican Revolution (1910-1920), the Mexican government expended vast sums and shuffled legal ownership specifically to benefit *ejidos*—a particular form of agrarian community endemic to Mexico—of which there are 14 in Janos County. The *ejidatarios*—rights-holding members of the ejido—received free land, financial supports to build homes and

villages, heavy subsidies on farm inputs and price supports on staple crops, and massive financial assistance with infrastructure. Despite those efforts, the ejidos in Janos today control relatively little crop agriculture and all but one have lost population as residents seek better economic opportunities elsewhere. The agricultural expansion in Janos¹ has instead been conducted principally by Mennonites, who received no such government support.

Why were government efforts to create agrarian communities in Janos largely unsuccessful, but Mennonite colonies that acted independently have thrived? The answer, I argue, is tied up in the particular social and cultural institutions that supported Mennonite agriculture and, conversely, in the structural mechanisms that founded and undermined the ejidos in Janos County. The type of irrigated, mechanized farming practiced in Janos is expensive, and the investment costs of entry are high. Ejidatarios who came to Janos were utterly unprepared to meet those costs, and the government support structures were ultimately insufficient. Mennonites, conversely, arrived in Janos County with greater personal wealth and established social practices that facilitated access to the expensive needs of modern commodity agriculture: irrigation wells, farm machinery, and annual inputs (seeds, fertilizer, etc.). The different trajectories of the ejidatarios and the Mennonites reveal the dependence of agriculture on capital access in such challenging conditions as the Chihuahuan Desert.

Research Approach

The focus of this study overall is on land use/land cover change (LULCC). I studied that LULCC through the lives of the people who experienced them, rather than through remote sensing techniques or by quantitative analysis of government statistics. Offen (2004) described this type of study as a political ecology approach to historical land use/land cover change, one of the four principle types of historical political ecology. The study did not emerge from a debate in the literature or an attempt to test a particular theory but instead as an attempt to solve the puzzle of agricultural expansion in an unlikely place. Overall, my approach to understanding agricultural land conversion in Janos centered on talking to individuals about their own experiences with landownership, with agriculture, and, in some cases, with their struggles to acquire land. The conclusions I draw from this approach emerged slowly and imperfectly, with exceptions to every pattern I identified. I came gradually to my explanation by stitching together the personal experiences of 134 individuals in Janos and identifying the emergent themes. Over eight months in the field, I was able to “reconstruct local environmental histories, or the history of local environmental change and its conceptualization, and then contextualize these histories in social, political-economic, state intervention, and discursive changes extending back a couple of generations” (Offen, 2004, p. 27).

From the beginning of my research, I knew that I wanted to conduct research with all three of the dominant landowner groups in Janos County: Mennonites, ejidatarios, and ranchers. Mennonites and ejidatarios do the vast majority of the farming in Janos County.

¹ Rather confusingly, Janos County also contains a town named Janos – the largest population center - and an ejido named Janos, which actually contains the town but retains a largely distinct governmental structure. Of the three, I will refer most often to Janos County, which I will often simply call Janos. When referring to either the town or the ejido, I will use ‘town of Janos’ or Ejido Janos, respectively.

Ranchers have the smallest numbers but control the most land. Ranching was also the dominant land use in Janos County before the land reform created ejidos and before the Mennonites arrived. I wanted to understand why and how land had historically been transferred from ranchers to Mennonite colonies and ejidos, as well as why ranchers are continuing to sell land to Mennonites. Ranchers are not conducting the conversion of rangeland to irrigated crops themselves, so understanding agricultural land conversion also requires understanding what drives land transfers.

To understand why irrigated agriculture in Janos has been expanding so rapidly over the last three decades, I had to look at the historical events that made it feasible. Mennonites first emigrated from Canada to Mexico in the 1920s, just as the national land reform was getting started. The Mexican Revolution was largely fought over land rights, and the land reform radically restructured land tenure throughout the country. As I talked to Mennonites and ejidatarios alike about their own and their parents' arrival to Janos from other regions, I realized the importance of the land reform for creating the land use patterns now on display. The manner in which the land reform was enacted in Janos over many decades both brought the Mennonites to Janos and facilitated ongoing land acquisitions and conversion. Conversely, the particular way that ejidos were created in Janos through the land reform put them at a significant disadvantage for bringing their land into profitable production, a disadvantage which most were not able to overcome.

Historical pre-conditions alone are not sufficient explanation for ongoing social and land use transformations, however (Blaikie, 1985; Lambin et al., 2001). The Mennonites have been remarkably successful at acquiring rangeland and putting it to the plow. Even more remarkably, the majority of the Mennonite farmers I interviewed make a comfortable living from farming. Despite the fact that there are agricultural Mennonite colonies in more than half a dozen countries in Latin America, there are remarkably few studies describing them. I had to learn for myself what Mennonites did that allowed them to establish and expand a highly investment-dependent form of irrigated and mechanized farming. To do that, I talked to 44 Mennonite farmers and community leaders about how farmers acquire things like credit and farm machinery, and how Mennonite colonies buy land and organize settlement. One of the key themes that emerged from discussions about farming is that the Mennonites have a number of social and cultural institutions that facilitate access to resources for individual farmers, and also enable groups of Mennonites to organize the collective purchase of large pieces of land. Mennonites, for example, often charge each other for expensive services or purchases in multiple annual installments with no interest. Mennonite churches work to organize groups of Mennonites to purchase large blocks of land in a single transaction, with subsequent divisions among individual farmers.

In contrast to the Mennonites, there is a rich literature on ejidos in Mexico, and numerous examples of both broad and specific case study research on ejido agriculture. The patterns of low-investment land use I observed on the ejidos largely fit with what I read in the existing research, but the background conditions were different. As I learned through interviews, ejidatarios in Janos rarely have the same kind of local history and connection to place that I had read about in, for example, accounts from southern and central Mexico. There have been many more land sales on the Janos ejidos than have been reported in other rural areas (Assies, 2008; Barnes, 2009; Perramond, 2008). It was difficult for me to talk to ejidatarios

that had sold land because most of them had long since left the area, most often to live in the United States. To understand land sales and low investment in crop agriculture, I had to piece together what was absent by talking to both the ejidatarios that remained and to Mennonites who had purchased land from ejidatarios. In this area, the history of how ejidos were formed and where the ejidatarios came from prior to their arrival in Janos County proved to be quite illuminating and, I argue, a crucial part of the reason why so many left.

As has sometimes been accused of political ecology more generally (Turner & Robbins, 2008; Walker, 2005), my research tells a story about the land that focuses on the people. The conversion of Chihuahuan Desert grassland to irrigated agriculture has very significant ecological consequences, consequences which I barely touch on here. Fortunately, other researchers have published articles on numerous aspects of Janos ecology and the effects that land use change is having (e.g., Ceballos et al., 2010; Davidson et al., 2010; Manzano-Fischer, List, Ceballos, & Cartron, 2006; Ponce-Guevara, Davidson, Sierra-Corona, & Ceballos, 2016; Sierra-Corona et al., 2015), but there has been very little social research in Janos. Here, I will focus less on the effects of land conversion than on how and why it occurred as it did.

Janos and the Chihuahuan Desert

The Land

Janos County is located at the northwestern end of the Chihuahuan Desert. It is a transitional landscape. To the west lies the northern extent of the Sierra Madre Occidental, that great spine of mountains that constitutes the continental divide and runs south half the length of Mexico. This far north, however, the mountains are in decline, diminishing in height while also breaking up into discontinuous sections called the Sky Islands. Threading through the arid 'ocean' around the mountainous Sky Islands, the Chihuahuan Desert on the east side of the Sierra Madre bleeds into the Sonoran Desert to the west, bringing two largely distinct desert vegetation communities into contact. In this liminal space between the Sierra Madre and the Rockies, mammals from the Rocky Mountains and the Great Plains, such as black bear, pronghorn antelope, and raccoons encounter tropical species such as jaguar, ocelot, and coati. Tropical birds spend their summers here, while grassland species that breed in Canada and the Dakotas wait out the northern winter here.

It is basin and range country, where eons of simultaneous eastward and westward continental drift have pulled the land apart, causing blocks of the earth's crust to list endwise into the molten rock below. As these blocks tilt, they create mountain ranges on rising ends and basins at the sinking ends. Due to the orientation of the tilting blocks, this pattern creates disconnected mountain chains and interstitial valleys that all run north-south. These mountain ranges and valleys each get their own name, some of them well publicized in Western literature – the Chiricahuas, Sulpher Springs Valley, Sierra En Medio – and the list of landscape features for outsiders to learn runs long. Millions of years of erosion have filled in these valleys, making them sometimes uncannily flat, with relatively thick soils. These valley soils are, however, irregular, with mosaics of sand, clay, and even gravel. Impervious layers of calcium carbonate, called caliche, underlie some areas at depths that can vary from a dozen centimeters to several

meters. Despite such patchiness, on the whole these valleys are quite arable, if you can get enough water.

As any farmer or rancher in the area will tell you, they don't call it a desert for nothing. The region is dry, but the Sierra Madre and other, smaller mountain ranges receive significantly more precipitation than the basins that surround them. For example, the Chiricahua Mountains have a maximum elevation of nearly 10,000 feet above sea level (asl) (3,048 m) and receive over 40 inches (102 cm) of precipitation a year at their crest (Oregon State University 1998, cited in AZ Water Atlas, p. 543). In contrast, Sunsites, Arizona, at the bottom of the Willcox Valley to the west with an elevation of 4,350 asl (1,326 m), receives an average of just 10-12 inches (25.5-30.5 cm) per year (ibid.). The town of Animas, in the Animas Valley to the east with an elevation of 4,437 asl (1,352 m), receives an average of 10.87 inches (28 cm) per year (Southwest NM Regional Water Plan, 2017, p. 66). On a larger spatial scale, precipitation declines with average elevation in both directions from the Sierra Madre to the dry centers of the Sonoran Desert to the west and the Chihuahuan Desert to the east.

Permanent rivers in this part of the desert are all but non-existent, with no more than three thin rivers in northern Chihuahua between the Sierra Madre to the west and the Rio Bravo/Rio Grande to the east, all of which end in closed desert lakes (Thomson & Ali, 2007). It is for this reason that irrigation with surface water is rare in the region, and reliance on groundwater for domestic uses, for crop irrigation, and even for cattle is nearly universal. The Janos aquifer is deep and probably ancient, and the observed declines demonstrate that its annual recharge is far less than what is currently pumped onto local crop fields.

The particular geophysical characteristics of Janos County also make it home to a hotspot of ecological diversity. The county includes high mountains and desert floors, and wildlife typical of South American and North America mingle here. It was also, at least in the 1990s, home to the largest colony complex of black-tailed prairie dogs (*Cynomys ludovicianus mexicanus*) in the world, which are a federally protected species in Mexico. Largely to protect the prairie dogs and their associated wildlife species, much of Janos County was declared the Janos Biosphere Reserve in 2009 (Ceballos et al., 2010; List, Pacheco, Ponce, Sierra-Corona, & Ceballos, 2010). The Reserve does not ban human habitation or human use but did place limits on land use change, forbidding new fences, roads, irrigation wells, the conversion of native rangeland to crop agriculture, and the use of transgenic crops, such as the genetically-modified cotton that was then becoming common in Mennonite fields.

The Reserve has generated a lot of ire amongst especially the Mennonites and some ranchers but in truth it has had little effect on land use, largely because there is essentially no enforcement of the regulations it created. The Reserve has drawn more attention to the area, however, as well as grant dollars for small-scale, cooperative conservation efforts with ranchers and ejidatarios (Hruska, Toledo, Sierra Corona, and Solis-Gracia, 2017). While the legal restrictions of the Reserve might one day develop more teeth, they have so far been no match for agrarian capitalism.

Social Groups and Landownership in Janos

Understanding changes in landownership and land use in Janos requires first a basic understanding of the dominant and historical types of land tenure categories, and the

demographic and economic characteristics of the social groups they align with. The three men portrayed at the beginning of this chapter represent the three dominant types of landholders in Janos County: ranchers, ejidatarios, and Mennonites. Each landholder type differs considerably from the others in its social institutions, cultural practices, economic status, livelihoods, and land tenure. Each social group corresponds to a distinct property type with its own land uses. Ranches own land entirely in fee title². Ejidatarios own land *rights* but almost never have fee title, and many aspects of ejido land use are managed collectively through votes by the ‘assembly’ (*asamblea*) – the collection of all rights-holding ejidatarios. Mennonites own land collectively as colonies and privately as individuals; most colonies start with a single fee title to all the land held by the colony as an institution and land parceled out informally, but have granted fee title to individual farmers over time.

Cattle grazing was the dominant land use in Janos County for at least three centuries (Blyth, 2012; Brand, 1961), and it is still the dominant land use today, though the vast estates that existed prior to the Revolution have been broken up into smaller ranches and new property types. Historically, farming was limited to a small area along the riverbank very near to the town of Janos itself, with outlying lands being used largely for cattle grazing. Like most of the rest of Mexico, the latter half of the nineteenth century saw the Janos area surveyed and officially privatized in the hands of land barons such as long-time Chihuahua Governor Luis Terrazas, who at one point owned more than three million hectares of land in Chihuahua (Lloyd, 1998; Wasserman, 1993). Nationally and in Chihuahua, the vastly unequal landownership and imperialist exploitation by foreign owners were driving forces behind the Mexican Revolution (for Mexico, see Assies, 2008; Hart, 2002; for Chihuahua, see Alonso, 1995; Lloyd, 1998; Nugent, 1993; Wasserman, 2015).

Ranches in Janos County today are far more modest than a century ago. Ranchers are private land owners who operate cow-calf operations, principally oriented toward exporting calves to the US. In Janos, ranches vary from 2,000 ha up to 20,000 ha, though two ranchers own multiple ranches with a higher total land area. Ranches in Janos operate in essentially the same way as described in detail for Sonora by Perramond (2010). Not a single ranch owner in Janos lives on their ranch full-time, living instead typically in Nuevo Casas Grandes (one hour south) or Ciudad Juarez (three hours east) and visiting as often as they need or want to. Ranches are typically managed on a day-to-day basis either by paid managers or cowboys, or by the rancher’s sons. Ranching has been the dominant land use in Janos for centuries but the Revolution fundamentally upset the ownership patterns in Janos such that no family has ties to ranching in that area for more than a century. The American- and Mexican-owned haciendas of northwestern Chihuahua played a significant motivating role in Pancho Villa’s revolutionary success in Chihuahua.

The term “ejidatario” refers to a member of an ejido with land and voting rights. The ejido is a particularly Mexican institution and land tenure form that emerged out of the post-Revolution constitution, and was a direct response to the vastly unequal landownership that had largely precipitated the Revolution. Ejidos were established by the government and legally

² Mexico does not have a system of federal landownership equivalent to the US Forest Service or Bureau of Land Management. In the US, most ranchers lease some of their grazing land from the government. In Mexico, ranchers own all of their land in fee title, or else rent it from another individual who holds fee title.

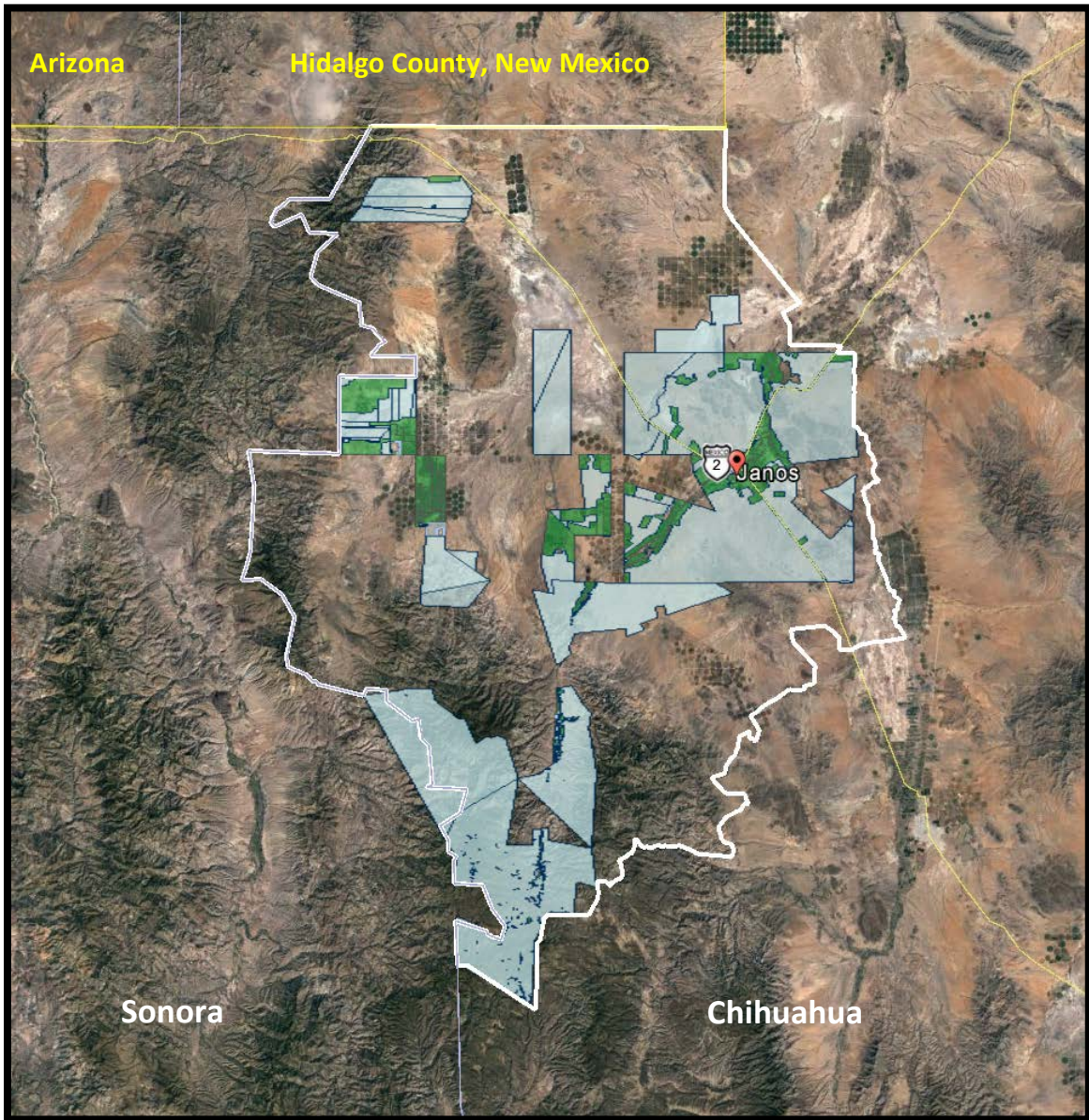
managed through institutions made up of ejidatarios but under terms established by the government. Many forms exist to suit differing resources, but the archetypal form is one with three land types: housing plots (*solares*), farm land (*parcelas*), and communal grazing land (*uso común*). Members of the ejido (*ejidatarios*) have use rights to the land but no private title. Prior to constitutional amendments in 1990s, ejidatarios could pass their land onto an heir but could not sell it, rent it, or use it as collateral on a loan, and could lose their land right if they failed to farm it for two consecutive years. By 1992, there were more than 29,000 ejidos throughout Mexico accounting for more than half the total land area (INEGI, 1990), but the *quality* of the land was often poor (Assies, 2008; Walsh Sanderson, 1984). Mexico's arid north had a smaller proportion of land in ejidos than did the central and south, in no small part because there were fewer people there to demand land.

There are 14 ejidos in Janos (Figure 2) that together comprise about one-third of the county's land area. Much of that land is in the shoulders of the Sierra Madre and thus mostly non-arable, relegated to raising cattle or to forestry. The 14 ejidos were created at different times, from 1924 to 1992. Unlike in much of central and southern Mexico, ejidatarios in Janos are mestizos with no ancestral or recent historical connection to their land – they arrived from somewhere else when the ejidos were created. This makes most ejidos in Janos County, including the two where I conducted most of my ejido interviews, quite different from ejidos documented in much of the literature, and the dynamics on display here cannot be assumed to be common in southern or central Mexico. Ejidatarios in Janos variously farm, run cattle, and/or work in local businesses or on Mennonite farms. On the whole, they tend to be poor. Emigration to the US has depopulated all of the ejidos except Ejido Janos, which benefits economically from the town at its center and has slowly gained population because the town's commercial enterprises have slowly grown.

Mennonites are defined by both race and religion, being Caucasian and belonging to the Mennonite faith, a sect of Protestantism that originated in Flanders in the 1500s with the teachings of Menno Simons. It is closely related to the Amish faith, and Weber (2002 [1905]) classified it along with Quakerism as one of "the Baptist sects" that emerged from the Reformation. In Chihuahua, locals use the terms 'Mennonites' (*Menonites*, or simply *Menones*) and 'Mexicans' (*Mexicanas/os*) as distinct terms with no overlap, even though nearly all Mennonites I met are Mexican citizens. Mennonites in Mexico are famously, stereotypically, and predominantly farmers, though some run local businesses or dairies instead.

The Mennonites first arrived to Chihuahua from Canada in the 1920s. President Obregon granted several thousand conservative Mennonites from Canada state exemptions (from military service, education standards, and others) to settle in Chihuahua, where they might facilitate an economic recovery after the Revolution. The largest concentration of Mennonites settled in the Sierra Madre foothills of central Chihuahua, near what became the city of Cuauhtémoc, and formed communities centered around farming and dairying (Bridgemon, 2012; Dormady, 2014; Sawatzky, 1971). The Chihuahua Mennonites are Mexican citizens but have assiduously not assimilated. Notably, they still speak a unique dialect of Low Prussian (called Plautdietsch) as their first language, they still dress distinctly (in most areas, at least), and they still live predominantly in self-segregated farming communities such as those in Janos.

Figure 2. Janos County (outlined in white). The County's 14 ejidos are depicted with colored boxes. Dark green shading indicates parcels allotted for farming. Gray shading indicates grazing areas originally established as commons but now mostly parcelized.



The majority of Mennonite-owned land in Janos in the form of colonies, which are large land parcels – originally ranches – that were purchased as a single unit by the colony institution, a consortium of Mennonites typically organized through a church. The colony then subdivides the land among individual families, with each family buying as much land as they can afford up to a set limit. In most cases, the colony buys more land than it initially has families for, and it may take a decade or more to attract enough individuals to parcelize the entire property. Historically, individual farmers did not receive fee title to their land, just a certification from the colony. More recently, however, colonies have tended to formally subdivide, allowing

individuals to gain title. There are five colonies in Janos but only four of them followed exactly this process. The smallest and most recently formed (2005), Colonia El Berrendo, was purchased cooperatively by 14 families without any outside church organization.

Mennonites also own and rent land that is outside the organized colonies. Though the colonies were the first Mennonite presence in Janos, there has been subsequent expansion beyond colony boundaries. In some cases, individuals from within a colony have bought or rented land from ranchers or ejidatarios independently (the sale of ejido land rights was legalized after the land reform ended 1992). In other cases, groups of Mennonites either from within Janos or from elsewhere buy blocks of land from ranchers cooperatively – typically adjacent to an existing colony – and subsequently subdivide it. The ordering of land purchases, initially as colonies and subsequently outside of them, is indicative both of unique Mennonite social institutions and the pervasive forces of agrarian capitalism.

All three social groups and land types in Janos have had important roles to play in the story of agricultural expansion. The Mennonites own and work most of the farmland in Janos, and so explaining Janos's agricultural expansion requires a focus on Mennonite social and agricultural dynamics. But there is actually more land in ejidos, and the ejidos were intended to be – through the land reform process, the Constitution, and the 1934 Agrarian Code – the primary agricultural producers of not just Janos but all of Mexico. The formation of the Janos ejidos, as well as their economic stagnation and eventual depopulation, was central to the establishment and spread of Mennonite agriculture. The ranchers' role is as the sellers of the land the Mennonite colonies were created on, and they irregularly continue to sell or lease land to Mennonite farmers. My research includes both an examination of how and why land was transferred from one social group to another, and the mechanisms by which native rangeland was converted to irrigated agriculture, as the two phenomena cannot be extricated from one another.

Land and Agriculture in Mexico and in Janos

Mexico's land reform was intended to create an enormous class of cooperative family farmers – the ejidatarios. That vision was only ever partially realized, as ejido agriculture was never as productive or as lucrative as would be hoped, given the vast land area number of people involved. Janos County is emblematic of this fact. One third of the land area is in ejidos, but it has been Mennonites who have had more economic success and continue to expand their landholdings and the size of their operations. In much of Chihuahua – a ring around Ciudad Juarez, on the US border, being an exception – Mennonites *are* the face of commercial agriculture. While much of this dissertation is devoted to explaining why that is the case in Janos, there is a broader and much more widely established set of explanations for why ejidos are not the breadbasket of Mexico.

Tracking historical agricultural production in Mexico is harder than in the US due to more limited statistics. While data on a very limited number of crops has been published annually for more than 50 years, data for all crops is harder to get, chronologically limited, and, not entirely unlike the US, prone to some occasional oddities (Doolittle, 1988). Unlike the US, which showed a decline in total farm land of about 10% between 1947 and 1997 (Hart, 2001), Mexico has shown a general trend of increasing crop area right up to the present, with the

proportion of crops under irrigation increasing over time. The percentage of perennials has also grown over time, regardless of irrigation (though a much higher percentage of perennial crops are irrigated, nationally). Table 1 shows the number of hectares of total and irrigated crops in five-year increments dating back to 1980 for both all of Mexico and for Chihuahua.

The national numbers dip from 1985 to 1990 followed by a stagnant period until the rise between 2005 and 2010. Chihuahua follows a similar pattern overall but has a slightly greater percentage increase in total crop area since 1980, a far greater increase in the area of irrigated crops, and a far higher percentage of crops under irrigation. That Chihuahua would have a higher percentage of irrigated crops is not surprising given its aridity, but that alone does not explain why the area of irrigated crops has more than doubled since 1980.

Table 1. Harvested hectares of crops, both just irrigated and total, for all of Mexico and just for the state of Chihuahua (Source: Servicio de Información Agroalimentaria y Pesquería [SIAP]). SIAP only provides consistent data dating back to 1980.

YEAR	Mexico IRRIGATED CROP AREA HARVESTED (ha)	Mexico TOTAL CROP AREA HARVESTED (ha)	Chihuahua IRRIGATED CROP AREA HARVESTED (ha)	Chihuahua TOTAL CROP AREA HARVESTED (ha)
1980	4,809,968	16,181,909	256,498	705,555
1985	5,248,787	18,209,147	307,589	1,022,247
1990	4,861,540	17,903,900	307,900	915,877
1995	4,971,409	18,727,660	298,175	701,536
2000	4,678,419	18,730,640	327,979	601,133
2005	5,200,116	18,528,491	373,781	759,751
2010	5,501,789	20,158,773	471,941	1,082,428
2015	5,783,470	20,801,779	524,676	1,019,942
2018	5,996,661	20,270,413	562,215	1,004,807

That Mexico still had such capacity for agricultural expansion in the 21st century is a function of its particular history of land ownership and economic structure. The fact that the majority of farmland was in the form of ejidos was significant. In the US, the Homestead Act and its subsequent corollaries gave away land that could be farmed without irrigation. Those land distributions, combined with early government investment in surface irrigation schemes, meant that agricultural expansion had largely quit by the 1940s – there was no more land to profitably farm. Mexico has much less land that can be farmed without irrigation, largely lacks the vast flat spaces of the US Midwest, and historically had less financial capacity to develop major irrigation schemes than did the US. Much of the land that was distributed through the land reform was rangeland or forest, not active farms. It simply took longer to develop the agricultural land base, which was hampered by the fact that much of the work was conducted by ejidatarios, who had few resources to bring to bear.

Government investment historically drove much of the agricultural sector, as state enterprises provided guaranteed prices for many crops, subsidized inputs, funded extensive

irrigation and other infrastructure projects, and state enterprises bought some crops at above-market prices from farmers and sold these products at below-market prices to select consumers (e.g. Sanderson, 1986; Yunez-Naude, 2003). Due to the prohibition on using ejido land as collateral, ejidatarios were generally excluded from private credit sources, relying on government sources such as the federal Rural Development Bank (*Banco de Desarrollo Rural*, or BANRURAL). The ability of ejidatarios to develop the land that they received for farming, or for private agricultural entities to thrive under heavy-handed state oversight, varied dramatically by era and location. As Table 1 showed, agriculture on the whole in Mexico slumped in the late 1980s and 1990s before picking back up again. What that table does not make clear is that it was ejido agriculture that slumped, and it was largely private agriculture that regained momentum.

The explanation for that temporal pattern lies in Mexico's particular financial, agricultural policy, and land tenure history. Broadly speaking, the twenty-plus year falter in agricultural expansion between 1985 and 2005 is due to a series of economic crises and significant changes to national policy on agriculture, ejido management, and trade. Those changes were kicked off by a national debt default and subsequent nationalization of the private banking industry in 1982. In the wake of the debt crisis, Mexico gradually undertook a comprehensive set of structural adjustments and policy liberalizations that together cut government spending in agriculture and the ejido sector, slowly reduced subsidies to such things as electricity and petroleum products, and ended protectionist trade policies that had buffered Mexican farmers from international competition. The ratification of the North American Free Trade Agreement (NAFTA) in 1994 was emblematic of these shifts but was merely one component (Cornelius & Myhre, 1998; de Janvry, Gordillo, & Sadoulet, 1997; Haber, Klein, Maurer, & Middlebrook, 2008).

Taken together, the "neoliberal counter-reforms" (as they are often known) of the late 1980s and 1990s caused widespread farmland abandonment, land sales, and out-migration among ejidatarios (de Janvry, Emerick, Gonzalez-Navarro, & Sadoulet, 2015; Luers, Naylor, & Matson, 2006; Valsecchi, 2014). The reduction in ejido farming was driven by at least four separate factors: declining crop prices, increasing input costs, loss of government credit sources for ejido agriculture, and the termination of the policy requiring ejidatarios to farm their land at least every other year to maintain their land rights (*ibid.*). The counter-reforms meant that ejidatarios were less financially able to afford farm inputs, earned less from crop sales, and could suddenly keep their land rights even if they migrated to find wage opportunities elsewhere. The percentage of Mexico's citizens living in the US climbed from 3.5% in 1980 to 5.2% in 1990 to 10.2% in 2005 (Hanson & McIntosh, 2010). As ejidatarios (and other farmers) shifted their economic efforts outside the agricultural sector, the land area in production fell off.

But the government disinvestment and policy liberalization of the late 1980s and 1990s did not doom agriculture forever, as evidenced by its renewed expansion in the new millennium. That is because private investment in agriculture eventually did begin to substantially increase, as government disinvestment and changing economic and trade policies created new opportunities for those with sufficient investment capital. Spurring private investment was exactly the thought behind ending land reform and liberalizing the ejido system, as even the system's proponents had realized that inalienable land rights and a reliance

on government credit was stifling investment and productivity (Appendini, 1998; Myhre, 1998). It was not just Mexico that came to that conclusion. Following the “Washington Consensus” and the spread of neoliberal doctrine in the 1990s, state support for agriculture declined all over Latin America, to be eventually replaced – in a rather new form – by private capital. The agriculture that emerged, and in many cases is expanding agricultural frontiers, has often been led by vertically integrated corporations, contract farming arrangements, and precarious labor arrangements (Kay, 2015; Teubal, 2009; Vergara-Camus & Kay, 2017). Chihuahua is something of a different case, however, because so much of the agricultural expansion there has been conducted by Mennonites rather than corporate investment.

Statistically speaking, Chihuahua’s agricultural expansion since the 1990s is nothing short of remarkable. While irrigated agriculture in all of Mexico has expanded by 24.7% since 1980, Chihuahua’s area of irrigated agriculture has expanded by 119%. The area of crops in Janos has more than tripled since 1980 (Hruska, 2019). The increased area of irrigated agriculture in Chihuahua accounts for a full quarter of the total increase in all of Mexico, despite it having only 5% of Mexico’s total harvested cropland. I think it is fair to assert that Mennonites, who live in far greater numbers in Chihuahua than in any other state, play a significant role in these numbers.

Agriculture in Janos: The connection between money and water

The neoliberal counter-reforms that drove declines in ejido agriculture in Janos County since the late 1980s and 1990s are also partially responsible for the remarkable expansion of irrigated farming in Chihuahua since 1980. Irrigated farming can be extremely productive but it is also very expensive. Government support of agriculture on the Janos ejidos specifically was never sufficient to make irrigated farming ubiquitous, largely because there were never enough irrigation wells to supply water to all the ejidos lands designated for farming. The government only paid to drill a small number of wells in Janos County, and ejidatarios were largely unable to afford to drill more. To afford more wells, they would have needed to have farm profits, and they could not really farm without wells.

It is possible to dry farm in Janos, but only so long as you do not need to harvest a crop every year. I interviewed many ejidatarios on Ejido Pancho Villa who had tried dry farming for a few years early in the ejido’s history and then gave up after repeated crop failures. One man I interviewed had kept it up until 2012, but he grew select fodder crops to feed pigs (if it was a good harvest) or cows (if the plants never matured), so he was not as affected by bad years as were other people. Only Ejido Monteverde had dry farmed more or less reliably, due to its favorable location directly at the base of the Sierra Madre, where they received slightly more abundant and reliable rain. But farmers there told me that the decade-long drought that began in 1992 (see also Ortega-Ochoa, Villalobos, Martínez-Nevárez, Britton, & Sosebee, 2008) put an end to dry farming there, and that it had not been possible since. While my interviewees did not use the term ‘climate change’ (*el cambio climático*) to describe this change in rainfall patterns, that was what they were describing.

Farming on the flat lands in Janos County was not very productive or widespread until the adoption of irrigation with groundwater, shortly after World War II. Mennonite farmers further south in Chihuahua, and in Canada before that, had used groundwater pumps to a

limited extent at least as far back as the early 1920s (Sawatzky, 1971). The first attempt at groundwater irrigation that I heard about in Janos was in the 1950s, shortly before the arrival of the first Mennonites. Groundwater irrigation allowed crop farming to spread from a limited stretch of land surrounding the one permanent river in Janos across the flat valley floors. The Janos aquifer is fairly consistent throughout the regions where people have tried to farm.³ While odd, small waterless pockets exist all over, the only large area of water deficiency I learned of was on the north side of Colonia El Cuervo, which remains sparsely settled nearly fifty years after the colony was founded. Without the aquifer, agricultural development would never have been possible at the scale that now exists.

The Janos aquifer is not an infinite supply of irrigation water. With only two exceptions, every farmer I talked to in Janos – Mennonite and ejidatario – agreed that the groundwater level was declining and would likely run out eventually. Water levels have already declined significantly from when many interviewees had arrived in the area decades ago. In the 1970s, many ejidatarios had dug shallow wells (*norias*) by hand to access ground water for drinking and watering livestock. After the long drought started in 1992, however, all such wells went dry and stayed dry. Irrigation wells from the 1970s were typically 180-250 feet deep (all interviewees in Janos measure well and groundwater depth in feet); most new wells now are at least 700 feet deep, and some more than 1,000 feet.

Pulling water up out of the ground costs money because of the electricity (or diesel, until electricity became widespread in the 1990s) needed to run the water pumps. The declining aquifer thus increases the cost of irrigating crops and means that new wells periodically need to be dug, which, at \$30,000-50,000 USD per well at current rates and depths, is a significant cost burden and one that not all farmers can bear. To reduce their pumpage costs, farmers with the available capital decrease their water use by upgrading the water efficiency of their irrigation systems.

Prior to about 1990, all irrigation was with flood, where water was dumped onto the ground at the top of a crop furrow and allowed to run downhill (grading was essential) to the bottom of the field. Flood irrigation requires a very specific soil texture to work effectively, however. Too much clay and most of the water runs right out of the field without penetrating the soil to water the plants; too much sand or gravel and the water can all sink into the ground at the top of the field and never even reach the bottom. To avoid such problems, farmers in Janos began adopting center pivot irrigation systems in the early 1990s, which sprinkle water on the plants from above and can be fine-tuned to match soil types and plant needs. In the last five years, some farmers have begun to adopt drip irrigation, in which plastic hoses are buried inside the crop rows and drip out water directly into the plant root zone, avoiding all evaporation issues entirely. Besides using far less water per hectare for the same crop, drip irrigation has the additional benefit of delivering higher yields for both chilies and onions, two crops that are expensive to grow but can deliver very high profits and which are increasingly being adopted in Janos.

³ According to government groundwater maps there is just one aquifer that sits under most of the county, though I learned that both Mexican and US maps tend to show aquifers terminating improbably at the border, except where extensive studies have been conducted around cities like El Paso/Ciudad Juarez.

The downside of upgrading irrigation technology is that it costs money. Center pivot irrigation systems are durable but are expensive to purchase. Drip tape (also called dripline; the flexible plastic hose used in drip irrigation) needs to be replaced every five years or so and is laborious to install. The investment costs of upgrading irrigation systems means that any farmer faced with exorbitant electricity or diesel bills for water pumpage must pay out additional money – usually in one lump sum – to buy new irrigation equipment. Not all farmers can bear this cost. As a result, some farmers (typically on small farms and without good capital access) faced with a dry well or pumpage costs that exceed their crop sales are forced to sell their farms to farmers who have the capital to invest in new wells and irrigation equipment. The annual decline of the Janos aquifer is essentially acting as an additional farm cost and one (among others) driver of farm consolidation. Farm sales of this type in Janos are very frequently from ejidatarios to Mennonites.

Irrigation equipment is just one aspect of farming where initial up-front investments can lead to better returns. Bigger, newer farm machinery covers more land area in less time, allowing more land to be tilled by one person in a single season. The other common example is crop type. The cheapest crops to grow (i.e. with the lowest seed, fertilizer/pesticide, labor, and water costs) are also the crops with the lowest expected profits: sorghum, beans, maize, and small grains (wheat, oats). Crops that fetch the highest prices (often because they can be readily exported) are also more expensive to grow and harvest: peanuts, chilies, onions, melons, and, to a lesser extent, cotton. Poor farmers thus grow cheap crops, use inefficient irrigation systems, and earn little money. Wealthier farmers grow expensive crops with efficient irrigation systems and earn better money. The old adage “it takes money to make money” is very true in this style of farming.

Connections and Contributions of this Study to the Literature

This study of agricultural expansion in Janos County connects to a number of bodies of literature through both geography and theory. This is a study of agricultural expansion, with connections to the literature on agricultural frontiers and important insights for ‘the agrarian question,’ or the relationship between capital and agriculture. The manner in which Mennonites have mobilized capital to create huge new farming areas is potentially unique and not well described elsewhere. This research also contributes to the significant body of research on agriculture in Mexico’s ejido sector, and offers a new perspective from the arid north, which is not well represented in the literature.

The majority of research on ejido dynamics has been conducted in central and southern Mexico, where the social context of ejido formation is far different than what I observed in Janos. In those cases, the ejidatarios were local and had a history with their land that predated the formation of the ejido. There, the land reform functioned to give land rights to people that had long claimed the land as their own even if they did not have access to it (e.g., Bobrow-Strain, 2007; Eakin, 2006; Goldring, 1998; Osborne, 2011; Stephen, 1998). Studies from these areas help explain why the legal avenue to sell and/or privatize ejido land created by a 1992 amendment to Article 27 of the Constitution did not result in widespread privatization or sales nationally (Assies, 2008; Barnes, 2009; Perramond, 2008).

The Janos ejidos are very different from the dominant picture of ejidos painted by these studies, both in the fact that most ejidatarios in Janos had no previous connection to the land where they received land rights and in the high rate of land sales and abandonment. Case studies from arid northern Mexico are rare. A few studies describe high rates of privatization and sales in regions with very large government-funded irrigation projects, where property values are high and agriculture is productive when the necessary inputs can be aligned (Lewis, 2002; Otero, 1999; Whiteford, Bernal, Díaz Cisneros, & Valtierra-Pacheco, 1998). Three other cases from arid areas without such government-funded infrastructure and without the regional prevalence of groundwater irrigation found similar economic challenges as seen in Janos but without the same degree of land sales and out-migration (Perramond, 2010; Sheridan, 1996; Vásquez-León & Liverman, 2004). As both Otero (1999) and Lewis (2002) noted, there are strong regional differences in ejido functionality, and the experiences of groundwater-dependent ejidos in the country's arid north have not yet been adequately examined.

Mennonites in Chihuahua and elsewhere in Mexico have also escaped much scholarly attention. The most notable exception is Sawatzky's (1971) detailed account of the early decades of Mennonite settlement in Mexico. Sawatzky was himself a Mennonite and gained exceptional access to Mennonite records in Mexico and in Canada, in addition to conducting extensive interviews. His account provides innumerable details that informed my work in Janos, including a short description of the founding of Colonia Buenos Aires. Two other articles provide limited additional detail of Mennonites in Chihuahua (Bridgemon, 2012; Dormady, 2014). There is very limited information on contemporary Mennonite land use or agriculture, however⁴. While other studies might reference Mennonite land purchases or in-migration (e.g., Ellis, Romero Montero, Hernández Gómez, Porter-Bolland, & P. Ellis, 2017), they do not focus on how Mennonite land acquisitions or farming take place.

By presenting a comparative picture of ejidos and Mennonite colonies in Janos, I hope to expand the discussion of how ejidos historically operated in Mexico, how they have changed in the wake of the neoliberal reforms, and the role of geophysical context in ejido agriculture. The extent to which the Janos case differs from the experiences of ejidos elsewhere demonstrates how important the local social-ecological context is when it comes to the effects of national policy. The profoundly different trajectories of Mennonites and ejidatarios in Janos—something which has not previously been documented—further demonstrates that social difference is an important factor in agricultural access and decision making about land use and livelihoods. Those differing trajectories also demonstrate the profound importance of capital access in shaping agricultural economies and land use in arid ecosystems.

Agricultural Expansion and Its Drivers

At its core, this is a study of agricultural expansion, a particular type of land use/land cover change (LULCC) where both land use and land cover are altered. It is a case demonstrative of

⁴ Andrew Ofstehage has recently written three articles and a dissertation on Mennonite agriculture in the Brazilian Cerrado and its connection to the transnational soy regime. I was not able to refer to those works here, as I did not find them in time. I would recommend that anyone interested in Mennonite farming in Latin America track them down.

the processes and dynamics involved in the spread of crop agriculture across the globe, a hallmark of both human settlement generally and European settler colonialism specifically (Crosby, 1986). This study analyzes the drivers and processes of agricultural stagnation and expansion in Janos and some of the social consequences that expansion has caused.

This study contributes to a wide-ranging literature on agricultural development and expansion in which numerous, often contradictory, explanatory theories remain active. In their landmark 2001 paper, Lambin et al. noted that, despite the improvements in the characterization of land cover (the physical and biotic surface layer of the Earth) and its changes enabled by the increasing quality and availability of satellite and aerial imagery, our understanding of changes in human land use was still relatively poor. As a result, land use change, especially that which causes a change in land cover, are often attributed to simple and popular “myths” such as population growth and poverty. Such myth gain traction due more to their ability to promote specific political or programmatic agendas than because of their explanatory power. Overall, Lambin et al. (2001, p. 266) posit that most land use change in the relatively recent past at least partly results from “cause-connection patterns operating at regional and national scales” and which more generally fall under the broad heading of ‘globalization.’

Case study evidence support the conclusion that the simple answers found in population growth, poverty, and infrastructure rarely provide an adequate understanding of land change. Rather, individual and social responses follow from changing economic conditions, mediated by institutional factors. Opportunities and constraints for new land uses are created by markets and policies, increasingly influenced by global factors.

There is, in fact, an excellent example of this type of myth mobilization for Mexico. In a 2001 book chapter, Aaron Bobrow-Strain (2001) took on a report that attributed internal migration of peasants and the land occupations of the Zapatistas in the early 1990s to land degradation caused by, in essence, farming while poor. Bobrow-Strain refutes this myth, arguing instead (convincingly, I would add) that the Zapatista uprising and related migrations were driven by neoliberal trade and agricultural policies that made it impossible for smallholder farmers – especially ejidatarios – to earn a living where they were.

The points made by Lambin et al. (2001) and exemplified by the work of Bobrow-Strain (2001) highlight the need for in-depth social research to uncover the real drivers of land use/land cover change (LULCC). Unfortunately, detailed social data are not always included in LULCC studies. The (broad) field of land change science – which examines LULCC – has had a tendency to rely on remote sensing data and statistics, both of which are useful for analysis of LULCC at large spatial or temporal scales but which lose their power to explain why and how changes occur at smaller scales (Turner, Lambin, & Reenberg, 2007). Furthermore, remote sensing data can be readily correlated to policies, large-scale demographic changes, and other forms of statistical data, but proving causation is much more difficult. Qualitative, place-based social science excels at analyzing LULCC at small spatial and temporal scales, but inference to other regions or time periods relies on comparison and extrapolation, which may not be precise (Rindfuss, Walsh, Turner, Fox, & Mishra, 2004; Turner & Robbins, 2008).

Unfortunately, the majority of LULCC studies examining agricultural expansion, particularly in Latin America, have focused on the tropics and on forested regions in particular. There is, for example, a significant body of literature examining the expansion of crop agriculture and cattle ranches into the Amazon rainforest using a range of research methods, from ethnography to remote sensing. There is far less research on agricultural expansion into rangelands, especially in arid regions with no significant tree cover. This is a significant gap given that rangelands are probably the dominant land cover on the earth's surface (Lund, 2007).

Despite the considerable differences in biophysical context, the research on agricultural conversion into tropical forests in Latin America does offer several insights that are relevant to this study, and which will be picked up in subsequent chapters. The first is simply that agricultural expansion is sometimes driven by governmental colonization policies that give away free land (e.g., Bray & Klepeis, 2005; Hecht, 1985; Walsh, 2008). The formation of ejidos in formerly uninhabited sites throughout Mexico, including Janos, is an example of this technique. Colonization of formerly unoccupied lands (or occupied only by indigenous peoples who do not farm) can also be driven by less direct governmental action, such as by establishing land titling programs that allow settlers to gain legal title to land they have occupied and cleared (e.g., Alston, Libecap, & Schneider, 1996; Angelsen, 1999; Gould et al., 2006).

The construction or improvement of transportation infrastructure may drive land use toward more intensive uses, as the cost of delivering products to market decreases. The replacement of Amazon forest by cattle ranches, and then of cattle ranches by soy farms, has been linked to construction and improvement of highway networks, for example (Walker et al., 2009). These types of dynamics, where land use and property values are affected by effective distance to markets, are typically called von Thünian dynamics, named after the farmer and very early economic geographer Johann Heinrich von Thünen (1783-1850). Von Thünian dynamics are relevant in Janos largely because of the way they affect property values. The price Mennonites are willing to pay for rangeland is largely determined by how close the property is to an existing colony, to a road, and to power lines. Rangeland directly adjacent to a colony carries a very high value, often greater than ten times more than what it would be worth for raising cattle, and thus offering a strong financial incentive for ranchers to sell land to Mennonites.

The last category of drivers is shifts in markets and agricultural policies that affect agricultural input costs and crop sale prices. In recent decades, the research about Latin America that falls within this category is largely devoted to the implementation of neoliberal policies related to the Washington Consensus of the 1980s and 1990s. As I discussed above, the expansion of international trade in agricultural commodities, allowance of foreign direct investment, and the reduction or elimination of price supports and other agricultural subsidies dramatically affected the lives of smallholders in numerous countries, including Mexico. Mexico's ejido sector, which was very dependent on government support programs, was hit especially hard (Cornelius & Myhre, 1998a). Following the neoliberal reforms of the early 1990s, Mexico's total agricultural production declined for a time, and ejido land was abandoned or left fallow as large number of ejidatarios fled the countryside for wage work in cities or in the US (de Janvry et al., 2015; Luers et al., 2006; Valsecchi, 2014). As the vignettes that opened this

chapter suggest, the departure of ejidatarios from Janos created opportunities for those who stayed, including Mennonites.

My research in Janos suggests that agricultural expansion has been driven by *all* of the above factors but not at the same time. The national land reform functioned as a colonization policy in Janos in that it granted land rights to new ejidos to people currently living in other regions, causing them to relocate to Janos and attempt to earn a living from the land there. That such attempts often failed to produce long-lasting farms does not negate the fact that these policies pushed Janos County from being composed almost entirely of large ranches to shifting increasingly toward irrigated agriculture. In time, neoliberal trade policies, improving technology, and von Thünian dynamics have also become important. Mennonites have gained access to new and more lucrative crop markets since NAFTA as well as improved access to credit. Improved technology has enabled farmers to expand their individual holdings and to bring down their irrigation costs per hectare farmed. Intensifying agriculture has driven up land values and motivated further sales of ranch land to wealthy Mennonite farmers. This evolution of drivers suggests that theories of agricultural development must be dynamic to account for temporal shifts rather than be pinned to the historical snapshot of a particular survey or statistical dataset. The evident patterns of economic differentiation and concentration of landownership also suggest the continued relevance of older studies of agricultural development by the likes of Kautsky, Lenin, and Chayanov.

Janos County and 'The Agrarian Question'

The process through which agriculture expanded in Janos County over fifty years, and the socioeconomic characteristics of those who conducted that expansion, highlight the connection between capital and agriculture in arid Mexico. The relationship between capital and agriculture has been a hotly debated—but also far-flung—topic of research for more than a century. In 1899, Karl Kautsky and Vladimir Lenin independently published treatises on the relationship of rural agriculture to capitalism. Their works centered around the question of whether or not rural peasants could be counted on to join urban proletarian uprisings against capitalist inequity. More broadly, however, the agrarian question has come to stand in for the relationship between capital, agriculture, labor, and livelihoods. Extensive research has gone into 'agrarian transformations,' where largely subsistence-and-barter peasant societies become incorporated into capitalist economies. Crop agriculture in Janos County has been predominantly market-oriented since the at least the 1970s, the rough chronological beginning of my analysis, so there has been no transformation as such. During that time, however, capital and markets have increasingly driven the practice of agriculture in powerful ways. There are no true 'peasants' in Janos, nor have there been peasants in most of the world for many decades now, but that does not negate the relevance of the agrarian question today (Akram-Lodhi & Kay, 2009).

A long-running theme of research around the agrarian question has been the degree to which agricultural communities differentiate from a relatively uniform class of small-holder farmers to two disparate classes: elite landowners and landless agricultural wageworkers. Kautsky (1899) and Lenin (1899) both foresaw this transition as being relatively complete and inevitable in most cases, while Alexander Chayanov predicted that some number of "middle

farmers” (essentially family farms without laborers) would persist due to their willingness to work extremely hard for little profit (Banaji, 1976; Bernstein, 2009). This question was extremely relevant to Mexico’s land reform and certain ejido policies were created specifically to avoid complete differentiation, such as bans on selling or renting ejido land rights and the limit of one land right per person. Ejidos were designed specifically to maintain a large national population of ‘middle peasants.’ The problem was that the ejido system largely failed to generate agricultural profits, forcing most ejidatarios to become wage workers anyway (de Janvry & Sadoulet, 2001; Finan, Sadoulet, & de Janvry, 2005).

The very high investment costs of commodity agriculture in Janos historically limited crop agriculture, with the need for irrigation posing a major barrier. Ejidatarios were only able to enter commodity farming with government support in form of free irrigation wells, free or subsidized infrastructure, and governmental credit for farm machinery and inputs. State support made agriculture feasible for at least some ejidatarios, but the very structure of the ejido and the support programs prevented real wealth accumulation or economic differentiation. Mennonites, on the other hand, had the financial resources and supportive social institutions to practice commodity farming with minimal government support (just national crop price supports and subsidized diesel). Economic differentiation was very slow to develop in Janos, however, due to a combination of technological limitations in irrigation and farm machinery, lack of credit to invest in higher-value crops, and lack of access to markets to sell higher-value crops. Mennonite farming was profitable but not to the degree that it accrued sufficient profits to expand operations in the manner described by Kautsky or Lenin.

Since the 1990s, however, there has been a definite trend toward economic differentiation of farmers. Prior to that, ejidatarios rarely farmed more than a couple of land rights, and Mennonites rarely employed wage labor outside of limited cotton-picking. Mennonite farms differed from ejido farms, but Mennonite farms were relatively homogeneous and ejido farms were relatively homogeneous. Beginning in the 1990s, land consolidation and economic differentiation increased rapidly, driven by a number of diverse factors including the legalization of ejido land right sales and the adoption of new farming technologies (see Chapter 6). Access to credit and new crop markets allowed wealthier farmers, especially Mennonites, to change the way they farmed, increasing annual profits. With those profits, they were able to expand their operations by buying out neighboring farms and/or buying and converting parcels of rangeland.

Janos County offers fresh insight on the agrarian question by highlighting what ingredients were necessary to spark a rapid shift from a community of ‘middle peasant’-esque farmers toward a highly differentiated and consolidated landscape dominated by large farms reliant on wage labor and outside credit. Commodity farming within a predominantly capitalist system does not preclude the continuation of family farms not reliant on wage labor. Structural limitations on ejido agriculture largely prevented such farms from ever becoming established there at all, and relatively few large-scale ejidatario farmers have emerged. Relatively autonomous, family-based, Mennonite commodity farms have existed for many decades and will likely continue to do so, though their numbers are declining. The relative profitability of modern Mennonite agriculture combined with good credit access has created a growing class of farms reliant on wage labor and outside credit. Individual farms are expanding, helping to drive an expansion of Mennonite farming across the landscape.

The history of crop agriculture in Janos County demonstrates the diversity of forms that commodity farming can take. Economic differentiation and land consolidation are not foregone conclusions, and can happen in a variety of ways even when they do occur. The case of Janos demonstrates that both structural and social factors can play prominently in agrarian transformations, and that historical conjunctures can generate inflection points in community and capitalist dynamics that may be relatively easy to spot in retrospect but very difficult to predict.

Social Difference, Land Use, and Economic Prosperity

There is simply no getting around the fact that there are two dominant ethnic groups that conduct farming in Janos, and that it is the white people (settlers) who earn the most money and buy the most land. Ethnicity came up time and again in my research, most often expressed to me in quiet statements of ‘us’ and ‘them.’ I did periodically hear overtly racist comments, particularly against migrant workers from central and southern Mexico, who can typically be identified by sight and often speak an indigenous language as their first language. Migrant workers constitute an underclass in Janos, and both Mennonites and local ejidatarios starkly differentiate themselves from the “*Oaxaquitas*” (a mild slur referring to their supposed origins in the state of Oaxaca, though in fact most that I spoke to came from Guerrero). This is not a study of race relations or identity formation, but the fact that wealth and land acquisition track so closely with ethnicity means that the socioeconomic differences between these groups cannot be ignored. The intersection of race and political economy is experiencing a new flush of interest with the Black Lives Matter movement [still very active at time of writing, in 2020] but there is relatively little research on the intersection of race or ethnicity and agricultural development.

In his *The Protestant Ethic and the Spirit of Capitalism* (1905), Max Weber laid out a case for why Protestants – and in particular Calvinists – earn more wealth and attain higher ranks in capitalist industry than Catholics. Weber postulated that each religion raises children to adulthood with a particular ethic of behavior, a particular pathway for moral uprightedness, and, from that, a particular attitude toward labor and economic behavior. To take on a genuine capitalist interest in business for the sake of business, it is necessary to overcome a “traditional” view of economic enterprise that earned gains solely to meet known wants. That kind of mentality, argued Weber, is far more likely to be instilled as part of a Calvinist or Pietist upbringing. Of the four focal groups of Protestants he discussed, Weber included Mennonites among the “Baptist sects,” along with the Quakers. He reported that the Mennonites also had disproportionate economic success wherever they went, though they tended to limit themselves more to agriculture than to other pursuits. One might wonder whether that economic success contributes to economic differentiation in Mennonite farming communities, as those farmers particularly full of the spirit of capitalism expanded their operations to the point where they resembled the large capitalist farms described by Kautsky. I found no research on the topic.

I discuss Weber here as an opening to a connection between livelihoods, economic gain, and social difference. Weber focused on religion, but there are many cultural factors that shape behavior beside religion, and many of these coincide with ethnic differences as well. In far

western China, for example, ethnic Han and Hui farmers have been able to invest in and make money from farmland rented from Kazakh agro-pastoralists who had previously struggled to coax a profitable crop from their small fields (Fan, Li, Zhang, & L. Li, 2014). In that case, similar to the Mennonites, Han and Hui farmers had much more farming experience and better access to capital, equipment, and markets than did the Kazakhs. In Tibet, government sponsored greenhouse farming programs aimed at Tibetans were principally utilized by Han migrants from central China. Similar to Weber's Protestants, it was the Han in-migrants who were willing to work with state agents, put in long hours in unpleasant conditions, and tolerate a Spartan lifestyle to earn good money (Yeh, 2013). In-migrants of the Bugis minority in central Sulawesi, Indonesia, used capital from previous business ventures and borrowed from extensive social networks to do something that locals did not: buy fallow swidden land to plant cacao, which was both a lucrative cash crop and a very long-standing symbol of private land ownership (Li, 2007, p. 101-7).

In all of these cases, the economic success of one ethnic group as compared to another is the result of a correlation of ethnicity with differences in financial resources, social connections, attitudes about work and lifestyle, and inculcated skills. Structural racism plays a bigger role in some cases and less in others. This research shows that while the Mennonites may appear to be somehow uniquely able to make farming profitable in northern Chihuahua, they are merely one example of a social group whose particular social institutions and historically garnered resources have enabled them to take advantage of opportunities that other groups have not. As the agrarian change literature has examined in cases around the world, capital access shapes agricultural outcomes in very important ways, and capital access often correlates with ethnic or other socially-derived divisions.

Organization of Remaining Chapters

The rest of this dissertation is divided into six chapters, four empirical/analytical chapters, one on methods and study site, and one on final conclusions. **Chapter 2** provides an overview of the research methods I used in this research, including some statistics on who I interviewed. I also briefly discuss the blind spots in my research created by the safety precautions I had to take while working in an area with high activity in the illegal drug trade. Like elsewhere in northern Mexico, drug cartels – the members of which are locally called *narcos*, short for *narcotraficantes*, 'drug-traffickers' – have a strong presence in Janos. I was not able/willing to ask about anything related to drugs or related illicit activity, which to some degree limited my understanding of local microeconomics.

In **Chapter 3**, I argue that Mexico's land reform, which operated unevenly for seventy years and was intended to benefit poor Mexican farmers, directly led to the arrival of Mennonite colonies in County Janos and structured landownership in such a way that facilitated subsequent expansion of Mennonite farms. I present a century of land policy and land use history in Janos to tell this story, which entails a broad explanation of how the land reform actually operated in northwestern Chihuahua.

The primary duty of **Chapter 4** is to provide more the empirical details about my four focal communities. That background is necessary to understand the two analytical chapters that follow. Here, I relate the founding and trajectories of Ejido San Pedro, Ejido Pancho Villa,

Colonia Buenos Aires, and Colonia Las Virginias. I also provide histories of the primary sources of agricultural credit for ejidos and for Mennonites. As becomes apparent when the histories of communities and credit sources are presented together, land use and livelihoods in these communities was profoundly affected by farmers' ability to secure credit. Many other factors also played a role in the contraction or proliferation of irrigated farming, but credit access and credit use featured prominently in the ability of Mennonite farmers to make investments in their farming operations that increased profits and enabled them to expand their operations.

Chapter 5 analyzes Mennonite agricultural practices. These practices, together with superior access to capital, reveal why Mennonites have been able to establish and expand farms at such higher rates than ejidatarios. I argue that the Mennonites were able to overcome the particular barriers to profitable farming in Janos due primarily to their unique social institutions that reduce the cost of entry for new farmers and facilitate expansion by established farmers. Most Mennonites also started in Janos with more financial resources than did most ejidatarios, which was a secondary contributing factor to their respective trajectories. I focus my analysis on the manner by which Mennonites secure three basic requirements for modern mechanized farming: irrigation water, farm machinery, and farm inputs (e.g., seeds, fertilizers, etc.). This chapter demonstrates some of the fatal flaws of the ejido system as it was instituted in arid Chihuahua and also provides specific examples of how in-group social and cultural capital can benefit agrarian capitalism.

Chapter 6 zooms back out from the specifics of group institutions to discuss how the process of agricultural expansion in Janos has evolved over time. I argue that the factors that drove land conversion in the 1970s are very different from the factors that are driving it now, half a century later. Irrigated farming was initially established in Janos by people hoping to earn a basic livelihood, but its expansion has accelerated due largely to capitalist investments by people who are already earning a stable livelihood. Technological advances, neoliberal policy shifts, and economic differentiation among Mennonite farmers have all contributed to this process. Data for this chapter comes from the same interviews used in Chapters 3-5 plus additional inquiries about specific land transactions, as well as one week of exploratory interviews my assistant and I conducted in the La Oasis cluster of Mennonite colonies in eastern Chihuahua. Of particular note, the information I learned in La Oasis suggests that Mennonite colonies undergo a similar developmental process in many places, not just in Janos.

In the **Conclusion**, I summarize the overall findings and themes of the study as a whole. Vastly unequal landownership was the principle complaint that launched the Revolution in 1910. Now, ranches and farms are once again consolidating, though not nearly to the degree that existed in 1909. While Janos is perhaps unusual in its supply of economically comfortable family farmers, it also displays similar trends in labor intensity and farm size as does mechanized agriculture world-over. Given the utter economic dependence of much of Janos County on groundwater irrigation, the continuing decline of the Janos aquifer is not a trivial concern.

Chapter 2: Research Approach and Methods

Preliminary Research and Question Framing

There is not much in the way of literature on the recent social history of Janos. There are two detailed accounts of the history of Janos prior to the turn of the 20th century, largely related to the relationship between the Janos military garrison and the Apache (Blyth, 2012; Griffen, 1987). Jane-Dale Lloyd (2001) discusses elements of Janos and neighboring areas of northwestern Chihuahua leading up to the Revolution. There are also a handful of works that discuss specific ranches in Janos but all prior to 1950 (Campbell, 2014; Hart, 2002; Porter, 1970; Irwin, 1984). There are a few works on the Mennonites in Chihuahua. One mentions Janos specifically – a book based on the dissertation of a Mennonite doctoral student in UC Berkeley’s Geography Department – but that briefly covers only the origin of Colonia Buenos Aires, the first Mennonite Colony in Janos (Sawatzky, 1971). The several recent ecological journal articles stemming from research in Janos do not discuss the social situation except, at most, to mention that farming is expanding (Ceballos et al., 2010; Davidson et al., 2010; Ponce-Guivara et al., 2016; Sierra-Corona et al., 2015). I also gained some information from interviews conducted as part of David Toledo’s dissertation research, the analysis of which was published in Hruska et al., 2017. Those interviews were relatively limited in number (17), however, and largely limited to discussions of fire and land degradation over time. In order to learn more, I had to talk to people.

I moved into an UNAM Ecology Institute research house in Ejido San Pedro, in nearly the middle of Janos County, in late February of 2017. My Spanish was still rough – I had learned it over the prior year for this project – and I knew I needed an assistant to help with interviews. I hired a recent graduate from the Autonomous University of Chihuahua (*Universidad Autónoma de Chihuahua*) who was born and raised in Chihuahua but spoke inexplicably fluent English. Starting in April, we set out to establish a basic history of every ejido and Mennonite colony in Janos by talking to community leaders and elderly people, as well as a basic understanding of how the ranches operated.

We conducted 32 interviews in five weeks using a short set of semi-structured questions followed by unstructured discussion of history and current community dynamics. By category of person, we interviewed 21 ejidatarios, 7 Mennonites, 2 ranchers, one member of Fernandez Leál (a private community once part of Ejido Janos), and one academic historian in Chihuahua (city). Interviewees were recommended by associates of our researcher housing, by snowball sampling, and by stopping in at small *tiendas* (corner stores) to ask for recommendations. Those formal interviews are in addition to whatever more casual conversations we had with local residents. Additionally, we gained limited data from 7 different government agencies (in Chihuahua, Nuevo Casas Grandes, and Janos), from which we mostly learned simply that those agencies had very little data to share.

Primary Research Protocol

The focus on *land* in land use/land cover change (LULCC) research often overlooks the complex constellations of actors and their motivations involved in changing the land. This study sought to understand how the process of agricultural frontier expansion evolved over time through an examination of the people who conducted that expansion. By studying agricultural frontier expansion as a historic social process, the connections between changes in the land and changes in political economic or other social conditions are brought to the fore. To this end, this study follows a political ecology approach.

Political ecology is a bottom-up subfield of human geography that ‘seeks to unravel the political forces at work in environmental access, management, and transformation’ (Robbins, 2012, p. 3). Political ecology and land-change science share an interest in historical processes of social and environmental change and included social-ecological feedbacks, although political ecology tends to focus more on social drivers of change (Turner & Robbins, 2008). I based my research primarily on asking the people who own and manage land about who they are and how and why they managed their land as they do.

After evaluating the preliminary interview data and formulating a research methodology to answer the emergent questions, data collection resumed in June of 2017. Between June and October, we conducted 114 semi-structured interviews with landowners or ex-landowners (49 ejidatarios, 40 Mennonites, and 25 ranchers), and 20 open-ended interviews with key informants, local experts, and government officials. Ejidatario and Mennonite interviewees were selected through a stratified snowball sampling protocol that accounted for age, primary occupation, and amount of land owned. At the end of each interview, we would ask for recommendations for other people to talk to that fit certain characteristics (e.g., younger Mennonites who did not own any land, or ejidatarios who ran cattle but did not farm). This approach allowed us to reach a broad sampling of livelihood types, income levels, and time in the community. Sampling continued in each of our focal ejidos and Mennonite colonies (more on that below) until we reached saturation, where we had accounted for all major demographics and no new patterns were emerging. For ranchers, we interviewed every rancher who we could contact who was willing to be interviewed.

Landowner interviews focused on personal history of land ownership and use, reasons why land use/cover changes were made, available resources, and livelihoods (questionnaires are included as supplemental material). Open-ended interviews were used to fill in specific knowledge gaps about historical details, specific communities, farming and ranching practices, and government policies/programs. All interviews were conducted in Spanish except two in English. Interviews were not recorded, in part to comply with Institutional Review Board requirements for my research designed provide an extra layer of anonymity given the commonality of illicit activity in the area (e.g., illegal migration, unpermitted well drilling, planting genetically modified cotton seed inside a biosphere reserve, etc.). Occasionally, a potential interviewee would decline an interview, and others gave us a ‘soft’ decline by endlessly postponing. Generally speaking, however, most people we talked to through the snowball process consented to an interview, though sometimes standing in front yards or driveways.

My assistant and I independently took notes during every interview, and each night we typed up a unified set of notes with all additional information we could remember. Where possible, data gained from interviews (e.g. important land transactions, BANRURAL functioning) were verified in subsequent interviews and with key informants to ensure an accurate accounting of historical change and the functioning of important drivers. Some details, such as the mechanics of certain large land sales or the use of particular credit sources, took months and many interviews to triangulate.

Little quantitative economic data was, or could be, collected from interviews. Some financial data, such as farming input costs and crop revenues, would have been helpful for comparing between, for example, ejidatario and Mennonite farming practices or between private crops sales and sales to CONASUPO. Interviewees rarely remembered such figures, however, particularly for years past, and record keeping is essentially non-existent in these communities. Given those limitations, interviews had to focus on processes and patterns rather than establishing strict economic logics of land use.

Rancher interviews covered local and family history, and helped to explain specific large land transactions and to understand the dynamics of ranch sales and generational turnover more generally. To analyze ejido and Mennonite colony dynamics, I selected case study communities that we could sample intensively enough to understand the full breadth of socioeconomic trajectories across each community type. I selected two pairs of adjacent ejidos/colonies in order to better study how the two types of communities interact and are, to some degree, dependent on one another.

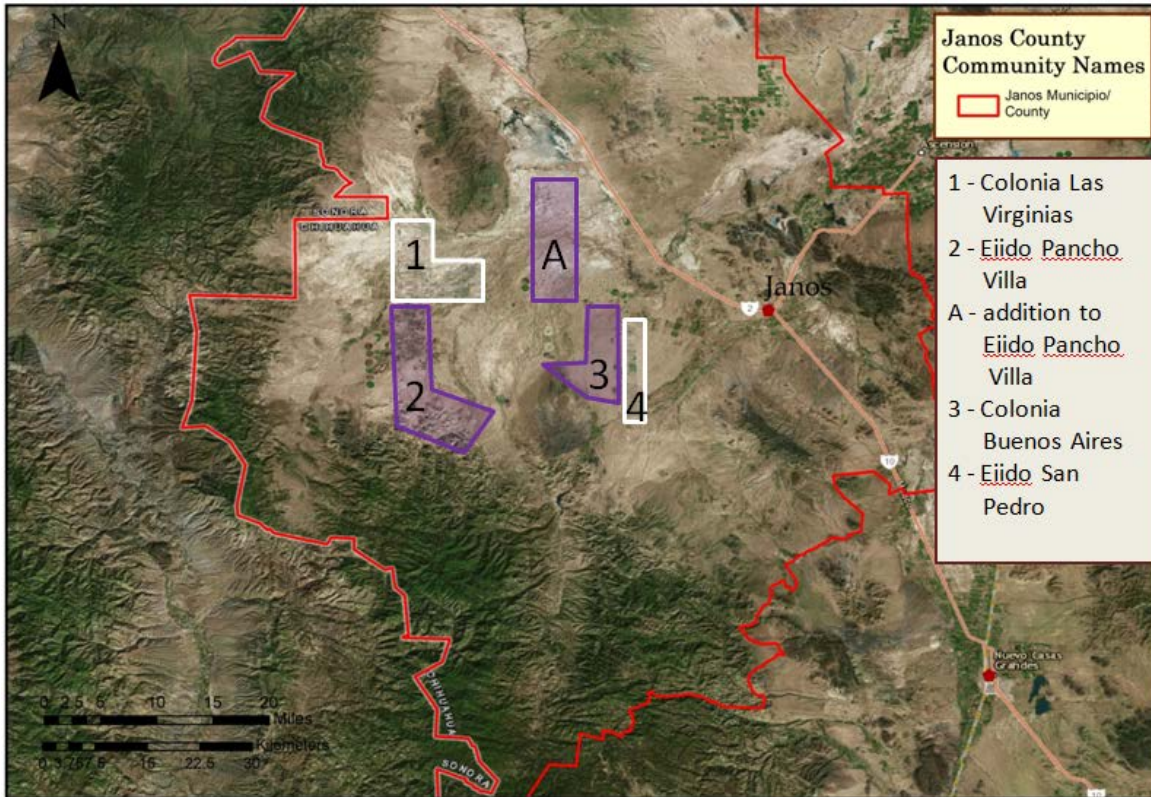
The 49 ejidatario landowner interviewees were selected from two Ejido San Pedro and Ejido Pancho Villa. Ejido San Pedro is almost entirely arable, while approximately one-third of Ejido Pancho Villa's designated grazing land is too hilly for farming (Table 2). The 40 Mennonite landowners were selected from Colonia Buenos Aires and Colonia Las Virginias. Ejido Pancho

Table 2. Specific details about the four focal communities of this study. Note that Mennonites have recently acquired additional land for farming adjacent to the original two Mennonite colonies, but these lands are not managed by colony institutions. Data on Mennonite colonies comes from interviews; data on ejidos comes from the National Agrarian Registry (*Registro Agrario Nacional*).

<u>Community Name</u>	<u>Founding Date</u>	<u>Initial Size</u>	<u>Grazing Land (uso común)</u>	<u>Farming Land (parcelas)</u>	<u>Notes</u>
Colonia Buenos Aires	1958	2,700 ha	N/A	N/A	property had 743 ha planted in crops at time of purchase
Colonia Las Virginias	1981	10,000 ha	N/A	N/A	purchased as two parcels from two brothers
Ejido Pancho Villa	1967	11,546 ha	6,652 ha	4,380 ha	received an addition of 10,000 ha of grazing land in 1978
Ejido San Pedro	1972	6,108 ha	4,115 ha	1,926 ha	

Villa and Colonia Las Virginias are adjacent, and Ejido San Pedro and Colonia Buenos Aires are adjacent (Fig. 3). These specific combinations were selected to include differences in Mennonite colony size and age, and differences in ejidatario livelihoods and outmigration.

Figure 3. Map of Janos County (outlined in red) showing the location of the four focal communities. Ejidos are outlined in purple, Mennonite colonies are outlined in white.



The sector I was not able to interview were those ejidatarios and Mennonites who had emigrated in search of better opportunities elsewhere, usually the US and Canada, respectively. I was able to interview some ejidatarios who had left temporarily and then returned – usually voluntarily but sometimes due to deportation – and was able to hear why they had left to begin with (usually a combination of poor income-earning potential in Janos paired with chronic boredom). I was not able to interview any of the many ejidatarios who abandoned the ejido in the first decade or two after founding, defeated by the difficulty of the lifestyle and the improbability of a good living there. I interviewed three Mennonites whose parents had moved them to Canada as kids and who had then moved back, and heard expected stories of small farm failure and debt. Those few cases provided a thin base from which to extrapolate. Otherwise, however, I was left asking those who remained why their neighbors or cousins or siblings or children had emigrated. I heard a lot of stories that were useful but by definition they were second-hand.

Interview notes were topically coded using MaxQDA v.11 software (produced by VERBI GmbH) to facilitate qualitative analysis. I created 46 in-vivo (terms taken directly from the notes) and constructed codes (terms/ideas I developed during analysis) using line-by-line open

coding, focusing on land use (e.g. 'crops grown'), land ownership (e.g. 'land sales', 'land purchases'), household economics (e.g. 'economic diversification', 'credit use'), farming technology (e.g. 'irrigation', 'farm machinery'), the environment (e.g. 'drought', 'groundwater'), social dynamics (e.g. 'cooperation'), and policy impacts (e.g. 'land reform', 'BANRURAL'). Most important for this study, personal land use histories and mechanics of individual land transactions detailed in interviews were scrutinized to determine drivers and establish patterns in the process of agricultural expansion. Analysis sought to identify patterns of transitions in land use and ownership (such as when a parcel is converted from rangeland to crops or sold to a neighbor) at the level of the individual and at the level of the community.

Post-Janos Research

Following the primary data collection period in Janos, I undertook shorter studies of two other areas. The first, lasting just five days in October, was in a set of adjacent Mennonite colonies often collectively called Colonia La Oasis, though in truth La Oasis is just one of over 8 different adjacent colonies. La Oasis is located east of Chihuahua (city), less than an hour's drive from the Chihuahua-Texas border crossing at Ojinaga-Presidio. My assistant and I learned about La Oasis from one of our Mennonite research participants in Janos who had family living in La Oasis.

In five days my assistant and I conducted nine open-ended interviews, four of which were conducted in English (the English-speaking men had all lived in Canada for years before buying land in the La Oasis colonies – a relatively common phenomenon). Our first interview was with the owner of the motel we stayed in, whose irrigation wells had all but gone dry and had opened a motel as a replacement for farming. From him, we worked through snowball sampling. Interviews focused on the history of the colonies and what happened in one area where a small aquifer had been depleted, leaving a large portion of two colonies without sufficient water to irrigate more than a few fields. The history of La Oasis is very different than the colonies in Janos, having been founded much later and expanded much faster. As both cause and effect of its accelerated growth, class dynamics in La Oasis show more pronounced economic differentiation, with a stronger presence of wealthy elite and fewer true family farms. I discuss these dynamics in contrast to the Janos colonies in Chapter 6.

Research Limitations

There were two important limitations on my research. An unintentional limitation was in my interviewee sampling: we interviewed only five women in Janos, one woman in Casas Grandes for historical background, and one more by phone who was living in the US. The overwhelming majority of our interviews were with men, which most certainly leaves out a large swath of lived experience. We did not make an effort to interview men specifically, but gender roles are very defined in Janos. Whenever we introduced ourselves and described what we were going to ask about, men would agree to talk to us, while women would go and get their husbands. The partners of ejidatarios often sat in on our interviews and sometimes contributed but rarely answered questions directly, instead deferring to their husbands. In many cases partners seemed surprised by what they heard their husbands tell us about their farming or cattle operations. While there are female ejidatarias in Mexico, they are a minority, and we never met

any in Janos (see also Deere & León, 2001). Mennonite women rarely speak any language other than their native Plautdietsch (Spanish is not taught in school), and neither I nor my assistant spoke Plautdietsch. There is only one woman rancher in Janos, and she refused an interview through her ranch foreman, stating risks from the local cartels. In all of our interviews with ranchers or ranch managers, their partners were present in only two cases, and neither contributed to the interview.

The second limitation on the research is related to illicit activity. There are numerous varieties of illicit behavior in Janos but the most significant and the most dangerous is the trafficking of drugs by violent cartels. The cartels, or rather, the one cartel that operates in Janos (I do not know which one), is very active and has a presence in all the Mexican communities, and quite probably within the Mennonite colonies as well. I heard countless stories of past violence, was warned about certain vehicles or certain people, and read news reports of killings and police busts both past and present. I was once warned by a US Customs and Border Protection agent at the Antelope Wells/El Berrendo border crossing that I would be killed if I tried to do my research in Janos, and then he told me about finding coolers full of human heads that had been dropped off at the border in the middle of the night. Those sorts of stories have a certain chilling effect on one's desire to learn a great deal about drug trafficking, or at least they did for me.

Drugs and the cartels are not the only kind of illicit activity, however, just the kind most surrounded by a veil of secrecy. Other, technically illegal, activities fell out on a spectrum of perceived moral indecency and degree of revelation. The planting of genetically modified cotton within the Janos Biosphere Reserve was technically illegal, for example, but many interviewees readily told me they had done it, often specifically clarifying that the act was illegal. The drilling of new irrigation wells was illegal unless one had purchased an unused well permit from someone else, which was likely rare, but well drilling machines are visually and audibly conspicuous and run continuously for over a month – it is no secret when someone installs a new well. Still, very few people admitted to me that their wells were illegal; a more typical answer to questions about how they were able to install new wells given the federal ban was to talk about how *expensive* it was to get a well permit – a reference to bribing the relevant officials. Illegal migration was another common illicit act, and one which many people readily admitted to. The sensitivity about migration was not past events but about revealing details about family members who were *currently* in the US illegally, no doubt due to the perceived risk that I might somehow get them picked up by Immigration and Customs Enforcement.

For my own safety, that of my assistant, and that of my interviewees, the drug trade was a topic I could not ask about at all with some people, and only in very general terms with the rest (e.g., Have you ever had issues with narcos on your ranch? Does the drug violence make you nervous or affect how you think about staying here long-term?). I also made sure to finish interviews and get back to the research house by dark, due to the many warnings we were given not to drive around at night. One other researcher and one NGO employee I talked to had been waylaid at night by narcos, though both were let go with nothing but a warning not to be out at night.

In Janos, the drug trade and associated capital likely play *some* role in areas directly relevant to my research. The first relates to livelihoods. Much of my research examines how people earn a living, figuring out why people choose one option over another, and why some

options are more lucrative than others. Why did some people choose to farm while others found construction jobs in other towns? Involvement in the local cartel and income earned from drug trade most certainly affects those decisions. I neither knew which individuals were making livelihood decisions based around cartel activities nor how exactly how widespread that phenomenon was.

One of the puzzles in working somewhere that so many people have emigrated from is why the people who left, left. Out-migration in Janos helped clear the way for land consolidation, though which was the cause and which the effect was sometimes hard to determine. It seems plausible to me that some people emigrated because of the cartel, for one reason or another. It also seems probable that some people chose to stay because they work for the cartel, making possible a life that would not be otherwise economically tenable. Not knowing for whom that was true made it harder for me to evaluate what conditions constitute grounds for emigrating.

The third area of my research potentially affected by drug trafficking is land transactions. Based on stories I heard of ranch owners of decades past, it seems likely to me that some ranch sales occurred because a drug kingpin wanted a ranch near the border to use as a base of operations and/or to launder drug money through an otherwise legitimate ranching business, a business known for conducting a lot sales in cash. Drug profits also enable land purchases that would not be possible with legitimate earnings alone, potentially skewing my assessment of what drives land consolidation. I would hazard that illicit activity contributes to *some* land sales but that it did not typically play a role in land conversion.

The fourth topical area is land use. There is more economic turnover in farming than ranching – more costs and more revenue. I know of one probable case where rangeland was converted to farms by someone associated with a cartel, probably both to better launder money and to increase the activity on the property, making it harder to track what or who comes in and what or who goes out. Was that common? Probably not, though any Mennonite in Janos who had drug money to spend would likely use it to buy more land for farming, as that was the predominant use for all profits. Though I suspect this particular activity to be rare, it is hard to know for sure because I could not research it.

This is not to say that I learned nothing about illicit activity in Janos. Between gossip, triangulating vague references and stories, and cases where I was confident I was being lied to, I was able to piece together a very general terrain of illicit activity, from transgenic crops and crooked well permits to ranches being used for laundering money. My conclusion is that low-grade illicit activity is very important for facilitating certain elements of farming and agricultural expansion onto and near the Janos Biosphere Reserve. Drug trafficking and its proceeds play a relatively small role, I think, with occasional and notable exceptions. The growth of some large ranches or large farms may well have been fueled with illicit money, just as many of the haciendas of old were said to have been. For the majority, however, I suspect that growth was fueled by economies of scale, economic differentiation, and a highly variable terrain of access to capital, skills, connections, and labor, as is true in most industries, and that is the story that is told in this dissertation.

Chapter 3: Land Reform, Ranch Fragmentation, and the Founding of Desert Farmsteads

In this chapter, I present a history of how the land reform actually played out in Janos County over the 70 years it was in operation. Prior to the Revolution, Janos was dominated by vast ranches, most of which were owned by Americans. The Revolution and subsequent land reform broke up those vast estates and, over many decades, created a patchwork of smaller ranches, ejidos, and Mennonite colonies. Through this history I will explain how the land reform played a central role in the arrival of Mennonites to Janos. The structural legacy of the land reform – in a spatial pattern of land parcel sizes and location – also contributes the ongoing sales of ranch and ejido land to Mennonites long after the land reform officially ended. I will also describe the process by which the ejidos were created, which differs from common narratives and which will help explain, in later chapters, why the ejidos have largely abandoned crop agriculture and depopulated.

On one wall of the office where I did most of my computer work while living in Janos was a paper map of property boundaries for the state of Chihuahua from 1948. It had been there for years, originally put up by a Mexican doctoral student who had lived in the same house while doing his research on grassland ecology. It was more than four feet to a side, made of individual 8.5"x11" photocopies all carefully glued together on a big roll of heavy paper. Reportedly, a rancher put it together by painstakingly photocopying each section of a map found in some government office, probably in Chihuahua (City). I spent hours looking at the area of Municipio Janos, in the top left corner of the map. Each parcel, if large enough for the print, contained the name of the owner. Some were Euroamerican-sounding names: Greene, Warren. Other than Ejido Janos, which was nearly the same then as it is today, few of the owners matched what I knew about contemporary ranch ownership in the area, and many of the property boundaries had changed. Many parcels were far larger than anything remaining today.

The map showed only three ejidos and no Mennonite colonies – they had not been established yet. At the beginning of my research, I knew that the land reform had created the ejidos and must also have been at least partially responsible for fragmenting the very large ranches (>40,000 ha) shown on the map. But I did not know how the land reform had actually played out in Janos nor how the Mennonite colonies were established. I knew from reading Sawatzky's (1971) history of Mennonite colonization of Mexico that they had not received land through the land reform. The immediate question was how had the five Mennonite colonies in Janos come to be there?

The answer is that Mennonites from central Chihuahua settled in Janos through buying land from ranchers, and the colonies continue to expand largely through this same means. Ranchers have historically sold land to Mennonites for two principal reasons. The first, and which has only begun to happen recently, is that Mennonites are now willing to pay high prices for certain parcels of land, far higher than another rancher would pay for the same land. That price acts as a windfall opportunity for those ranch owners who have better uses for cash than they do for a few hundred or thousand hectares of increasingly arid rangeland. The fact that

some Mennonites can offer such high prices is itself a consequence of global farm technology improvements, international trade policies, and the availability of cheap migrant labor from central and southern Mexico. The second reason, which was what allowed Mennonites to purchase land in Janos back in the 1950s, was that some ranchers were faced with the choice of selling their land or having it expropriated by the government for the land reform. While a 20,000 ha parcel of land owned by one rancher was often subject to government expropriation, a 10,000 ha Mennonite colony was not because of the way land was subdivided among individual farmers. Mennonite colonies appeared consistent with the goal of the land reform to distribute land for small-scale production.

A major component of Mexico's post-Revolutionary constitution and subsequent policy structure, the land reform was predicated on redistributing land from haciendas, plantations, and foreign-owned estates to the vast majority of the population that held no land rights (Assies, 2008; Hart, 2002; Rippy, 1953). In practice, the government had the authority to expropriate land from virtually any large landowner for redistribution as either private land, to indigenous communities, or as ejidos. People seeking land could often expedite this process by occupying ranch land, starting farmsteads, and demanding formal land rights to their new plots (Bobrow-Strain, 2007; interviews, 2017).

The land reform directly established 14 ejidos in Janos County, though one of these – Ejido Janos, which is where the actual town of Janos is located – was actually the restitution of a 1778 Spanish land grant (Wasserman, 1993). The creation of ejidos functionally established agrarian communities where none had previously existed. Four ejidos actually expanded over time to accommodate children of ejidatario/as who wanted their own parcels (ejido parcels can normally be passed to only one heir), and the expansionist fervor of some existing ejidos served to keep the pressure on the neighboring ranchers to defend their private property rights. Each new ejido community also served to draw in government assistance in the form of roads, buses, government services, etc., which made future agrarian development in the area that much easier.

The threat of expropriation and/or occupation motivated ranchers in Janos to shrink the size of large ranches, either by subdividing them among family members or by selling off sections that they were likely to lose. According to Mennonite and rancher informants, four of the five Mennonite colonies in Janos were established when ranch owners (three of them not Mexican-born) sold large portions or their entire ranch property to Mennonites after coming under pressure of expropriation and/or occupation. In several other cases, ranch subdivisions among multiple family members on paper led to sales to non-family members in later years.

All this is not to say that raising cattle is a threatened way of life. Quite the contrary. Cattle grazing is still the predominant land use in Janos, as it is throughout Chihuahua as a whole. The ranches themselves have shrunk dramatically from a century ago, when the northern part of Janos was within the Palomas Land and Cattle Company, an American-owned ranch that spanned more than a million hectares just south of the US border. On the whole, however, ranching in Chihuahua today looks much the same as it does in the US: there is a general shift toward using more cross-fencing and supplying more supplemental feed during dry periods; black Angus is the dominant breed (almost purely for market reasons); and cattle genetics are carefully scrutinized, with some ranchers buying bull semen from the US for artificial insemination. Being so close to the US, most beef calves born in Janos in the last

hundred years have been sold across the border, destined – after one or two intermediary stops to graze on rangeland – for US feedlots.

In an odd quirk of economics, the US imports huge numbers of calves and steers from Mexico and exports thousands of tons of finished beef back to Mexican restaurants and supermarkets, all because of the abundance and low price of US corn, soy, and other animal feeds (Machado, 1981; Peel, Matthews, & Johnson, 2012). While a small number of ejidatarios are able to negotiate (and pay for) the export process themselves, the bulk of their calves are sold to ranchers or middlemen (“coyotes” in local parlance) who truck them up to one of the nearby US ports of entry. But ranchers and ejidatarios complain that cattle are no longer as profitable as they once were, because beef prices have not kept up with rising costs of living and certain production costs. It is likely for this reason that three of the five largest landowners in Janos – and both of the top two – are vertically integrated cattle operations, with cow-calf ranching operations in Janos and feedlots located elsewhere (in one case, Texas).

The expansion of irrigated farming in Janos does not threaten ranching socially or economically, but it does radically reorient the local economy around Mennonite agricultural production. Farming entails far more economic activity per hectare than does ranching. Labor needs are higher, material and equipment costs are higher, utility and fuel costs are higher, the need for seasonal operating credit is usually higher, total revenue per hectare is higher, and net profit per hectare is usually higher. As a result, there are far more livelihoods, seasonal and permanent, in Janos now than there were before the (slow) explosion of irrigated farms. As one ejidatario put it, in reference to the economic reliance of ejidatarios on the Mennonite farming community, “if they ever leave, we will have to pack up and go with them.”

The History of Land Reform in Janos County

The land reform was a product of the post-Revolution constitution, aimed at rectifying decades of increasingly unequal landownership and economic opportunity. Prior to the Mexican Revolution (1910-1920), most of northern Chihuahua was dominated by vast ranches, many of them owned by Americans. William Randolph Hearst owned the 200,000 ha Babicora Ranch in northwestern Chihuahua (Hart, 2002). Another American tycoon from California, Edwin J. Marshall, owned a one million hectare ranch called the Palomas Land and Cattle Company, which ran along the U.S. border for the entire length of New Mexico (Irvin, 1984). Just south of Palomas was the Corralitos Land and Cattle Company, a ranch of some 360,000 ha attached to the Candalaria Mine. A New York-based corporation headed by Edward Shearson and Edwin Morgan, nephew of the famous oil tycoon J.P. Morgan, owned both the ranch and the mine in 1910, though the two enterprises were separated during the Revolution (Campbell, 2014; Hart, 2002). The long-time governor of Chihuahua, Luis Terrazas, also owned more than 2.8 million hectares scattered across Chihuahua, the majority of which was ranchland (Wasserman, 1993).

Palomas Land and Cattle Company and Corralitos Land and Cattle Company together owned a significant share of what is now Janos County in 1910. Much of the remainder was composed of other US-owned ranches, with some US-owned timber operations logging the mountains (Hart, 2002). All of these ranches were northward-facing, raising beef cattle that were then driven across the border on foot or packed into the new US-financed railroads and

hailed through the port of entry at El Paso, bound for feedlots and slaughter in US facilities (Brand, 1933; Campbell, 2014; Wasserman, 2015).

Mormons immigrating from Utah in the 1890s established nearly a dozen small farming communities scattered among the large ranches and timber estates of northwestern Chihuahua and along the Sonora border. Mormon colonization in Mexico was directed by edicts from church founder Joseph Smith to start a mission in Mexico, and also provided a way to avoid the new US legal crackdown on polygamous marriage (www.lascalonias.org). Colonists established Colonia Diaz outside the town of Ascención, and Colonia Dublan and Colonia Juarez outside Casas Grandes. Unlike the corporate operations of Palomas and Corralitos, the Mormons formed tight-knit communities of yeoman farmers that farmed, raised beef and dairy cattle, and started small commercial enterprises selling fruit, milk, and cheese locally. According to one source, the Mennonite cheese industry (still a major economic activity) started in 1931 with expertise from the Mormon colonies outside Casas Grandes (Sawatzky, 1971, p. 140-2).

The consolidation of land by elites in northern Chihuahua was not unique to that region. By 1910, only 8.7% of the Mexican population owned land at all, and 87% of landholdings were in the form of haciendas whose owners comprised just 0.2% of the population (Secretaria de la Reforma Agraria, 1985, as cited in Assies, 2008, p. 39). Most of the populace worked as tenant farmers, sharecroppers, itinerant miners, or urban wage workers. Opportunities for advancement were slim to none, and a large proportion of the land was devoted to earning profits for foreign elites and corporations (Alonso, 1995; Hart, 2002; Nugent, 1993; Wasserman, 1984, 1993). In 1910, peasants and townspeople from around the giant ranches of Chihuahua rose up in rebellion against the regime of Porfirio Díaz, while Emilio Zapata led a southern contingent of rebels out of the sugar plantations of Morelos (Alonso, 1995; Hart, 2002).

Inequality in land ownership, not only of cattle ranches in the north but also of agricultural haciendas or latifundias in the south, was the core grievance of the revolution (Assies, 2008; but see Wasserman, 1980). It is thus not surprising that the post-revolutionary constitution of 1917 created processes to expropriate land from foreign owners and domestic hacienda owners, redistribute those lands to the landless poor, and to limit the amount of land that any one person could legally own. Land redistribution was not a rapid process, however, but instead occurred irregularly and largely in response to political pressures of the times (Albertus, Díaz-Cayeros, Magaloni, and Weingast, 2016; Assies, 2008; Walsh Sanderson, 1984). As will be discussed below, ranches in Janos were incrementally fragmented into smaller and smaller parcels over the course of five decades. The next section will explain how that process occurred.

Mexico's Land Reform and Private Ranches

The 1915 Agrarian Code provided for the return of all lands to peasants that had been illegally dispossessed during the previous half-century. Article 27 of the new constitution of 1917 set out the new rules on property ownership and established a national land reform intended to break up haciendas and redistribute land to those that needed it most. Land was to be given away not as private property, however, but as the form of communal property called *ejidos* (or, if the land was given to indigenous communities, *comunidades*). The land reform was as much an act of politics as it was of ideology, however, as some promise of restitution was necessary

to quell the lingering violence of the Revolution. The government's political mandate to meet constitutional requirements to distribute land to the landless was tempered by the simultaneous economic need to maintain functioning private industry. Large ranches were buffeted by both of these needs, and as a result were inconsistently subject to expropriation through the land reform.

The 1917 constitution did not eliminate the institution of private land but merely set limits on how much one person could own. One individual or corporation was generally limited to no more than 100 ha of irrigated land *or its equivalent*, but many exceptions were made for lucrative commodities (e.g., 300 ha for bananas, sugar, sisal, or coffee); additionally, unirrigated grazing land was limited to that amount necessary to sustain 500 head of cattle (Rudolph, 1985, as cited in Vásquez Castillo, 2004, p. 31). It was left to individual states to determine how many hectares it actually took to sustain 500 cattle. Chihuahua initially set the maximum size of private ranches at 44,000 ha (Aguilara Gómez, 1965, as cited in Sanderson, 1981, p. 66). In Chihuahua, as in most states, the government did not make any systematic effort to enforce the size limit for several decades. Even when it was enforced, ranch owners typically had the option to first subdivide their property, selling the excess and choosing which hectares would be retained in the event of an expropriation (Sanderson, 1981, p. 68).

President Cárdenas (1934-1940), the same president who nationalized the oil business, took the contradictory steps of significantly increasing the amount of land redistributed per year and also created a legal process to protect large ranches from expropriation. Those two actions served to address public protest over continuing land inequality while providing some security for an important economic sector that both provided for national food needs and contributed significantly to national exports. The Revolution had severely affected the cattle industry across the country, and by the 1920s Mexico was facing a beef shortage. Export taxes on cattle crossing the northern border in the US were increased as one method of addressing the problem, but were insufficient. By the time Cárdenas took power in 1934, the beef industry was still highly unstable and private ranchers were hesitant to invest in ranches or cattle production due to concerns about the land reform (Machado, 1981, p. 49-54). Cárdenas's early expansion of land redistribution served to further shake confidence in the ranching sector, and some remaining US-owned ranches sold out in the first few years of his regime. But Cárdenas was not deaf to the protests of cattle producers, which frequently owned arid lands poorly suited to smallholder farming anyway (Machado, 1981, p. 51).

In 1937, Cárdenas issued a decree that all rangeland properties capable of supporting 500 cattle or more (i.e. properties larger than what was protected under Article 27) were eligible for 'certificates of immunity' (*certificados de inafectabilidad*, literally 'certificates of inaccessibility'). The certificates shielded the land from government expropriation for a period of 25 years (Diaria Oficial de la Federación, 1937), and were given out as late as the 1980s.⁵ The catch was that certificates would only be issued to ranches in areas *where agrarian needs for land had already been met*, a condition which was not legally defined and thus provided officials with an exceptional amount of discretion about where and when certificates could be

⁵ One ranch manager actually showed me the certificate for the ranch he managed. I also interviewed the grown children of 2 ranchers who had had certificates for their ranches but lost land to expropriation anyway. Their only explanation was that it makes a big difference who your friends are.

issued (Machado, 1981, 52-54). Ranchers had to apply for certificates, and did not always receive them.

Following the 1937 Cárdenas decree, official notices of ranchers receiving certificates of immunity for ranches greater than 40,000 ha became commonplace in the *Diario Oficial de la Federación* ('Official Newspaper of the Federation', the Mexican government's official public bulletin of governmental affairs and decrees). Between 1937 and 1958, 197 certificates were given out in Chihuahua alone, accounting for 3.9 million ha and 44% of all land granted certificates across the whole country (Pérez Martínez, 2016, p. 200).

Chihuahua's declaration of 44,000 ha as the maximum allowable size for private ranches came under increasing scrutiny and political opposition by the 1960s, just as the first certificates were expiring (Machado, 1981). Ranchers who did not receive certificates, or those whose certificates were soon to expire, had a strong motive for clarifying the size at which a ranch became eligible for expropriation. That size limit was still set by the Article 27 cap based on 500 cows, but there was now mounting pressure for a better calculation of exactly how many hectares were needed for each cow/calf pair (termed a 'coefficient'). The *Comisión Técnica Consultiva para la determinación regional de los coeficientes de agostadero* (COTECOCA; the Consulting Technical Commission for the regional determination of rangeland coefficients) was created in 1964 to determine how many hectares of land were needed to support one cow-calf pair in every ecoregion of the country, based on field data.

The coefficients for Chihuahua were officially released in 1980, and ranged from 8 ha to 60 ha per cow-calf pair (*Diario Oficial*, 1980, p. 15-6), meaning that the size limit to be exempt from expropriation could vary from 4,000 to 30,000 ha depending on vegetation. These new standards meant a significant reduction in the parcel size exempt from expropriation (down from 44,000 ha), putting new pressure on remaining large ranches not protected by certificates. It is no coincidence that a large proportion of all issued certificates expired in the late 1960s, during the six-year presidential term that would see more land redistributed as ejidos than any other (Pérez Martínez, 2016, p. 200).

The land reform was official national policy until 1992 but in practice land redistribution was episodic. Just three presidents gave away 59 percent of all the land redistributed between 1934 and the end of the land reform in 1992: Lázaro Cárdenas (1934-1940), Gustavo Díaz (1964-1970), and Luis Echevaría (1970-1976) (see Table 3). Some scholars have attributed the episodic nature of land redistribution to variations in political pressure on the Institutional Revolutionary Party (*Partido Revolucionario Institucional*, PRI). PRI was the ruling party of Mexico from its foundation in 1929 until the upset election of the PAN candidate President Vicente Fox in 2000. PRI had always associated itself with the rural poor and the land reform, and it relied on ejido votes to stay in power. The government had little economic incentive to redistribute land from potentially profitable private enterprises to the ejidos, which typically soaked up more money in government support than they produced. The incentive to redistribute more land, then, is often viewed primarily as a bid to boost PRI's popularity at the polls at times when its support was flagging (Albertus et al., 2016; Fox, 1995; Walsh Sanderson, 1984).

Table 3: Redistribution of land by presidential period, 1935-1992 (from Assies, 2008, p. 46)

Period	Total of redistributed hectares	Type of land in %				Beneficiaries
		Irrigated	Rain-fed	Grazing land	Other ²¹	
1934–1940: Lázaro Cárdenas del Río	18,786,131	5.0	18.0	50.2	26.8	728,847
1940–1946: Manuel Ávila Camacho	7,287,697	1.3	13.8	53.9	31.0	157,816
1946–1952: Miguel Alemán Valdés	4,633,321	1.3	15.9	57.5	25.2	80,161
1952–1958: Adolfo Ruiz Cortines	6,056,773	1.3	14.9	49.1	34.7	68,317
1958–1964: Adolfo López Mateos	8,870,430	1.8	15.3	62.3	20.6	148,238
1964–1970: Gustavo Díaz Ordaz	24,738,199	0.3	8.2	65.2	26.3	278,214
1970–1976: Luis Echevaría Álvarez	12,773,888	0.9	5.1	59.0	35.0	205,999
1976–1982: José Lopez Portillo	6,397,595	1.2	13.6	62.7	22.4	243,350
1982–1988: Miguel de la Madrid Hurtado	5,626,227	1.5	9.6	61.4	27.5	248,486
1988–1992: Carlos Salinas de Gortari ²²	551,869	7.4	23.5	35.4	33.7	80,692

Based on Bizberg and Meyer (2003, 592).

By the end of land reform in 1992, there were more than 29,000 ejidos accounting for about half the country's land area (INEGI, 1990). Although "patterns of land use in individual ejidos are so varied that it is difficult to generalize" (DeWalt & Rees, 1994, p. 47), most ejidos were established with the intention that ejidatarios would produce food, either by growing crops, grazing livestock, or both. While ejidos often lacked significant infrastructure and came to be known for their low productivity, there were also cases where ejidos were founded around major state-operated irrigation projects and intensive production of cotton, wheat, etc. (Whiteford et al., 1998).

As was true in Janos County, all ejidos were established with an internal governance system designed to foster participation and the democratic process. Each ejido voted to elect its own officers, and essentially all ejido matters required a winning vote of a quorum of the assembly (the collection of all rights-holding ejidatarios, as opposed to non-rights-holding ejido residents). The degree of cooperation on agricultural production between ejidatarios varied immensely, however. At certain times and places, the federal government promoted ejido agricultural cooperatives in which ejidatarios pooled labor and divided benefits according to a formal structure, while at other times and places such cooperatives were actively undermined by officials in multiple agencies (Otero 1999; Whiteford et al., 1998). Grazing lands were often left undivided and used by all ejidatarios (such lands were officially called *uso común*, or commons), while land designated for cropping was often formally or informally allocated to individuals.

The length of time ejidatarios had resided on ejido lands prior to their designation as ejidos varied enormously. Particularly in Southern and Central Mexico, many ejidos were granted to people who had been living on or near that land for generations (e.g. Bobrow-Strain, 2007; Goldring, 1998; Stephen, 1998). In the arid north and in the forested Yucatan Peninsula, ejidos were often established essentially as colonization mechanisms, where formerly uninhabited land (or at least uninhabited since colonial genocide of the indigenous population) was distributed to outside settlers for the purpose of bringing it into commercial production (e.g., Ellis et al., 2017; Klepeis & Turner, 2001; Whiteford et al., 1998; Vásquez-León &

Liverman, 2004). It is not clear to me, however, whether apparent cases of ‘colonization by ejido’ were motivated primarily by a desire to establish new population centers in otherwise sparsely settled regions, to increase the intensity of production in previously extensively used lands, or if it was simply more politically expedient to give away land that did not have prior residents. All three likely played a role and in any case were observed effects of the land reform in Janos County.

The Land Reform in Janos, Part 1: the Ejidos

The land reform created 14 ejidos in Janos County, accounting for one third of the land area. All of the land had previously been owned by private ranchers or, perhaps in a couple of cases, timber companies. The first ejido created in Janos was Ejido Janos, which was actually a restitution of the Janos presidio, now under the new ejido legal structure. The five presidios in Chihuahua (Janos, Casas Grandes, Galeana, Cruces, and Namiquipa) were all restored relatively quickly following the Revolution, a tribute both to the renowned Revolutionary activity of the citizens there and their potential to renew those hostilities if not made whole (Alonso, 1995 and Nugent, 1993). When Ejido Janos was restored in 1927, it became the first ejido in Janos County, and would remain the largest (at 112,000 ha). The remaining thirteen ejidos were formed between the 1930s and 1992, the year the reform officially ended. The majority, including both Ejido Pancho Villa and Ejido San Pedro, which were my case study ejidos, were created during the long surge in redistribution under Presidents Díaz Ordaz and Echevaría Álvarez in the late 1960s and early 1970s (Tables 4 and 5).

At least 10 of the 14 ejidos in Janos County were created not by returning land to the people who had been illegally dispossessed of it but by giving away land to landless petitioners who lived elsewhere who simply wanted land *somewhere*.

With few exceptions, the land in Janos County that became ejidos had been uninhabited ranchland prior to the arrival of the first ejidatarios. Private ranchers previously owned the land and used it for grazing cattle. The new ejidatarios had to establish houses, gardens, sources of drinking water, and farm fields when they took possession. The two exceptions to this rule were Ejido Janos and Ejido Casa de Janos. Ejido Janos had been a small town and military garrison for centuries, and it had an ‘urban’ core. The newly decreed ejidatarios of Ejido Janos thus had significant infrastructure to start with. Similarly, the town site of Ejido Casa de Janos was (according to interviews) the site of an old hacienda headquarters, and the first ejidatarios to receive land there in 1933 were the workers and tenant farmers who had been on the hacienda.⁶ The hacienda in question was probably Corralitos Land and Cattle Company, though the main headquarters was much farther east, in Casas Grandes County. Corralitos records indicate that they had built a primitive dam to irrigate several thousand acres of crops in the early 1900s (Campbell, 2014), and the site of that dam is at or near where the government built two new dams in the 1970s, just above the village of Casa de Janos.

⁶ I also heard a slightly different account of Casa de Janos. According to an elderly rancher who had grown up in Janos, Ejido Casa de Janos had previously been a permanent cowboy camp for Corralitos Land and Cattle Company, which was too big to operate out of just one headquarters. According to this rancher, there had never been farming or tenant farmers at Casa de Janos, just wage-earning cowboys.

Table 4: Descriptive details on ejidos in Janos County with groundwater irrigation

Ejido Name	Janos	San Pedro	Pancho Villa	Casa de Janos	Ignacio Zaragoza (Tierras Prietas)	Monteverde
Date Established	1927	1972	1967	1935	1971	1970
Total size (ha)	112,000	6,107	21,545	19,625	3,137	12,664
Terrain	Flat	Flat	Some flat, some hills	Mostly flat, some hills	Flat	Flat
Farming	Yes	Yes	Yes	Yes	Yes	Yes
Ag Water Source	Groundwater, river, seasonal irrigation canal	Groundwater	Groundwater	Groundwater, seasonal irrigation canal	Groundwater	Rain (until 1992), Groundwater
Residence	Town of Janos	Village	Village	Village	Limited	Village
Mennonite Ownership	Limited; some Mormon owners	All farming	Limited	Limited but growing	All farming	Limited
Notes	Site of the town of Janos, both historic and current	Mennonites do all farming	Mix of cattle and farming	One ejidatario owns nearly half the rangeland	Few residents; Mennonite ownership growing	Some 2,000 ha of old rainfed fields were abandoned in 1990s

Rather than occupations, the most common practice for establishing an ejido in Janos was for landless workers in other areas of Chihuahua to sign petitions demanding land from the government. These petitions often circulated around mines and major infrastructure projects with many landless workers. Many of the petitioners who became ejidatarios in Janos had signed petitions for land while employed in other towns in northern Chihuahua, including Casas Grandes, Ciudad Juarez, and Flores Magon. Some of the ejidatarios I interviewed on Ejido San Pedro had grown up as far away as the state of Zacatecas, and were merely working in Chihuahua as laborers when they signed petitions for land (some men signed several petitions, usually for naught).

Table 5: Descriptive details of ejidos in Janos County with no groundwater irrigation.

Ejido Name	Lazaro Cardenas (Ojo Frio)	Altamirano	Los Pinos	Cinco de Mayo	Los Ojitos	Coronel Porfirio Talamantes	General Felipe Angeles	San Francisco
Date Established	1930	1935	1976	1972	1986	1992	1992	1992
Total size (ha)	12,794	34,321	5,412	23,217	646	6,778	2,541	4,179
Terrain	Mountain-ous	Mountain-ous	Flat	Mountain-ous	Flat	Flat and Mountain-ous	Flat and Mountain-ous	Flat and Mountain-ous
Farming	Limited	Limited	No	No	No	No	No	No
Ag Water	Rain, limited riparian	Rain, limited riparian	N/A	N/A	N/A	N/A	N/A	N/A
Residence	Village	Village	None	None	1 Family	None	None	Limited
Mennonite Ownership	None	None	None	None	None	None	None	None
Notes	Some income from harvesting/selling firewood	Timber harvests and mill are main income source	Grazing only	Used to sell timber contracts; recently taken over by a drug cartel	One family owns the whole thing	Grazing only; ownership consolidating	Grazing only; ownership consolidating	Some small businesses along highway

One of the challenges of the ejido system is that when an ejido is created, the land is usually fully allocated to the starting members, meaning that all the land is divided up into a set number of land rights (*derechos*) equal to the number of ejidatarios on the official roster. There is no ‘excess’ land to account for future population increases. Prior to the changes to Article 27 of the Constitution in 1992, ejido land rights could not legally be divided and reallocated. An ejidatario who died could only pass on their rights as ejidatario to one child. This also held for spouses, as there were provisions to prevent both marriage partners from each having a land right, meaning that widows/widowers were often left landless (Deere & León, 2001).

As a consequence of not having land available for the children of ejidatarios, each ejido had successive generations of landless peasants who often became land claimants themselves. Rather than create a whole new ejido to accommodate new generations, ejidos were sometimes expanded through an addition (*ampliación*) wherein an additional piece of land was expropriated from a neighboring or nearby ranch and added to an existing ejido. The addition had its own set of ejidatarios (mostly children of earlier ejidatarios) who were added to the

member body of the parent ejido. In Janos, Ejido Casa de Janos received three separate additions, and Ejidos Pancho Villa, Altamirano, and Lázaro Cárdenas received one addition each. The creation of an ejido in a private ranching area did not act like a release valve on government pressure for land redistribution, then, but actually created additional pressure on nearby ranchers down the line.

The Land Reform in Janos, Part 2: Reshaping private property

In order to redistribute land in the form of ejidos, the Mexican government first had to appropriate that land from the private owners who held it. Private ranch ownership did not by any means disappear following the Revolution, but the size and ownership of ranches did change dramatically in Janos County. Average ranch size decreased while the number of ranches went up. Changes were widespread but did not happen immediately following the Revolution (see Nugent, 1993, p. 90-1). Ranch fragmentation increased over time due both to dynamics created by the establishment of ejidos and to increasingly stringent rules on maximum ranch size.

The biggest US-owned ranches and timberlands in Janos were targeted for redistribution *relatively* quickly after the Revolution. The Palomas Land and Cattle Company, for example, went through two rounds of expropriation: the first was in 1923 under President Obregón, who had some lands redistributed as ejidos, and the second was in 1947, when President Alemán ordered the occupation and sale of remaining holdings in approximately 40,000 ha blocks (Machado, 1981, p. 55-6, 100; Irvin, 1984). In interviews, ranchers provided accounts of the breakup of other major holdings, such as the property of Lewis Booker and Alfred Boyd (both Americans) along the Sonoran border at the western edge of Janos County, and Corralitos Land and Cattle Company, in the southeast of the county.

Many foreigners were either forced out or scared out in the early decades following the Revolution, the owners that replaced them were often Mexican elites. For example, the General Rodrigo Quevedo, a Revolution war hero and Governor of Chihuahua, bought the Corralitos Land and Cattle Company from its US investors in 1934 (Brown, 2005). Quevedo did not get the whole ranch, however, as portions were restored to Ejido Casas Grandes (formerly a presidio, like Janos; Wasserman, 2015, Chap. 5) and redistributed to create Ejido Casa de Janos. The patriarch of the Gabilondo family sold some of his Sonora ranches to buy up numerous ranches in Janos along the Sonora border, and one of his heirs would later become leader of the Chihuahua chapter of the Chihuahua Livestock Union (*Unión Ganadera*)⁷ (Pérez Martínez, 2016). Part of the land Gabilondo bought had been part of a 69,000 ha property owned by Lewis Booker and Alfred Boyd, both Americans, that had been targeted by the National Agrarian Reform (*Reforma Agraria Nacional*, the federal agency in charge of the land reform and formation of ejidos) after the Revolution (Hart, 2002, Appendix 1, p. 513; Interview, 16 Sept. 2017). Teófilo Borunda, another one-time Governor of Chihuahua (1956-1962), and one

⁷ The Livestock Union is equivalent to the United States Cattlemen's Association. Its primary function is to manage cattle exports, particularly to the US, and it actually owns and oversees the cattle corrals at the Santa Teresa border crossing, where most cattle from Janos now cross into the US. For an insightful, contemporary media portrayal of this crossing, I recommend the Planet Money podcast, episode 875.

<https://www.npr.org/sections/money/2018/11/09/666372072/episode-875-why-did-the-cow-cross-the-border>

of his relatives both owned ranches in Janos at different times (Interviews, 14 & 16 Sept. 2017). His relative used profits earned from real estate development in Chihuahua (city) to buy what had been one of the divided blocks of the Palomas Land and Cattle Company (Interview, 14 Sept. 2017).

Like Teófilo Borunda, many of the men buying ranches in the initial decades following the Revolution had not previously been ranchers. There was an economic rationale, as these large ranches in the relatively good grasslands of Janos were very capable of turning a profit, and buying a ranch could be helpful for diversifying one's economic portfolio. Ranching in the north of Mexico also carries a certain cache, as it does in the US (e.g., Gentner & Tanaka, 2002; Gosnell & Travis, 2005), and there are certainly non-monetary incentives for ranch purchases as well, then and now (Oviedo et al., 2013; Torell, Rimbey, Ramírez, & McCollum, 2005). Regardless of motive, the Revolution and subsequent land reform had provided a window of opportunity for wealthy Mexicans to buy up fairly large ranches at good prices, either directly from US owners who were liquidating assets to avoid expropriation or due to costs incurred by the Revolution itself, or by buying land auctioned off by the government after expropriation, as in the case of Palomas Land and Cattle Company. Given that Chihuahua had set the legal ranch size for complying with Article 27 and the land reform at 44,000 ha, and that many ranchers secured certificates of immunity for ranches even bigger than that, the fragmentation of the vast pre-Revolutionary estates was mostly to ranches that were still quite large.

The structure of ranches that emerged in the decades leading up to 1964 was threatened by the expiration of the certificates of immunity and by increasing political pressure for land reform in the 1960s. As was previously described regarding ejido population growth and additions, all four of the ejidos established before 1940 (Janos, Casa de Janos, Lazaro Cárdenas, and Altamirano) had grown in population and by now were putting pressure on neighboring ranchers. All of those except Ejido Janos were awarded with more than one addition over the following decades. In the 1960s, amid a spike in agrarian political mobilization, three large ranches were occupied by peasants seeking land. Two of those ranches were owned by families who were legal Mexican residents but also recent immigrants, one from Spain and one from the US (reported in interviews). From 1967 to 1976, Ejidos Pancho Villa, Monteverde, San Pedro, Ignacio Zaragoza, Los Pinos, and Cinco de Mayo were all created (see Tables 4 and 5).

The response of ranchers to the *de facto* legal constriction on property size (even if the *de jure* constriction would not be made official until the publication of the COTECOCA coefficients in 1980) was to find ways to reduce the size of their holdings, at least on paper. It became a common practice to legally subdivide a ranch and list the various sections under different names, often within the same family. In some cases, a patriarch would put sections of the ranch under the names of his children (usually sons), which served a secondary purpose of establishing legal inheritance. Land was also often legally registered under a wife's name, a practice I found to still be common among ranchers today (when I was digging through property records). Based on interviews with the sons of several of these ranchers, most of the ranches subdivided in this way were still operated as single ranches so long as the patriarch was alive. When the patriarch died, however, land was left in many different hands, whether by design or not.

As was made clear to me both through family stories in interviews and occasionally in land records, each generation of ranch inheritors was less likely to want to ranch than the former. Inheritors often did not ranch for long and instead chose to sell off their portion of the family estate and take that windfall on to other ventures in other places (including to the US, in more cases than I would have thought). The threat of land expropriation, then, could serve to fragment a large ranch into multiple parcels with unrelated owners a generation *after* the threat actually existed. As I will discuss in more detail below, fragmentation and inheritance by heirs with no interest in ranching has played an important part in the continuing expansion of Mennonite farming in Janos.

The Mennonites Arrive in Chihuahua

Ejidatarios were not the only beneficiaries of the Revolutionary backlash against the landed elite. The economic ruin of Chihuahua and the land reform both helped pave the way for Mennonites to emigrate from Canada to northern Mexico in the 1920s. The violence and economic disruption of the Revolution created a need for economic stimulus in Chihuahua, and the land reform created a motive for hacienda owners to sell off their holdings. By arriving when they did, the Mennonites were able to purchase abundant land and to receive State protection from agrarian occupation. According to Sawatzky (1971), Mennonite immigration to Mexico from Canada was motivated primarily by a desire to escape a changing political tide in Canada. It was not the first time that Mennonites had fled a country due to changing politics.

Mennonites had first arrived in Canada from Russia, having fled sudden czarist persecution in Russia in the 1870s. Mennonite immigrants received land in the western plains states of Saskatchewan and Manitoba as part of Canada's westward colonization efforts. Their reputation as industrious farmers who needed little outside support earned them good treatment from the Canadian government. Mennonites were able to secure numerous concessions (what Sawatzky calls a "Privilegium") by the Canadian government (as they had elsewhere previously), most notably exemption from compulsory military service and all national educational standards.

The situation changed around the time of the First World War. The Mennonite exemption from the military draft was picked up in the media to great public outcry, though it was not revoked even at the height of the war. Of even greater concern than the draft, however, was a growing political pressure to force private Mennonite schools to conform to national education standards (such as teaching English) or eliminate them entirely. For some of the more conservative churches (there are many different sects and attitudes toward the outside world within Mennonitism), these pressures were perceived as attacks on their culture and way of life. Some conservative church leaders began to seek a new country of residence where they might find more secure government concessions. One of the countries they made overtures to was Mexico, fresh out of the Revolution.

The administration of President Obregón (1920-1924) was quite receptive to Mennonite inquiries. Though there is no documentation of the government's motivations at that time, their warm reception of Mennonite immigrants was likely due to the dire economic situation in northern Chihuahua at the time. The Chihuahuan economy had been deeply affected by the Revolution. The ranching industry and its associated cattle exports had been a pillar of the

Chihuahuan economy at that time, and the war virtually shut down the industry for two decades. Revolutionaries, especially under Pancho Villa, frequently traded cattle 'confiscated' from Mexican ranches for munitions in the US, or otherwise sold or ate them (Machado, 1981, Chap. 1; Pérez Martínez, 2016, p. 36-7). Some US-owned ranches in Mexico, including Corralitos Land and Cattle Company (Brown, 2005) drove their herds across the border to properties in New Mexico or Texas for safekeeping. The state of Chihuahua went from having a total of 396,023 cattle in 1902 to having 96,184 in 1923 (Machado, 1981, Table 1). Another source lists the decline as being 800,000-947,000 head in 1906 down to 187,000 by 1923 (Pérez Martínez, 2016, p. 31, Cuadro 1). Whatever the exact figures, Chihuahua, and indeed the country as a whole, was in need of an economic stimulus. Thus when the Mennonite delegation from Canada approached the Obregón administration about securing land to establish farming communities, which would entail the transfer of capital from Canada to Mexico, the new President Obregón was amenable to providing the immigrants with Mexican citizenship with specific exemptions from the draft and educational standards, among others (Dormady, 2014; Sawatzky, 1971).

The land reform, and hacienda owners' fear of it, played a role in the location of early Mennonite settlements. Transporting all of their household belongings and farm equipment from Canada to Mexico was a serious logistical challenge, and so it was preferable to find land in the country's north, close to a railroad. In 1920, the Zuloaga family (under the patriarch General Félix Zuloaga) was the second-largest landowner in Chihuahua after Luis Terrazas. Some of their lands were already being occupied by agrarians, and the Zuloagas were eager to sell land before it could be lost to expropriation. In 1921 the Zuloagas negotiated with two communities of Canadian Mennonites to sell the Hacienda Bustillos and an adjacent parcel totaling 225,000 acres near the present city of Cuauhtémoc, in the foothills of the Sierra Madre west of Chihuahua (city). When the larger of the two colonies migrated, they filled six trains from Canada into Mexico (Sawatzky, 1971, p. 44-9). Unlike the Zuloagas, who owned the Hacienda Bustillos as a private ranch with few residents, the Mennonites functionally subdivided the land into small farms (less than 50 ha), which was exactly what the land reform was already doing with ejidos. Despite the large total parcel size of the purchase, Mennonite occupation was very much in line with the format of the land reform: Mexican citizens subdividing vast estates into family farms.

Other communities of Mennonites made other, smaller land purchases nearby, including a portion of the old Hacienda Santa Clara in 1922, formerly held by Luis Terrazas (Sawatzky, 1971, p. 71-2). Another small colony started in Durango in the same year. Mennonites from Canada founded more colonies over the next decade, mostly in Chihuahua and some of them also on the old Hacienda Santa Clara (Sawatzky, 1971). In each case, Mennonite colonies paid for land from private owners who were hoping to avoid occupation by peasants and expropriation through the land reform. All incoming colonies immigrated as groups and brought with them as much of their farming equipment, livestock, and domestic possessions as they could fit on a train.

The first Mennonite farms in Chihuahua were in areas with enough rain that irrigation was rarely needed. Shallow wells were dug for watering orchards and for domestic use, usually powered by wind mills. The first Chihuahua Mennonites did use and own some tractors, however, and their fleet would continue to grow over time. The Old Colony (*Altkolonier*) and

Sommerfelder sects, both of which were among the most conservative in Canada and who made up almost all of the early migrants, eschewed personal vehicles and used steel-rimmed wheels on their tractors. Small Church (*Kleine Gemeinde*) colonies were already driving personal cars by the 1940s, however, and used rubber wheels on their tractors. Motorized pumps for wells were acceptable to all colonies, though there was a general disapproval of irrigating field crops in the early colonies, where rainfall was in any case sufficient. In other colonies, however, irrigation was required. Mennonites in the state of Coahuila were drilling wells down to 800 feet in 1953 (Sawatzky, 1971, p. 168), proving that the technology has been available to Mexican Mennonites at least since then.

Each Mennonite colony started with an initial surplus of land. Immigrating families would sell operational farmland in Canada at high prices and buy virgin land in Mexico at low prices, allowing each family to buy more land than they had owned previously. The differential in property values allowed many parents to buy land for sons to start their own farms when they came of age (Sawatzky, 1971, p. 62). The Cuauhtémoc colonies all started with reserves significantly bigger than what they could initially farm, but over the following decades both population growth (Mennonites have big families) and expansion of individual farms brought those surpluses under the plow. Once the reserve land is entirely put to use, the next generation is forced to look for land elsewhere. This pattern of colony purchase, internal expansion, and then purchase of off-colony land (wherever that may be) has been a hallmark of Mennonite farming in Mexico since the very beginning and is ongoing (discussed in detail in Chapters 6).

Writing about Cuauhtémoc in 1966, Lister and Lister (p. 276) concisely described how the Mennonite colonies operate in relation to surrounding Mexican communities and in relation to their own land base:

[The Mennonites] have made no attempt at acculturation with the single exception of learning Spanish necessary to their enterprise. They allow no Mexican children in their schools, no Mexican adults in their churches. No Mexicans are employed as household servants or farm hands. Their only contact is in the stores and shops of Cuauhtémoc and occasionally the capital. They can never be assimilated into the main stream of Mexican life under these conditions. Furthermore, no restrictions were placed upon the size of the colony nor the lands which it could buy. Their original number has doubled, and they have acquired an additional fifty thousand hectares. Dangerous encroachments upon the Mexican campesinos are feared if curbs are not made upon their rapid expansions. This, in turn, might lead to another exodus [of Mennonites to other available lands].

The description above was prescient; Mennonite farmers from the original colonies near Cuauhtémoc did indeed continue to expand until they ran out of suitable and affordable land. A lack of nearby land, especially for young families to start or expand small holdings, drove the formation of new colonies further afield. Mennonites arrived in Janos from the Cuauhtémoc area for exactly this reason.

The Arrival of Mennonites to Janos County

There are five Mennonite colonies in Janos County. Groups of settlers from Cuauhtémoc area, each organized by a particular Mennonite church, founded the first four colonies. In each of those cases, Mennonites bought several thousand hectares of land as a single parcel from a rancher who was afraid of otherwise losing the land to government expropriation as part of the land reform. The fifth colony, Colonia El Berrendo, was founded more than 20 years after the first four colonies, and through a much different process that is indicative of the increased flow of capital in Janos County at that time. I learned the origin story of each of the colonies through interviews with ranchers whose families had sold land to the Mennonites, and through interviews with Mennonites who had either been among the early settlers or whose parents had been. In this section, I provide an account of how each of the five colonies was started, highlighting the role of the land reform in each case.

Colonia Buenos Aires

In 1956, an American landowner living in Janos County contacted Mennonites in Cuauhtémoc about the possible sale of approximately 2,800 ha on the western border of Ejido Janos, named Buenos Aires⁸. Part of the land was already in irrigated crop fields and part was rangeland for cattle. The owner, who was a manager of some portion of Corralitos Land and Cattle Company's property (Interview, 14 April 2017), was being threatened with land occupations and the possibility of an expanding Ejido Janos. He was interested in selling Buenos Aires to the Mennonites because he thought a colony would act as a barrier to prevent Ejido Janos from expanding into other ranch lands to the west (the property is indeed a narrow strip of land along the border of Ejido Janos, exactly like a buffer strip).

The Mennonites who agreed to purchase the land were of the Old Colony sect, one of the very conservative sects that migrated to Chihuahua from Canada in the greatest number (Sawatzky, 1971). One older man whose parents had been among the first arrivals told me that his parents had moved to Buenos Aires partly because some Mennonites in Cuauhtémoc were trading their traditional steel-rimmed tractor wheels for pneumatic rubber tires, and his parents wanted to maintain a more traditional way of life. As is typical of Mennonite land purchases, individual farmers did not buy individual lots with private title; instead, interested buyers pooled their money to buy the property as a single parcel, with subsequent subdivision for personal use happening on Mennonite ledgers but without separate legal titles. Mennonites who wanted to buy land pooled money together as a down payment to secure a bank mortgage

⁸ Some details of this transaction differ from what I was told in interviews by both Mennonites and a local long-time rancher, and what was described by Sawatzky (1971, p. 174-6). The version in my main text comes from interviews. In Sawatzky's version, the landowner is never identified, the sale took place in 1958, and the sale was motivated at least partially by the fact that the previous landowner was behind on his mortgage and wanted to sell the land before foreclosure. It is possible to put the two versions of the account together, however. If the majority of the property was bought by a single Mennonite with a bank loan in 1956, as I was told, then it is entirely possible that failure to keep up mortgage payments prompted that wealthy Mennonite to take on Mennonite colonists in 1958 to take over the mortgage, essentially as Sawatzky describes. I do not have a way to positively verify either story, however; a search for records of the original land transaction proved fruitless.

for the purchase, though a single Mennonite—Guillermo Rempel—put up the bulk of the money for possession of a large portion of the property. Within a few years, however, Rempel was falling behind on his payments and so the rest of the colony “helped” him by essentially buying out a large part of his land for use by other colonists. Other than Rempel, most of the colonists farmed 10-50 ha of land each (Interview, 16 May 2017). The whole property was and still is known as Colonia Buenos Aires, after the original ranch. For about twelve years, Colonia Buenos Aires was the only Mennonite presence in Janos, and farmers there gradually installed more wells and expanded their farming and dairying operations over the entire property.

The late 1960s and 1970s brought a new wave of land reform pressure to the region. This was driven by two main factors. The first and more important was declining national popularity of the PRI party (which had been in power since the Revolution) and rural unrest in the 1960s. In order to garner more of the rural votes that had sustained their electoral success and to maintain rural order, the federal government redistributed more land to ejidos (Albertus et al., 2016; Fox, 1995). The second driver was the expiration of a large number of certificates of immunity, leaving ranches vulnerable to expropriation (Machado, 1981, p. 105-6). In Janos County, seven new ejidos were created between 1967 and 1976 in the flatlands west of the town of Janos. Big ranches that either had previously been protected by certificates of immunity or had otherwise been overlooked were now set upon for expropriation. The pressure exerted by the land reform had direct effects on ranchers through expropriation of land to create ejidos. Once established, some of those ejidos put additional pressure on neighboring ranches as they sought to expand in order to secure land for younger generations.

Colonia El Cuervo

In the late 1970s, the Reforma Agraria targeted the Willem family (a pseudonym) for expropriation. The Willems were a white American family (neither Mennonite nor Mormon) that had first immigrated to Chihuahua from Texas, driving their cattle across the border in the 1920s and moving slowly westward, renting land as they went. They eventually reached Janos County in about 1930, renting a portion of the old Corralitos Land and Cattle Company’s land. They relocated briefly to El Paso in 1941 when General Quevedo (a Revolutionary war hero) bought Corralitos from its American owners. They then moved back down in 1944 to buy a ranch in southern Janos County that had once belonged to the oligarch Luis Terrazas. Over the next 20 years, the Willem patriarch and two sons bought up well over 100,000 ha of ranch land, much of it from General Quevedo or other Revolutionary generals. But they could not keep it all. The family lost some of its holdings to the land reform in the 1950s, including a 7,000 ha parcel that became an addition to Ejido Lázaro Cárdenas. The family was subsequently able to accumulate more land, however, until the late 1960s.

In the late 1960s, the land reform again targeted the Willem family for owning too much land. As in prior decades, however, they had some power to choose how this would be done. As a first step, the family legally divided up as much of their holdings as they could under the names of many family members and even the family’s lawyer. Other parcels were sold off to other ranchers, including back to the Quevedo family. One parcel (7,290 ha, listed in records from the National Agrarian Registry office in Chihuahua) was given to Ejido Casa de Janos as an addition in 1970. The family sold another parcel (8,000-9,000 ha) as a single parcel to a group of

Mennonites from Colonia Buenos Aires and from Cuauhtémoc in 1979, which became Colonia El Cuervo. The current patriarch of the family is now in his eighties and owns only about 9,000 ha, none of which is registered in his own name. His kids together own another ranch further south that is about 25,000 ha, legally divided into multiple properties under different names (Interviews, 17 & 24 April 2017, with help from various maps).

Colonia El Cuervo remains the poorest and most sparsely settled of the Janos colonies due to lack of water. Large portions of the center of the colony have virtually no groundwater, apparently due to a simple geological quirk. There is no hardware store, housewares store, or cotton gin, as some other colonies have. Recent agricultural expansion has occurred not within the colony but onto adjacent lands. Within the last decade, small groups of Mennonites have bought blocks of land several thousand hectares in size and then subdivided them, drilled wells, and sold off the parcels to other Mennonites. Two sellers of such blocks of rangeland were members of the Quevedo family, which had owned much of the region back in the 1950s.

Colonia Las Virginias

The Delgado family (a pseudonym) bought a 42,000 ha ranch in western Janos County from an American in the 1950s. Jorge, the patriarch, had been a land developer in the Chihuahua (city) area, where he also owned more land. Jorge secured a certificate of immunity and kept the Janos ranch intact through the wave of ejido formations in the early 1970s, but two ejidos were created along its borders: Ejido Pancho Villa in 1967 and Ejido Monteverde in 1970. By the late 1970s, Ejido Pancho Villa had grown in population and was agitating for more land. The government expropriated a 10,000 ha parcel along the ranch's eastern edge and redistributed it as an addition to Pancho Villa, despite the Delgado family's certificate of immunity. The government threatened to expropriate more of the ranch, but Jorge was able to keep the remaining 32,000 ha by buying a different 10,000 ha ranch along the New Mexico border and immediately turning that over to the land reform.⁹

Following the expropriation of the Ejido Pancho Villa addition, Jorge Delgado evenly divided the remaining ranch among his three sons. Each of the three resulting ranches was small enough to qualify as a 'small property' (capable of sustaining less than 500 head of cattle) and thus safe from expropriation. Despite this legal guarantee, one of the sons, Rudolfo, continued to have issues with ejidatarios on the neighboring Ejido Monteverde, which was fairly densely populated and looking for more land.

When a Mennonite delegation from Cuauhtémoc came around asking about available land in 1980, Rudolfo agreed to sell the 6,000 ha of his ranch that bordered both Ejido Monteverde and Ejido Pancho Villa. In our interview, Rudolfo said that he sold the land both because the money was good and because he was worried that ejidatarios from Ejido Monteverde would occupy his land, or somehow convince the government to expropriate a portion of it. The Mennonites who arranged to buy the land put together organized a group of

⁹ Buying a ranch just to immediately turn it over to the land reform as a sacrifice, in order to keep a different ranch that is more desirable, is something I heard in two other interviews. In all three cases, the sacrificial ranch was in a more arid area of Chihuahua with less grass production, and thus less valuable for raising cattle, than in Janos County.

colonists, pooled their money, and secured a mortgage from a bank in Canada for the actual purchase. Two years later, another similar group bought 4,000 ha directly to the north of the first colony from another of the Delgado brothers¹⁰. Those two parcels together became known as Colonia Las Virginias (Interviews, 16 Aug. & 18 Sept. 2017).

In 2016, long after Colonia Las Virginias was fully occupied and had wealthy members looking for more land, Rudolfo Delgado sold the remainder of his original ranch, about 3,200 ha, keeping only the ranch house and 400 ha. The buyers were successful Colonia Las Virginias farmers who had pooled money to buy more land for themselves and their sons (Interview, 18 Sept. 2017). Those farmers are now in various stages of prepping that land for irrigated agriculture: clearing brush, leveling and smoothing the ground, and drilling irrigation wells. Both of Rudolfo's brothers have recently sold their remaining land to other ranchers who already owned land in Janos.

Colonia Buena Vista

Three Gómez brothers (a pseudonym) bought a 31,000 ha ranch from the Quevedo family at the end of the 1970s. Prior to the Quevedos, the ranch had been part of Palomas Land and Cattle Company. The brothers had come from Spain, and had been in the sheep business in Chihuahua before becoming successful in other businesses¹¹. Their Spanish origins meant that they had more trouble with the land reform than most ranchers, as foreigners had been specifically excluded from purchasing land after the Revolution (though those that already owned land could keep what they had, within the legal limits). As a result, the Gómez brothers were having problems with "squatters" on the land (what is typically referred to in the literature as land occupations), and they had a legitimate fear of expropriation. To mitigate that risk, two of the brothers went to Cuauhtémoc to find potential buyers, which they did. In 1985, the brothers sold about 10,000 ha to a collection of relatively wealthy Mennonites.

The new colony, which became known as Colonia Buenavista (named for the Palomas Land and Cattle Company pasture that had formerly occupied the site), limited individual land holdings to 100 ha per person in order to maximize the number of new colonists who could get land. Many of the buyers were established farmers in the Cuauhtémoc area who bought land for their sons to start an independent farming life. Unlike in the three previous colonies where initial farm parcels tended to be 50 ha or less, a large percentage of Colonia Buenavista was sold in 100 ha parcels. In part because of the larger parcels, the colony fully allocated the land in the original purchase in just a few years. Members of the colony would later buy small pieces of land from the Gómez brothers along the periphery of the colony, but have been unable to talk them into selling out the majority of the ranch that remains (Interviews, 8 May & 20 June 2017).

¹⁰ I was not actually able to talk to this second brother, who is supposedly living in the U.S. now. I asked the first brother who sold land to the Mennonites why his brother sold land to them afterward, and his only answer was "Because he's an asshole" (*Por que es un pendejo*).

¹¹ This did not come out in my interviews, but the Gómez patriarch may have first come to Mexico with a wave of other Spanish Republicans fleeing the dictator Francisco Franco after the Spanish Civil War. In 1939 a group of 2,000 of these refugees got support from the governor to collectively buy 140,000 ha of an old hacienda in the central Chihuahua municipio of Namiquipa (Lister & Lister, 1966, p. 278).

Colonia El Berrendo

The origin story of Colonia El Berrendo is quite different than the others in Janos. It was not established until 2005, long after the land reform had ended. It is thus an exception to the centrality of the land reform in the arrival of Mennonites to Janos, but I relay the story here for the sake of completeness and to demonstrate how a particular type of land transaction occurs in Janos.

Colonia El Berrendo started when 14 Mennonite families from various other Mennonite colonies (e.g., Colonia Buenos Aires, Colonia Buenavista, Canada) bought the property collectively with a single Mexican bank mortgage, similar to how other colonies start. Unlike the other Janos colonies, however, this property had already been converted to farming: 2,200 ha of fields, wells, dirt roads, and warehouses all ready for operation, but abandoned. Those 14 arriving families have been running the farms ever since, with few modifications and no additions. The property is surrounded on all four sides by a single rancher but almost touches the US border near the El Berrendo/Antelope Wells border crossing (the least-trafficked crossing on the entire border; Villagran, 2014). Because their one neighbor has not been interested in selling land to the colony, it has had no opportunities to expand (Interview, 8 May 2017).

The motivation to sell the El Berrendo farmland to the Mennonites was different than for other ranchers, because the owner was supposedly a cartel boss.¹² The cartel boss had also owned the surrounding ranch but had converted 2,200 ha for farming and then died (or was killed – I heard multiple versions of the story), and the entire property went up for sale. Due to the different prices for ranch and farm land and the fact that few people want to do both, the farm was sold separately from the ranch. El Berrendo is not the only case I heard of where the local cartel played a role in land management but it is the most dramatic such case.

The land reform provided a direct motivation for ranchers to sell land off parts of their ranches in order to minimize financial losses associated with government expropriation. Ranchers could choose to sell land to other ranchers but in many cases chose to sell to Mennonites for three specific reasons. First, because of the way that the Mennonites buy and settle land as colonies, their lands were exempt from expropriation through the land reform. Mennonite colonies can thus act as spatial buffers to contain existing ejidos from expanding onto neighboring ranches (though there are cases where ejidos were granted additions that were not contiguous with the original ejido, as with Ejido Pancho Villa). Second, Mennonites pay more for land than do ranchers, as the value that can be extracted per hectare from irrigated farming is greater than

¹² Like all stories related to the cartels, I was not able to validate the details of this account. In this case, I heard multiple versions of the basic story, on both sides of the border. One interviewee had known the owner of the ranch before the cartel boss bought it. That rancher had owned the land for a long time and was well liked on both sides of the border. One day some tough-looking men showed up at his house with a suitcase. They told the rancher that they had come to buy the ranch; the suitcase was full of cash. When the confused rancher explained that the ranch was not for sale, the men told him that was too bad, as now they would have to buy it from his widow. The rancher ended up taking the money and leaving town. This was just one of several stories I heard about cartel bosses owning, and losing, ranches in Janos, all of them nearly impossible to validate.

from ranching, given the land meets certain minimal conditions (flat, water access, relatively fertile soils). Third, the relative proximity and constant interest in land purchases by Mennonites in Cuauhtémoc has meant that land sales can be negotiated relatively quickly, which is important when the government is threatening expropriation. Compared to advertising a ranch sale and waiting for a rancher to buy a piece of ranchland at a fair price, ranchers who sold land to Mennonites told me that finding Mennonite buyers was easy and relied mostly on word of mouth. Selling land to a Mennonite colony is just as financially and legally simple as selling to a single rancher because the colonists buy land as single blocks and only subdivide it internally afterward. As is discussed in brief below and in more detail in Chapter 6, the monetary benefit of selling to Mennonites as opposed to a rancher actually increases over time, with important consequences for subsequent land sales.

The ability of groups of Mennonites to buy ranches as single blocks is dependent on their ability to mobilize capital, both materially as collateral and as credit in the form of bank loans. The wealth that is passed from generation to generation of Mennonite farmers is absolutely crucial here, as is reputation and social capital. Ejidatarios were never able to access capital in this way because they started with virtually no economic resources when they arrived in Janos, they could not use their ejido land as collateral for private loans (it was legally inalienable), and ejidatarios generally have a poor financial reputation in Mexico, earned or not. The ability to access capital allowed the Mennonites to buy their way into Janos and have the financial resources left over to make the capital investments needed to start irrigated farms. Migration to Janos alone is not sufficient for an agricultural boom. Capital access is a necessary precondition.

Capitalist Ranching in a Mennonite Landscape: The enduring legacy of the land reform for private land ownership

The land reform directly created some 29,000 ejidos across Mexico, but it also created a legacy of small ranches that were more likely to be sold to Mennonites or other farmers in subsequent decades. In the wake of the land reform, owners of large ranches often legally divided their ranch among multiple family members to create, at least on paper, a set of ranches small enough to avoid expropriation. The legal fragmentation of ranches, though not always functional in the beginning, often became functional fragmentation in subsequent generations. Fragmentation reduces the economic profitability of ranches by both raising costs per unit output and by making the ranch more vulnerable to damaging weather events (Thompson Hobbs, Reid, Galvin, & Ellis, 2008). As profitability declines, sales by profit-motivated ranch owners become more likely. When Mennonite colonies are added to this landscape, providing a skilled agricultural labor pool and driving up surrounding property values, conversion of rangeland to irrigated crops becomes more likely. The legacy of ranch division propelled by the land reform contributed to ongoing conversion of ranch land to farming long after the land reform ended.

The breakup and forced sale of US-owned haciendas in northern Chihuahua following the Revolution created a lot of investment opportunities for wealthy Mexicans. Many, though certainly not all, of the people who bought parcels of Palomas Land and Cattle Co. or other US-owned ranches had not historically been ranchers, and the money they used to buy land was

not earned from ranching. These wealthy men, whatever personal or emotional connection they might have had to their ranches, also expected those ranches to make money, and making money with cattle was not an unreasonable expectation. As described in Eric Perramond's (2010) detailed description of ranchers in northern Sonora, these large ranchers in Janos rarely lived on their ranches full-time and usually had some alternative business activities elsewhere. I do not know of a single owner of a ranch in Janos who lives full-time on their ranch; most live in the cities of Nuevo Casas Grandes or Ciudad Juarez. The ranches are typically run on a day-to-day level by managers (if the ranch is big and has real staff) or by cowboys, though in a few cases sons of the owner are the primary managers and live on-site part-time. In these cases, the sons will likely inherit the ranch and continue to run it. In cases where children of ranch owners grew up elsewhere, they typically have little interest in continuing ranching operations.

The relative wealth and elite status of ranch buyers in Janos actually had negative repercussions for long-term family ownership. Many wealthy ranchers sent their sons to high school or college in the US, where they developed lasting connections and later emigrated. I know of several former ranchers and/or their widows that sold their ranch in Janos and now live in the US permanently. The elite buyers also almost always divided their holdings among their kids—usually sons—when they died as a way to pass along a financial asset. Because those kids usually do not grow up on the ranch or play a role in running it as young people, there does not appear to be a motivation to preferentially leave the ranch to the kid most interested in ranching. This is in striking contrast to ranchers I interviewed on the US side of the border, who are much more likely to leave the ranch to the one kid (occasionally a grandchild) who is interested in actually running it.

The habit of dividing ranches through inheritance is exemplified by a rancher in Janos I interviewed whose father had divided the family ranch in his will. The rancher told me that his two older brothers had inherited parts of their dad's ranching operation while he, the youngest, received only some equipment. When both his brothers sold their portions, he lost his connection to the family ranch, a loss with lasting emotional consequences. As a result, he plans to divide his ranch evenly between his three sons in his will, even though he knows that they have other professions and little interest at all in ranching. He also knows that dividing the ranch increases the likelihood that the land will be sold out of the family because each piece will be too small to be financially viable on its own. Despite this, to leave a son out of that inheritance would be simply too great an injustice. As he put it, "I don't want them to sell but I'll be dead by then, so it will be their problem."

Widows and daughters rarely inherit ranches (see Perramond, 2010, Chap. 5), and even less often keep it for long if they do inherit. I have to agree with Perramond's assessment that Norteño (northerner) sexism and the conservative, patriarchal social values of rural ranching areas disincentivize women spending much time managing a ranch in person. In only one case that I know of does a female heir actually make management decisions regarding cattle, and in that case on only part of the ranch – she rents out the rest.¹³ One rancher I interviewed had

¹³ I was never able to interview this woman despite multiple attempts. I was surprised that I was rebuffed (by her cowboy, on her orders) because I knew that she had talked to other scholars and had even had at least one school tour to the ranch. Regardless, I was told that the situation with the cartel was too dangerous at present, leaving unspoken the assumption that there was a good chance I was not who I claimed to be. This was the only instance

both a son and a daughter, and I asked if he would leave part of the ranch to his daughter. His response was simple and telling: “No. She’d sell it.”

The purchase of ranches by wealthy elites as economic investment during the land reform led to particular chains of outcomes. One consequence was that the heirs of the original purchasers tended to be interested more in the financial possibilities of the ranch than they were in continuing a legacy of ranching. To extract the value of their ranch in a way that allowed them to live the kind of life they wanted – which is to say not punching cows and living isolated on the ranch – many simply chose to sell the land whenever they needed the money. This option became particularly tempting when a Mennonite colony moved in next door and drove up the value of all the potentially arable land around it.

Ejido or ranch land adjacent to an existing Mennonite colony will fetch a far higher sale price from Mennonite buyers than will a parcel surrounded by other ranches. The reason for this relates to investment costs associated with converting rangeland to irrigated crops. Mennonite farmers need road access (dirt roads are fine, but still roads) and electricity for establishing fields and harvesting crops. It is usually cheaper and easier to extend roads and powerlines from an existing colony than from other locations. Additionally, the logistics of maintaining multiple parcels are significantly reduced if one can drive the tractor or other farm machinery between all the parcels without having to haul it there on a flatbed truck. Mennonites can afford to pay more for land adjacent to the colony than for land further away because the investment and maintenance costs of farming it are lower. For ranch owners interested in cashing out, the arrival of a Mennonite colony next door presents a golden opportunity.

Two ranch inheritors I interviewed, however, found that the presence of the Mennonites made for a different kind of opportunity. In those two cases, the ranch owners live in distant cities and have set up profit-sharing agreements with local Mennonites to farm parts of their ranches. A typical contract would be that the rancher would provide the land, the well, and the irrigation infrastructure, the Mennonite provides the farm machinery, crop inputs (other than water), and labor, and the two split the crop sale money evenly. This kind of relationship allows profit-motivated ranchers to intensify the use of their ranch without needing to know anything about farming, which is a major hurdle often cited when I asked people who did not farm why they did not. For ranch owners who live part-time on the ranch and are committed to personally managing it, the thought of converting large portions of the ranch to farming was anathema, though many either already had or were considering a single pivot for growing cattle fodder to support ranch operations during dry periods.

The legacy of the land reform on private landownership takes three main forms. First, due to the historical conjuncture of foreign owners being forced to sell land and a new, moneyed Mexican elite emerging with the capital to buy it from them, extensive areas of rangeland were transferred to owners with little personal or familial connection to ranching. Inheritance in these families meant that land was often transferred to heirs with no interest in the ranch other than its sale price. The second form relates to spatial scale; parcel size limits, expropriations, and threats of expropriations shrank the size of private ranches, reducing their

of this type of distrust that I know of, though of course there is no shortage of other reasons for not wanting to talk to a gringo researcher.

profitability in the process. Third, the sudden financial need by four elite ranching families to sell land in order to avoid expropriation provided an entry into Janos for the Mennonites, who convert rangeland to irrigated crops and who appear to have no internal mechanism to halt outward expansion. The presence of the Mennonites interacts with the previous two legacy effects of the land reform to increase the likelihood of rangeland-to-crop conversion far beyond what it would otherwise be.

Summary and Conclusions

The nineteenth century saw a massive wave of privatization and consolidation of landownership in Mexico, much of it by US interests. Unclaimed government land, church land, and common lands surrounding towns and indigenous communities were all surveyed, privatized, and sold off in the name of modern economic development (not to mention old-fashioned greed). In northern Chihuahua, these processes meant sprawling haciendas devoted to export-bound cattle, but also limited development of farms and infrastructure. Following the Revolution, the national land reform essentially reversed the previous century's momentum. The haciendas were forcibly divided and, by 1992, more than half the national territory was distributed as ejidos. The process by which each ejido was created had lasting ramifications for its future social longevity and economic success.

In Janos, the land reform established 13 new ejidos and reconstituted Ejido Janos under the new legal ejido structure. Six of these ejidos never had any crops at all due variously to terms of the ejido formation, lack of water, or lack of arable land. The other eight did succeed in establishing at least some farms, though most were never able to put all their designated farmland into production (discussed in detail in Chapter 4).

The real agricultural boom in Janos did not happen on the ejidos but instead on lands owned by Mennonites, though the ejidos did contribute to the increase in land area under crops. The land reform was not intended to benefit Mennonites but benefit they did, as ranchers were eager to sell off lands at a profit rather than have the government expropriate them for redistribution. Just as the Mennonites expanded around Cuauhtémoc and went on to establish colonies elsewhere in Chihuahua, the Mennonite colonies in Janos have also expanded onto neighboring land outside the original colonies (detailed in Chapter 6). The more recent sales to Mennonites (i.e. post-1992) have been driven by high land values and profit motive rather than by any legal requirement to downsize.

Conversion of rangeland to crops in Janos is as much a story of land ownership as it is of technical expertise, investments, or produced output. It is difficult for me to imagine that crop agriculture would have developed to nearly the extent it has in Janos County if not for the land reform and the profound impact it had on patterns of land ownership. Partly this was due to specific objectives and assumptions about national social organization embedded in the land reform's agrarian roots. In the post-Revolution constitution, the idealized Mexican citizen was a rural, agricultural smallholder, and so the land reform was established in such a way as to produce agrarian citizens and agrarian landscapes. This did not mean that the results were encouraging, however.

The process by which ejidos were formed had several defects that undermined the odds of economic success, especially in a climate and landscape like that of Janos. Ejidatarios largely

lacked the economic resources necessary to establish profitable farms in Janos, though government supports temporary propped up many. Rather than through ejidos, the primary contribution of the land reform to land conversion in Janos was the fragmentation of large and economically profitable ranches and the incentive to sell land quickly. Ranch sales were the opportunity that inspired the arrival of the Mennonites, a group both inclined toward and highly capable of crop agriculture.

Chapter 4: Adjacent Communities, Worlds Apart

The establishment, intensification, and expansion of farms in Janos County all rely on access to capital. Establishment requires money for basic infrastructure (e.g., road access, a place to live), basic farm machinery, land clearing, and irrigation wells. Intensification requires money for improved irrigation technology, specialized farm machinery, high-value crop seeds or seedlings, agricultural chemicals, and wage labor for tending or harvesting crops. Expansion requires money for land purchases or rents, new wells and irrigation technology, and all the inputs and costs associated with farming. My simple argument here is that access to capital dictates whether an individual or a community can establish, intensify, or expand farms, and credit access is an important component of capital access especially for the type of commodity agriculture practiced in Janos. Credit access helped to overcome economic barriers to agricultural establishment or expansion but some cost barriers are not eligible for credit – such as high land values and the extraordinary costs of securing irrigation wells – and thus continue to limit agricultural development. This chapter will demonstrate that the historical trajectory of farming in my four focal communities in Janos – two ejidos and two colonies – largely rose and fell in conjunction with access to credit, though numerous other factors also contributed.

This chapter provides the empirical details necessary to connect the general history of Janos in Chapter 3 to the details of agricultural dynamics in Chapters 5 and 6. . The analytical work of Chapters 5 and 6 rely on an understanding of how particular communities in Janos formed, farmed, accessed capital, and changed over time. Here I provide a sketch of the four communities at the heart of this study – Ejido Pancho Villa, Ejido San Pedro, Colonia Las Virginias, and Colonia Buenos Aires – with a focus on the financial resources members of each community could access. Changes in accessible capital mostly took the form of changing credit availability and changes in farm profitability under different political economic frameworks.

Below, I provide narrative histories of credit access for ejidatarios and for Mennonites, and a brief history of each of the four focal communities. In each case, I describe the foundation of the community, the establishment of housing and agricultural endeavors, and the changes that have occurred since. The practice of irrigated crop agriculture in Janos has itself undergone significant changes in the last four decades, a result of technological advances and increasing access to capital and new markets. Increased capital investment leads to greater profits, widening the economic gap between the least capitalized and most capitalized farmers, with consequences for farm size and land consolidation.

It is important to clarify that while ejidatarios and Mennonites needed to secure the same means of production to establish farms – irrigation water, seeds and inputs, farm machinery, labor, etc. – the contexts of their challenges were different. The ejidatarios struggled simply to put their farmland into production; even today there are areas designated for cropping that are either grazed or unused because no one was able to secure the means of production. All of the farming that is conducted at Ejido San Pedro is now done by Mennonites, because ejidatarios who could not economically or logistically farm their own land rented or sold it to Mennonites from Colonia Buenos Aires. Ejidatarios engaged in wage labor and out-migration largely because they were not able to generate a sufficient income with their land.

Most children of ejidatarios did not receive land, were not able to buy it, or would not have been able to put land into production even if they had bought it. The main problem is an inability to put available land into production. Mennonites, on the other hand, typically engage in wage labor because they did not inherit and could not afford to buy land when they started their own households; the problem is a lack of land, not an inability to work the land they have. But even some of those landless Mennonites that take jobs locally or abroad eventually earn enough money to buy land on their home colony or nearby and begin farming.

While the community and credit histories below clearly show a correlation between the availability of specific forms of agricultural credit and farm practices and profitability, the intention of this chapter is not to conclusively prove a causative relationship. As future chapters will discuss, credit access was only one factor in the differing fates of ejido and Mennonite agriculture. Significant heterogeneity exists within each ejido and Mennonite colony when it comes to credit availability and use, both formal and informal. The history of credit use is laid out here primarily to establish the empirical connection between credit access and community trajectory to pave the way for the analysis of farm outcomes and community trajectories in future chapters.

The case of Janos suggests that there is a positive correlation between agricultural credit availability and farm productivity and/or farm profitability, a theory that is much lauded by development finance organizations but has not been well established empirically (Fletschner, Guirking, & Boucher, 2010). Several studies in disparate parts of the world have found empirical evidence to support the assertion that credit availability boosts farm profitability (Baffoe, Matsuda, Nagao, & Akiyama, 2014; Fletschner et al., 2010; Foltz, 2004) and productivity (Ali & Deininger, 2014; Carter, 1989; Guirking & Boucher, 2008), but the effect is often small. For example, Ali and Deininger (2014) found credit access to be positively correlated with productivity in comparatively wet and reliable cropping areas in Ethiopia, but credit access and productivity are uncorrelated in drier, drought-prone areas where credit is more often used to backstop household consumption. It thus cannot be taken for granted that farm productivity or profitability track credit access, nor that rising credit use lifts all boats. Carter (1989) found that increased use of credit did tend to boost farm productivity but did so through economic differentiation, farm consolidation, and increased production among the newly expanded farms.

Secondarily, even where credit is available at a price most households can afford, many households not use credit for non-price reasons. For one, households may not qualify for loans due to inadequate collateral or documented income; such households are said to be “quantity limited.” Formal credit sources such as banks frequently exclude poorer households due to high standards for qualification, a barrier that can be partially compensated for by credit from cooperatives (Barham, Boucher, & Carter, 1996) or the informal sector. Households may opt not to use formal credit even when they are qualified and can afford it due to “risk rationing,” where high collateral requirements of credit are deemed too risky to take on (Boucher, Carter, & Guirking, 2008). One survey of farmers in northeastern Mexico found 35% of the study population to be risk rationed, meaning that they chose not to use credit even though they qualified for it because the potential benefits did not justify the risk of the collateral requirements. Risk rationing is driven by perception and acceptance or non-acceptance of risk, and is therefore contextual. One study found that social safety net programs can increase the

use of credit by reducing farmers' perceptions of credit risk, with positive economic consequences (Alem & Broussard, 2014).

The case of Janos County offers strong support for the notion that credit availability contributes to agricultural intensification and increased profits. I do not have the precise year-by-year financial data to prove this relationship unequivocally, but all of the larger Mennonite farms I interviewed used at least one source of annual credit, while many of the smallest Mennonite farms and nearly all of the ejido farms did not. Access to credit increased the ability of farmers to grow higher-value crops such as GM cotton, chilies, and onions. It also facilitated technological investments such as center pivots or irrigation water pumps, though some farmers bought these items without credit. Credit access and use do not solely explain the rapid intensification and expansion of Mennonite farms that began in the 1990s, but they play a role.

More broadly, the respective trajectories that Ejido San Pedro and Ejido Pancho Villa took as compared to Colonia Buenos Aires and Colonia Las Virginias reveal the continued importance of the agrarian question in modern Mexico. The ejidos never made it far down the path of agricultural capitalism as predicted by Kautsky and Lenin; land consolidation and economic differentiation have been more limited on the ejidos because there was not enough capital in the system to drive those dynamics to their utmost potential. For the early decades of the Mennonite colonies, on the other hand, farmers had a sufficient mix of inherited and earned capital to maintain capitalist farms but not enough to generate sufficient investment to spur widespread consolidation. The structural economic reforms of the 1990s, paired with local technological adaptations, fostered a sort of emerging agrarian transformation. Rather than being driven by outside corporate investments as happened elsewhere in Latin America (e.g., Kay, 2015; Otero, 2012), differentiation and consolidation were driven primarily by the reinvestment of farm profits into intensified and expanded farming.

Credit and the Ejidos: BANRURAL

Agriculture on the ejidos prior to the neoliberal reforms of the late 1980s and early 1990s was not a free market enterprise. The government was involved in paying for irrigation wells, providing credit for farm machinery and inputs (seeds, fertilizer), subsidizing diesel fuel for tractors and irrigation pumps, and even buying certain crops at above-market rates. The primary lending institution for the ejidos was the National Rural Credit Bank (*Banco Nacional de Credito Rural*, ubiquitously known as BANRURAL), a federal entity tasked with funneling cheap credit to the agricultural sector, including the ejidos. BANRURAL was created in 1976 through the merger of three other agricultural credit banks: the National Agricultural Credit Bank (founded in 1926), the National Ejido Credit Bank (founded in 1936), and the National Agriculture Bank (founded in 1965), and its creation dramatically increased volume of agricultural credit nationally (Myhre, 1998; Pessah, 1987).

Despite designs intended to make accessing BANRURAL credit easy for ejidatarios, interviewees I spoke with reported that using credit from BANRURAL was a complicated affair. Technically, all debts belonged to the ejido as a whole and was managed by the ejido *Comisariado* (the elected head), but in practice machinery credit was held by irrigation well groups as five-year loans, and credit for inputs (seeds, fertilizer, pesticides, wages for additional labor), or sometimes the inputs directly, were ascribed to individuals as annual loans.

BANRURAL operated with a crop insurance program, National Agriculture and Livestock Insurer, (*Aseguradora Nacional Agrícola y Ganadera S.A.*) that would repay an ejidatario's annual debt if their crop was lost to some natural disaster. Individuals who failed to repay their annual debt were typically barred from receiving new loans until the debt was repaid. Machinery that was not repaid could in theory be repossessed, but I never heard of this happening. Instead, what I heard about mostly was graft and inefficiency at all levels of the process, from both ejidatarios and ex-BANRURAL officials.

Annual farm credit was doled out in four installments to cover planting, fertilizer and pesticide application, and harvest. Ejidatarios variously received this credit as material inputs (usually seeds or fertilizer) or as cash to purchase the inputs. Many ejidatarios used this money instead to cover basic living expenses, or sold a portion of the inputs (often to Mennonites) to get cash for this purpose (also noted as a common practice across Mexico by Myhre, 1998, p. 41). Ex-BANRURAL officials told me that ejidatarios frequently tried to claim that portions of their fields had been wiped out by some disaster when in fact they had not been planted at all, a fraud that BANRURAL regularly deployed extension agents to combat. On the other side, many ejidatarios told me that their group had made payments toward their machinery debt for years only to learn that none of the payments had been registered and the cash was being pocketed by BANRURAL employees. Others complained that BANRURAL employees simply skimmed a percentage off of all the loans they disbursed. Both of the former BANRURAL officials I interviewed stated flatly that there was enormous political pressure to keep BANRURAL credit flowing to ejidatarios as a means of securing rural votes regardless of whether debts were being repaid, which meant that missing payments did not raise many eyebrows. Using agricultural credit to secure political loyalty can be seen as merely part of the political usage of the land reform more generally (Albertus et al., 2016; Fox, 1995). Regardless of whether the individual or the institution was at fault, these instances of graft led to many ejidatarios being barred from taking out loans by BANRURAL, effectively eliminating their access to formal credit.

In part due to the significant inefficiencies discussed above, the Salinas administration (1988-1994) sought to privatize the agricultural credit sector, long dominated by state lenders. BANRURAL shrank dramatically under the new rules, dropping 75% of its former client base and closing up 304 of its 528 branch offices between 1988 and 1994 (Myhre, 1998, p. 42), including the Janos and Nuevo Casas Grandes offices.¹⁴ When BANRURAL closed the accounts for each ejido, it sought to recoup whatever outstanding debts remained, though it lacked a strong enforcement mechanism. As described to me in interviews, some ejidatarios sold off the

¹⁴ BANRURAL was fully shut down in 2003-2005 as part of a World Bank-funded structural adjustment loan to remake the rural finance sector. In a 2016 report, the evaluator described BANRURAL this way:

BANRURAL's record as a lender to agriculture was very poor. It was plagued with administrative inefficiency and political interference. Moreover, by providing subsidized loans and failing to recover them, BANRURAL had precluded the entry and active participation of private banks in agricultural finance. The fiscal cost of its operations was very high. Altogether, it received M\$25.7 billion in fiscal assistance from 1995 to 2000. Nevertheless, it continued losing money at about M\$200 million a month, ending 2002 with a capital deficiency of M\$20.4 billion. (IEG Public Sector Evaluation, 2014, p. 7)

machines they had on credit and others pulled money out of savings to repay outstanding loans, while a smaller number simply kept their machines and refused to pay their outstanding debt.

When BANRURAL stopped serving the majority of Mexican farmers in the late 1980s, commercial banks were expected to take up the slack. After decades of tight state control of the banking sector, however, widespread private credit access was very slow to emerge. As of 2005, Mexico had the lowest ratio of private credit to gross domestic product of any country in the OECD, and loans are skewed toward items that can be easily repossessed – such as cars – rather than raw materials or farm inputs (Haber et al., 2008). What this meant is that the restructuring and dramatic shrinkage of BANRURAL eliminated access to farm credit for most ejidatarios in Janos, making it financially impossible for many to continue farming.

The so-called ‘neoliberal counter-reforms’ of the 1990s did not mean that government support quit entirely, however. The most significant program to emerge in this period was PROCAMPO (*Programa de Apoyos Directos al Campo*, or the Program for Direct Rural Payments). Launched in 1994, PROCAMPO provided direct monetary support for farmers of basic commodities (starting with maize, wheat, beans, rice, sorghum, soybeans, cotton, safflower, and barley) in the form of annual payments at a flat rate per hectare produced. In 1994, PROCAMPO paid 1,502 pesos/ha for spring/summer crops and 1,416 pesos/ha for fall/winter crops (i.e. wheat). By the year 2000, payments were down at or below 1,000 pesos/ha and continued to fall despite significant inflation (OECD, 2006, pp. 76-7). Ejidatarios I spoke to told me the current rate was 90 pesos/ha for staple crops, which was little enough that most people no longer bothered to fill out the paperwork.

For many ejidatarios, these payments had initially been a significant boon, but there were many complaints, including the fact that each ejidatario could only register one derecho, that the paperwork was onerous and changed frequently, and the money always came after they really needed it. Some ejidatarios told me they had never participated in PROCAMPO, or had only temporarily, and only a few said that the program had impacted their decision making about farming. Some ejidatarios in Ejido Ojo Frio, for example, which is in the mountains and has no irrigation wells, planted small fields of corn for many years that they either irrigated with diverted streams or not at all. These fields rarely produced a decent crop and received little effort or inputs; the intent was mainly to get a PROCAMPO check, to grow a little cattle fodder, and, in a good year, have some corn for making homemade tortillas. Now the PROCAMPO checks do not pay for the gas it takes to get to town and back to pick up the check.

BANRURAL made mechanized agriculture possible for many ejidatarios who would not have been otherwise able to start. The ejidatarios in Janos County were disadvantaged from the beginning, given their relatively small plots of crop land (though large by ejido standards), their paltry financial resources when they arrived in Janos to stake their claim, and the majority’s relative lack of experience with agriculture. The end of BANRURAL and decline of other financial support for ejido agriculture served to undercut the ability of most ejidatarios to maintain profitable farming operations. Loss of credit for machinery and annual inputs, increasing costs for diesel and electricity, and declining farm gate prices for staple crops like maize and sorghum all cut into farmers’ bottom lines. Some ejidatarios continue to farm without government support but their number is small. Most had simply not gained enough financial momentum to maintain their operations after BANRURAL ended. Ejido Pancho Villa has maintained more crop

agriculture, and has seen more consolidation of farmland ownership, than most ejidos, likely because of the comparatively large number of irrigation wells drilled there by the government.

The relative dearth of capitalist agriculture on the ejidos is perhaps not what one would have predicted based on the agrarian transformation model of Kautsky and Lenin. In the classic model, a few capitalist farmers expand their operations, intensify production, and buy out their neighbors. Those who sold out become wage laborers on the farms of the new estate owners. On the ejidos, wage labor has been the dominant economic path, whether in the fields of Mennonites, in local businesses, or in the US. Some ejidatario farmers have expanded their operations but only to a point, not continuing to incorporate adjacent fallow field. Other than in Ejido San Pedro – where Mennonites have acquired nearly all available land designated for farming and some originally designated for grazing – most ejidos have a lot of farmland sitting idle or in minimally-profitable alfalfa fields. For many ejidatarios with only one or two farmland rights, crop agriculture today is merely the “commodification of subsistence,” and does not represent capitalist investment (Bernstein, 2010). There were not enough profits to be made in agriculture to spark a true agrarian transformation, and ejidatarios had other options to pursue.

The Ejidos

Ejido San Pedro

San Pedro was officially founded in 1972 with 103 members (*Reforma Agraria Nacional* data). Nearly all the ejidatarios I talked to described a process for getting land that I have not seen in the literature: they signed petitions. Most of them had been working in the town of Flores Magon (about 175 km southeast of Janos, in the state of Chihuahua) at the time of petitions, either as agricultural laborers or in various infrastructure projects. Most were born in the state of Chihuahua, though there was a contingent from Zacatecas. No one claimed to have wanted land in Janos specifically; in fact, several said they had applied for land elsewhere but were assigned to San Pedro instead. When the first arrivals showed up, it was just grassland, “puro llano” (‘pure prairie’), having previously been part of a large ranch with a history of US ownership, called Los Ojitos. Everyone I interviewed on the subject talked about how tall and lush the grasses had been then: thigh-high or more, with lots of prairie dogs.

The ejido is just over 6,000 ha total. Every ejidatario was assigned a housing lot (*solar*), 20 ha for cropping (*labor*), and use rights to the remainder of grazing land (officially termed *uso común* – ‘commons’ but often simply called *pastizale* – ‘pasture’), which was later calculated to 37 ha per land right (*derecho*). Based on the grazing capacity limits calculated by COTACOCA, that 37 ha of grazing land was said to safely support seven cows, and this is the number that became enshrined in the ejido rules: regardless of how much grass was actually out there at any given time, each ejidatario can have seven cows per pasture land right. In the beginning, though, none of the ejidatarios had any cows or any means to farm the land, so most just rented their land to one of the neighboring ranchers for grazing while they sought what wage labor was to be had. A typical rental price for grazing land was one or two calves per ejidatario per year, which allowed those ejidatarios who were interested to start their own herds.

Because of the initial lack of infrastructure and relative isolation (cars were not yet common), San Pedro never had 103 resident members. Many people who were assigned land

never established themselves at all. Others quickly moved away to pursue other opportunities and were generally struck from the rosters in non-resident culls called *depuraciones*, in accordance with national ejido policy. A large contingent of ejidatarios chose to settle in the nearby private community of Fernandez Leal (7 km away by car) – which had been established decades prior and which was closer to the town of Janos – while still trying to graze or farm their land at San Pedro.

Government support for Ejido San Pedro took several forms. Government contractors built the grid of dirt roads for the community center, which is connected to three dirt roads leading outward. There is a small elementary school, and a municipal well and water tower (the well went dry in 2016 and was replaced by a second one nearby). The government drilled several irrigation wells in the early 1970s but only one produced sufficient water for irrigation (there are no guarantees when drilling wells). For a few years, the 23 (approximately; accounts vary) ejidatarios who lived there and wanted to farm used that well to cooperatively farm corn and cotton, sharing the proceeds at the end of the year. Everyone hated working in such a large group, however, and it was disbanded in favor of smaller groups, typically 5 or 6 members each. Two ejidatarios subsequently borrowed money from a rancher to drill two wells of their own, and a state program paid to drill 5 more, though only two of the state wells got enough water to irrigate with. Each group was centered around one well and each was able to apply for agricultural credit from BANRURAL, the government credit agency primarily responsible for the ejidos. By 1982, there were five operating groups of ejidatarios conducting irrigated farming, or about one quarter of the total ejidatarios originally on the books.

By the 1990s, farming was in decline on San Pedro. BANRURAL quit giving out all loans by 1994 at the latest, leaving some groups with debts they could not (and would not) repay. Without the credit offered by BANRURAL and the associated above-market crop purchasing by CONASUPO, farming quickly became tenuous. The water pumps for the irrigation wells had originally been diesel, and the ejidatarios were able to get diesel fuel essentially for free through government programs. When everything was switched to electricity (i.e., when the wires were built out to San Pedro, Buenos Aires, and several other ejidos and Mennonite colonies) in the first years of the 1990s, the cost of power was left to the ejidatarios but was initially affordable. The nationalized energy sector underwent early reforms in 1992 (Carreon, Jimenez, & Rosellon, 2003) that contributed to rising electricity rates. The ejidatarios were caught between falling crop prices and rising costs, not only agricultural costs but consumer costs as well. The result was a wave of land right sales, though this was not technically legal until the early 2000s. Land rights were often split up for sale, so that rights to farm parcels and rights to grazing parcels would be sold separately, or else only one of them sold. Some ejidatarios with available capital were able to buy up a few land rights – usually grazing lands, but Mennonites were the big buyers.

By about 2003, none of the ejidatario groups were farming without Mennonite involvement. One group's well had dried up and everyone had sold their land to Mennonites, but the other four at least partially remain (some parcels have changed hands, others have not). Of the four remaining groups, three are simply renting their well and land to a Mennonite, and one group had a cooperative cost-, profit-, and labor-sharing agreement with a Mennonite until their well recently went nearly dry, reducing production to a negligible level. No one, including the ejido president or the government agency in charge of ejidos, had a reliable count

on how many ejidatarios remain after more than two decades of sales and consolidation. Most estimated about fifty, of which perhaps twenty are Mennonites, though the total is slightly higher once absentee owners are factored in, counting those with either a pasture or farming parcel. One Mennonite I interviewed owned ten farming parcels, and another owned 16 full land rights (farming plus grazing parcels).

The remaining residents of San Pedro all have multiple sources of income; if they have any crop or cattle income at all, it must be supplemented with other sources. One man renting his farmland to a Mennonite said the money he earns from his land is equivalent to a Christmas bonus. Others cited proportions of 10-30% of their total annual income. Only a few people reported making a majority of their income from their land, and those were either retirees (two) or a couple of people with multiple grazing land rights who were part of an NGO-sponsored group working on improved cattle management practices. From my count, there are fewer than five people under the age of 30 working land they own, and figuring out inheritance among multiple kids was a concern for many older folks given that land rights cannot be subdivided other than to separate grazing, farm, and residential land.

The remarkably uniform consensus was that there was little future for the next generation on the ejido, as agricultural prices fell while domestic costs continued to rise. Most families are reliant on the Mennonites (or occasionally ranchers or Mormons) for wage labor, either in the fields, in dairies, or various Mennonite-owned businesses, such as the grocery store. But such opportunities are harder and harder to find, as mechanization and migrant workers eliminate most of the agricultural jobs, and Mennonite kids take most of what is left. As one woman who lives in a house on her family's residential land in the ejido put it, "There is no future here in this town." She followed that statement by adding that if the Mennonites ever pick up and leave, the ejidatarios will all have to follow them because there will be no economy left behind.

Ejido Pancho Villa

Based on a small number of old government documents still held at the ejido, the process of establishing Pancho Villa actually started with a petition for land signed by 400 landless people in Casas Grandes in 1961. Due in part to the complexities of expropriating land, much of which had been protected by 25-year certificates of immunity (*certificados de inafectabilidad*) starting in the early 1940s, the ejido was not actually established until 1967, with 11,300 ha of land and 406 ejidatarios. Generally speaking, each ejidatario received 15 ha of cropland (a minority received 10 ha) and about 70 ha of grazing land, with a limit of 12 cows per grazing right. Farm parcels were surveyed and individually identified, but grazing land was only parcelized informally until surveys in the 1990s. Unlike the case of San Pedro, the ejidatarios of Pancho Villa actually occupied the site prior to the formal declaration, which did result in a few instances of violent conflict between the occupiers and the rancher's hired hands (and possibly goons hired specifically for this purpose). The would-be ejidatarios wanted a specific portion of land that they thought would be the best for farming, but the rancher was able to keep them off that parcel and they ended up with land on the edge of that ranch rather than in its core.

Unlike at San Pedro, ejidatarios at Pancho Villa farmed their land prior to receiving wells, and some ejidatarios whose land never received irrigation continued dry farming into the

1990s, though yields were always unpredictable. The first 8 irrigation wells were put in with financing from the National Bank for Ejido Credit (*Banco Nacional de Credito Ejidal*) in 1970 (this bank was soon to be replaced by BANRURAL), and for several years most of the farming on the ejido was organized collectively through the formal ejido government structure that is part of every ejido. Ejidatarios worked set tasks, their work hours were recorded, and at harvest each person was paid based on their participation. Similar to the collective at San Pedro, however, this one created a lot of animosity over the assignment of jobs, levels of participation, and end-of-season payments. When a special state program funded the drilling of more than 20 new wells in the late 1970s, the collective split up into groups centered on individual wells that each had separate credit lines with BANRURAL for machinery and annual operating costs. In 1978, the ejido received a 10,000 ha addition (an *ampliación*) nominally for the children of ejidatarios who otherwise would not receive any land. The addition was designated strictly for grazing, and it was not until after the amendments to Article 27 of the constitution that ended the land reform in 1992 created a pathway to privatization that some of it was converted to crops – often and increasingly by Mennonite buyers.

Many of the original 406 signatories of the ejido never actually settled there, and many others left over the years due to hardship and/or to follow better opportunities. Every year until about 1990 the ejido would strike those members no longer present and redistribute their parcels to new people, often the children of other ejidatarios. Following the end of BANRURAL and the massive peso devaluation of the early 1990s, people started leaving the ejido in greater numbers, often for the US. Some of the people I interviewed were the sole member of their immediate family still in Mexico, typically because they were either deported or simply never liked living in the US very much. In part due to legal changes included in the end of the land reform in 1992 and partly to internal (and unofficial) rulemaking, the ejido ended the requirement to maintain residency or work the land in order to keep one's ejidatario status. Many of those who left sold their parcels to other ejidatarios, though some retained ownership. Relatively few sales were to Mennonites in the neighboring colony of Las Virginias, probably due at least in part to the fact that the Mennonites were still expanding into their own colony lands in those days, and so demand for outside land was still low.

Ejidatarios that stayed tended to specialize in either farming or cattle rather than practice both, and many sold whichever type of land they were not using and bought more of the kind they were, if they could. It was relatively common to meet people with five or six land rights of one type or the other. Land rights sold in the 1990s were typically quite cheap, and those ejidatarios who had had success at farming or selling calves could typically scrounge the money to buy up the occasional right. Families who worked together – either fathers and sons or sets of siblings – typically did better, in part because of the greater labor available and in part because it allowed one person to take occasional wage jobs while the other stayed home to take care of the land. The biggest landowner on the ejido is a man who joined the ejido shortly after it was founded and worked with his brother for many years with both farming and cattle. They started buying up land rights in the 1990s and later divided their holdings when working together became unpleasant, though he continued to acquire new land; he now owns rights to more than 150 ha of cropland and 26 grazing land rights (about 1,800 ha).

There is still a lot of crop agriculture on Pancho Villa and the ejido is on average wealthier than most, though many parcels allocated for farming remain untilled, abandoned, or

used for grazing dairy cows or other livestock. Most of the farming is conducted by ejidatarios, though Mennonites do own and farm parcels here and there. The types of farming have evolved over time, however. In the BANRURAL years, nearly everyone grew rotations of corn, sorghum, and beans, in part because CONASUPO bought those crops on site at above-market prices (the old CONASUPO warehouse is still standing on the ejido). While those crops are still grown, the dominant crop is now alfalfa.

Alfalfa is a perennial forage crop that only needs to be planted about once every five years and requires little fertilizer or pesticides; costs for seeds and agrochemicals are thus low. Alfalfa is cut and baled as hay which is then sold to dairies, and in Janos a good field can typically get six to eight cuttings per year, meaning six to eight paychecks spread over six months rather than just one check at the end. The last and decisive advantage of alfalfa, however, is that the ejidatarios do not need any machinery of their own to grow and harvest it; several Mennonites at Las Virginias make a nearly full-time job of planting, cutting, turning, and baling alfalfa on a contract basis, and typically take their payment in the form of either 22.5% of each cutting directly, or 22.5% of the sale price (as of 2017). For poorly capitalized ejidatarios, alfalfa farming offers a relatively low-risk income source with very little labor, even if the annual profits are less than what could be earned with other crops that require more investment. One farm parcel of alfalfa was not enough to live on without retirement or some ancillary income source, but some ejidatarios eked out a meager living with just 2-4 parcels of alfalfa.

At the other end of the spectrum, a few of the more successful farmers now grow cotton, chilies, and onions, the same high-cost/high-profit crops that support the Mennonites, though on smaller parcels than do most Mennonites. Four ejidatarios have even planted pecans on their properties, which is prohibitively expensive for most people as it entails high costs in the first year and then at least seven additional years of outlay while the trees mature (this is why nearly all of the pecan orchards on the US side of the border are owned by large and extremely well-capitalized corporations rather than family farmers). Ejidatarios, however, find ways to buy saplings on the cheap and do all the labor themselves, including flood irrigation, which enables them to establish small but profitable (eventually, when the trees mature) orchards.

The limited development of profitable agriculture on Pancho Villa has not meant that the ejido structure has worked as designed, however. Of the current official list of 258 ejidatarios I received from the Registro Agrario Nacional in Chihuahua (City), only 86 people actually live or actively manage land on the ejido, according to one former ejido president who went through the list with us. The other 172 people are either dead, have long since sold their land rights, emigrated, or some combination thereof. This after 406 people officially received land at the start of the ejido in 1967, and another 140 received at least a grazing right on the addition in 1978. Landownership has consolidated into fewer hands, but many land rights are also held by people now living in the US and is used illegally, by family or friends with permission, or not at all.

Many of the houses in the town area of the ejido are now either owned by or rented to the migrant workers who come to work the chili and onion fields of the Mennonites, which have a peak labor season of about June to late September. As in San Pedro, most of the ejidatarios do not like the migrant workers but admit that without them the town would quickly be fading away. The elementary and middle schools (there is no high school) already have so

few children that keeping classes running is a challenge, and parents with the means to do so often rent houses in Nuevo Casas Grandes so their kids can attend school there. While I did interview many grandparents, their grandchildren are mostly in the US or in bigger towns and cities, such as Nuevo Casas Grandes or Ciudad Juarez.

Credit and the Mennonite Colonies: An evolution

Historically, Mennonites in Chihuahua suffered for lack of credit because they did not have private land titles to use as collateral for bank loans (colonies generally did not provide individual titles until recently; see Chapter 4 and Sawatzky, 1971, pp. 258-61). This meant that farmers were reliant on informal credit, if they used it all. As older interviewees told me, use of annual operating credit or loans to buy farm machinery were rare when the colonies were first established. As time went on, farmers began to use credit more frequently due both to it becoming easier to get but also due to changing social norms. While communal pride in self-sufficiency and mutual aid tended to limit credit use through at least the 1980s, farmers since then slowly grew to rely on credit, and now most farms would be hard pressed to operate without it.

For farmers at Las Virginias and Buenos Aires, credit for farm machinery came from three different places. Informal loans from businesses on the colony – generally hardware stores or grocery stores – were one of the earliest and most consistent sources of credit. For new farm machinery, credit from farm machinery dealers has been available since the 1990s, though it was initially difficult to get. In the 1990s, the preferred source of credit became UCACSA, the Cuauhtémoc Farmers' Credit Union (*Unión Crédito de Agricultores de Cuauhtémoc, S.A. de C.V.*). UCACSA opened its doors in Cuauhtémoc in 1994 in order to serve the credit and savings needs of Mennonite farmers (www.ucacsa.com.mx). UCACSA grew quickly and now has six offices throughout Chihuahua, including one in Nuevo Casas Grandes, just 30 minutes south of the colonies in Janos County. Loans from private banks have been used but are far less common due to issues of collateral.

Informal credit has been a part of the Janos colonies nearly since their founding, though its use was not necessarily widespread. In the colonies in the Cuauhtémoc area where dairying was historically a major revenue generator, the commercial dairies often served as a source of informal credit (Sawatzky, 1971, p. 260). The dairies were among the rare businesses that had to be well capitalized, as they bought milk from local farmers every day and sold dairy products out into the regional economy. In Las Virginias and Buenos Aires, central businesses such as grocery stores and hardware stores served as both informal banks and lending institutions, though most of their borrowers complained to me of high interest rates. Interest rates notwithstanding, informal credit was the only option for many farmers prior to the 1990s. BANRURAL did provide annual operating (*avío*) credit to Mennonites but I never heard of anyone receiving a machinery (*refaccionario*) loan.

Given that relatively few farmers buy new equipment, the loans available from farm dealerships are not used very often. Equipment loans from UCACSA are far more common, as the money can be spent on used as well as new equipment. UCACSA is a credit union founded by and devoted to the Mennonite community of northern Mexico. Loans from UCACSA are in theory available to anyone, but as nearly everyone told me, there is a requisite level of trust

involved, and non-Mennonites rarely qualify. UCACSA offers equipment loans and operating loans at highly competitive rates, and does not require a property title as collateral. Instead, UCACSA checks in with a farmer's colony boss/president (*jefe de colonia*) to verify that the potential borrower has the land and irrigation water they claim, and has a solid reputation (the vetting process remains somewhat vague to me, but includes land and, where necessary, irrigation access at a minimum).

In the early 2000s UCACSA developed a credit "cooperative" system that could be based out of a colony. In this case, rather than every farmer needing to communicate directly with/commute to Cuauhtémoc or other branch offices (Nuevo Casas Grandes is the closest office to Janos), colonies can consolidate requests for agricultural loans (e.g. seeds, fertilizer, machinery, dairy cows) into a single request. As the process was described to me by the accountant who oversees the Las Virginias "cooperative" account, the cooperative makes the formal loan request to Financiera Rural (the federal financial institution that – more or less – replaced BANRURAL; see IEG Public Sector Evaluation, 2014), who disburses the amount to UCACSA, who disburses it to the colony cooperative. The colony can then buy common seeds and fertilizers in bulk, at some cost savings. Las Virginias started participating in the program allegedly because the primary local source of informal credit was too expensive, but it also generates a small amount of revenue for the colony to use on infrastructure and social welfare. Credit is open to people on and off the colony but a significant level of trust is first required. There is a wide range of things that can be used as collateral, including cows, farm machinery, and land. In the event of non-payment, UCACSA holds the *colony* responsible to repay the debt, hence the emphasis on trust.

The Las Virginias cooperative supplies operating credit to much of the colony. Mennonites who do not participate in the cooperative generally get their operating credit directly from UCACSA, though a small number use the informal credit sources on each colony, which do not have formal requirements for collateral. Similar to the case of farm machinery loans, access to operating credit in Mexico was historically in short supply. Farmers usually saved their seed and used comparatively little synthetic fertilizer or pesticides. Small grain storage bins can still be seen on the Janos colonies, though most are unmaintained and disused. A few older farmers I talked to on both colonies had participated in BANRURAL, getting operating loans for corn and beans, and selling their crops to CONASUPO just like the ejidatarios. All of the interviewees had started with BANRURAL in its final years and so had limited experience with it, though unlike the ejidatarios, they had no bad experiences or graft to report. All but one interviewee repaid their loans without incident. The one exception, a man now farming more than 100 ha of crops, had started farming a field with very dense, clayey soil that produced poorly, and it took him three years to repay his debt; he sold that property soon afterward and bought another with better soils.

After BANRURAL shut its Janos office and UCACSA started operation in the early 1990s, the use of operational credit expanded and is now essentially universal. Very few farmers save their seed anymore, choosing instead to purchase high-productivity hybrids (or genetically modified varieties, in the case of cotton). The use of operating credit has also made farming cotton, chilies, and onions a much more viable option, and it can come from a variety of sources. Chilies and onions are expensive to get started in, in that they do best under drip irrigation, are generally planted as starts rather than seeds (adding a step in the process), and

are planted, weeded, and harvested by hand rather than machine. Production costs for these high-value crops can be covered with an UCACSA operating loan or through the Las Virginias cooperative, and cotton seeds and agrochemicals can be had on credit from the cotton gins. There is a cotton gin on Las Virginias, one on Buena Vista, one opening on Buenos Aires, and a big non-Mennonite-owned gin just south of the town of Janos. Cotton seed cannot be saved from one year to the next (a function of the ginning process; cottonseed meal and oil are also profitable byproducts in the food oil and animal foodstuffs industries), and has become relatively expensive because the whole industry is now centered on genetically modified (GM) cotton. GM cotton is both “Roundup Ready” and Bt, meaning that it is resistant to the herbicide glyphosate and produces Bt bacteria within its tissues that deter pests. Because GM cotton is produced by just two companies—Monsanto (sold under the DeltaPine® seed line) and Bayer (especially the variety FiberMax™), which have now merged—the seed is expensive. It also reportedly out-produces non-GM seed, requires less pesticide treatment, and can be treated with the Monsanto herbicide Roundup, which essentially eliminates the need for mechanical weeding.

After the Janos Biosphere Reserve (Reserve) was founded at the end of 2009, the gins have been forced to quit selling GM seed to anyone whose fields are in the Reserve or the one-kilometer buffer strip around the outside, which includes essentially all of Buenos Aires and El Berrendo, much of Buena Vista, and small portions of Las Virginias and El Cuervo. Those in the affected zone said that for the first several years they heeded the GM ban, but in the last two years everyone has planted the GM cotton, getting the seed either from the gins or ‘smuggling’ it in from the US, where it is completely unregulated (to be honest, I doubt anyone in the Mexican Border Patrol is checking or even knows the law on this subject). On an interesting side note, when I asked officials in charge of crop statistics at the state office of SAGARPA (*Secretaría de Agricultura y Desarrollo Rural*, the Mexican equivalent of the US Department of Agriculture) how many hectares of GM cotton there were in Chihuahua, I was given a definitive answer: zero. The state did not have any, I was told, as GM crops are not legal.

In summary, the Mennonites have a variety of sources for credit for machinery and operating expenses, though UCACSA is the most prominent. Credit is used to cover costs of seeds, fertilizers, pesticides, farm machinery, pumps and motors for wells, and even the labor costs of hiring migrant laborers (from Central and Southern Mexico, though ejidatarios also do some of this work) to plant, weed, and harvest chilies and onions. These credit sources are also available to ejidatarios, at least in theory, but in practice are rarely utilized. In truth, most ejidatarios were reticent about taking out agricultural loans in the post-BANRURAL era even if they qualified for one, a phenomenon scholars call ‘risk rationing.’

The relative nonchalance about taking out large loans that the Mennonites display was one of the things highlighted by many ejidatarios as the defining difference between the two groups. Being able to access credit can certainly pay dividends. Corn and beans are comparatively cheap to grow, but the profits they earn are typically less than for cotton, for example, which is the staple crop of Mennonite irrigated farming. For example, using futures prices for corn from October 16, 2018 (Chicago Board of Trade: 379.75 US cents/bushel, or 0.0678 dollars/pound) and cotton (New York Board of Trade: 0.8824 dollars/pound) and the conservative average yields reported to me in interviews with Mennonites, a 40 ha field of each of the crops would gross \$54,240 USD for corn and \$176,480 USD for cotton. Even if the price

of corn were doubled to account for Mexico's higher corn farm gate prices (Motamed, Foster, & Tyner, 2008), cotton still grosses 76% more at harvest time. Chilies are typically even more profitable, and onions are highly variable but net even better than chilies in good years. For most farmers, these crops are simply out of the question without access to credit.

Credit can be the lynchpin to expanding a farm even though it is almost never used by individuals to make land purchases. Credit allows farmers to plant high value crops and use all of the annual profits to buy land or drill a new irrigation well and still be able to plant a crop the following year. If a farmer buys out a neighbor and expands his total farm size by 40%, he can use credit to plant the entire area in the first year, bringing in the profits needed to pay off an annual installment on the land payment (most Mennonites buy land in multiple annual installments). Such high year-end expenditures are difficult for anyone without credit access, who must rely on their own savings to plant their fields the following spring.

The Colonies

Colonia Buenos Aires

Before sale to the Mennonites in 1958, Buenos Aires had been a ranch owned by an American, Jack Misal (spelling unknown), who was behind on his mortgage and looking for a buyer (Sawatzky, 1971, pp. 174-7)¹⁵. Of the 2,700 ha of land that were sold, about 700 ha was leveled and ditched for irrigated farming, partly with water from the adjacent (seasonal) Rio de Janos and partly with groundwater. While Sawatzky describes the origin of the Buenos Aires as simply a colony purchase by Mennonites of the Altkolonier sect up from Cuauhtémoc, I was told a slightly different story. The version I heard was that colonists had bought part of the property but that a single wealthy Mennonite from Cuauhtémoc had bought the other portion. According to this version, that Mennonite got behind on debts and so the young Buenos Aires colony 'helped' him out by buying up much of his property. Over time, all 2,700 ha of Jack Misal's land was folded into the colony. Within about 15 years of its founding, essentially all of the land was in production, with cotton as the major cash crop. In the mid-1970s, members of Buenos Aires partnered with colonists from Cuauhtémoc to buy a piece of land just to the south from a rancher threatened with expropriation, which became Colonia El Cuervo.

Just 20 families moved from Cuauhtémoc to Buenos Aires in the beginning, but more followed. The Altkolonier are a conservative sect, and technological prohibitions included cars, electricity, recorded music, and pneumatic tires on tractors (wheels were made of studded

¹⁵ Most of the information in this section comes from my own interviews, but some details come from the description of the founding of Buenos Aires in Sawatzky's (1971) book *They Sought a Country*, about the move of Mennonites from Canada to Chihuahua. I don't think Sawatzky actually visited Buenos Aires during his (dissertation) research in the early 1960s, and his information is probably mostly drawn from records of the Mennonite who surveyed the land as part of the colony purchase, which were actually consulted by Sawatzky in Canada. The acreage of land already in production on the property, as well as the fact that the property was in the process of foreclosure, comes from Sawatzky. Most other details, including the name Jack Misal and the fact that part of the ranch had been separately purchased by a single wealthy Mennonite, came from my interviews with one of the colony's early residents, whose father had bought parcels for himself and his sons in the original purchase.

steel), though tractors themselves and irrigation pumps were okay. Some of those that moved to Buenos Aires in the beginning did so because of social changes then underway in Cuauhtémoc, including the widespread adoption of rubber tires on tractors. Gender roles were strictly enforced, as were dress codes. Even today the women of Buenos Aires are rarely seen in anything but dark calico dresses with long sleeves, and denim overalls over button-down shirts are still the preferred dress for older men. The lack of trucks and other motorized transportation meant that the Mennonites were reliant on others for certain services, including trips to bigger towns of Casas Grandes or Chihuahua (city), or for hauling crops to market. I met several ejidatarios who had worked as part-time drivers for the Mennonites back in the 1980s.

A big parcel in those days was 50 ha, and most owned only 10-20 ha, laid out in strips along the central road in traditional Mennonite fashion. The colony is lower in elevation, hotter, and drier than Cuauhtémoc, and farmers had to adapt to new practices. With sandy to gravelly soils, irrigation water seemed to fall right into the flooded furrows in the earth, not even always flowing down to the end of the rows. Irrigation pipe needed to be changed (moved from row to row) on 4-8 hour schedules, 24 hours a day, preventing farmers from getting a solid night's sleep for months at a time. The high water demands of flood irrigation and the cost of operating the diesel pumps combined to ensure that farmers worked long hours for limited profits, though at least a failure of rain posed limited danger.

In the late 1980s, the first center pivot irrigation systems were purchased in Texas and brought down to Buenos Aires by intrepid farmers. Still diesel-powered, the pivots were a vastly more water-efficient irrigation system than flood. As one old-timer put it, with the water it takes to irrigate 17 ha with flood, you can irrigate 100 ha with a pivot (though the higher start-up and maintenance costs mean that a few people still use flood). But as the price of diesel rose in the early 1990s, the cost of pumping water (and running the pivots) became excessive, and a movement grew to bring electricity to the colony in order to switch over the pumps and pivots. It was a divisive issue over which no consensus could be reached. Those in favor simply worked with the government and paid a portion of the cost to bring powerlines into the colony, and those that were opposed left. By 1996, two groups comprising the majority of the population of both Buenos Aires and El Cuervo had packed up and left, one bound for Bolivia and the second for the state of Campeche in southern Mexico. Most of those who left sold their land to those who stayed, leading to a significant consolidation of landownership by those with available capital, though some land was also sold to newcomers from Cuauhtémoc. By the year 2000, center pivots and pickup trucks were ubiquitous on the colony, and every house had electricity.

With the use of modern tractors and center pivots, not to mention mechanical cotton pickers, Buenos Aires farmers could now farm significantly larger acreages than in the past. Gone were the days of waking up in the middle of the night to move irrigation pipe. During one interview with one of the early colonists and his son, the father was griping about the hard work irrigating was in the early days. The son responded by pulling out his smart phone and showing us the app he uses to control his center pivots; he said "I can irrigate my fields from my couch" with a grin and a half-shrug. Despite the departure of most of the population, pressure for land quickly returned. Buenos Aires is hemmed in by three different ejidos, and so that is where the Mennonites started buying land. Many times I was told that the ejidatarios never had any savings, so whenever they needed money in a hurry, including for emigration to the US, they sold land (ejidatarios confirmed this). By the time of my interviews in 2017, Buenos

Aires Mennonites owned and farmed land in Ejido Janos, Ejido San Pedro, Ejido Ignacio Zaragoza, Ejido Casa de Janos, and the community of Fernandez Leal.

Colonia Las Virginias

Las Virginias started in 1981 by Mennonites from Cuauhtémoc of a different, slightly less conservative sect than that which founded Buenos Aires. It started with the purchase of 6,000 ha from a rancher (who I interviewed) who was selling due partly because of the payout – 1,500,000 US dollars – and partly because he had been having some problems with the neighboring Ejido Monteverde trying to get more land (his family had lost 10,000 ha to Pancho Villa in 1978 for the ampliación). Two years later, the colony bought another 4,000 ha from the brother of the first rancher. The sale (the first one, anyway) to the Mennonites was made with a mortgage from a Canadian bank, which the colony repaid with installment payments from colonists and sales of land to newcomers over the next 30 years. There was more land than buyers initially, so parcels were gradually sold off over subsequent years. Later land sales brought higher prices due to proximity to other Mennonites, services, roads, etc.

When the Mennonites first bought Las Virginias, it was all flat, mesquite-infested grassland. Early colonists bought however much land they wanted at 250 US dollars/ha – typically 15-50 ha – and worked to clear their land often over several years. The heavy machinery for the clearing was either bought cooperatively by multiple colonists or rented from those who had bought them. There was initially no power and no cars (by choice), so the colony was pretty isolated. Farmers saved their own seed and relied on few outside inputs at first, in part because of a lack of credit. A few farmers used BANRURAL with some success, though not most, and others borrowed at dangerously high rates – 10% monthly – from either a Mennonite loan shark from Cuauhtémoc or a mysterious loan shark in Ejido Monteverde (almost certainly a narco; no one else there had enough money loan). Electricity came to the ejido in about 1991, without incident, and BANRURAL shut down shortly thereafter.

After BANRURAL ended, credit became very tight for those who wanted to use it, with few banks offering loans after the 1994 peso devaluation. Shortly thereafter, however, two things happened: the owner of the main colony hardware store started offering credit at affordable (not cheap) rates, and UCACSA started its operation. With credit suddenly that much more available, it became possible to not only purchase seeds (e.g. hybrid corn, GM cotton, high-yielding varieties of beans and chilies) and inputs every year, but also to buy farm equipment easier, including center pivots, water pumps for wells, and the pipe used for drip irrigation, which has become increasingly common in recent years as the water table under much of the colony has plummeted. The early wells on the colony were often only 100 feet deep¹⁶ (30 m) but new wells are often down below 1,000 ft (305 m) and often bring up warm or hot water, though the pumps inside the wells are often down only 400-600 feet (122-183 m).

While landownership in Las Virginias has certainly consolidated over time, it has done so to a lesser extent than has Buenos Aires. It is rare to hear of someone who farms more than 250 ha of the colony, though some farmers own or rent land off-colony. The *jefe* (boss, an

¹⁶ Depth of wells is one thing for which everyone in the study area uses the English measurement system, and I copy that format here.

elected position in this case) of the colony said that the community frowns on individuals owning more than 100 ha of colony land, though had no formal mechanism to prevent it. Wealthy farmers had rented land or worked out profit-sharing agreements with three neighboring ranches, and an independent group recently bought the last 4,200 ha of the original Las Virginias ranch from the original rancher, to be divided into 55 ha blocks.

The last of the 'excess' land from the original two purchases was sold and put into production eight years ago, which means there is no new land for young farmers starting out on their own. For this reason, emigration to Canada for wage work is now perhaps the most common outcome for young men, though a few also manage to go to the US. Others work in local businesses (dairies, cheese-factories, mechanics, builders, electricians, the cotton gin) or as hired hands for wealthy farmers. When land does become available through death or out-migration, the value now runs between 10,000 and 17,000 USD/ha for land already in production with a working well. Installing a new well costs a minimum of 40,000 USD, and no institution will offer loans for this cost because of the relatively high risk of getting a dry hole, which would not help the would-be farmer repay the loan. The overall shortage of available land plus the high land values plus the high cost of installing wells on dry land are a significant barrier to entry for young men, which at least partly explains why wealthy farmers expand and young men emigrate. The *jefe* told me that the population of Las Virginias ten years ago was 1,500 and it hasn't changed since, despite the large average family size of Mennonites.

Comparing Communities

The historical trajectories of Mennonite colonies and ejidos in Janos County have been very different. While the population and area of crop farms owned by ejidatarios on all ejidos except Ejido Janos have waned in recent decades, Mennonite farming continues to expand and intensify. The ejidos historically faced and continue to face significant structural disadvantages that are the result of how the ejido system was designed, expanded, and funded throughout the land reform period. Those disadvantages were exacerbated by the sudden loss of government support that came with the neoliberal reforms beginning in the late 1980s. There is an extensive literature in English and Spanish on the struggles of ejidatarios for financial stability and agricultural viability. While the high rate of ejido land sales in Janos County is unusual (Barnes, 2009; Perramond, 2008), the general trend of agricultural production and its relative importance in household economics is not (see, for example, de Janvry et al., 1997; de Janvry & Sadoulet, 2001). Mexican Mennonites have received far less scholarly attention despite their continued spread across significant areas of the states of Chihuahua, Campeche, and others.

The four community examples presented above allow comparisons for a number of outcomes within and across community types that reveal the importance of sometimes subtle differences in capital access. For example, Ejido San Pedro and Ejido Pancho Villa had access to all the same government programs and both communities have seen significant out-migration, but Pancho Villa retains significantly more ejidatario-owned cropland than does San Pedro. Notably, Pancho Villa benefited from getting more government-supplied wells than did San Pedro, and wells are the one significant cost that no one can get loans to cover, due to the high risk of not finding water. Other than the one instance in the early years of Ejido San Pedro

where two brothers bought a well drilling machine and drilled two wells, no ejidatarios were able to afford to drill a well except by using profits from crops grown with a government-supplied well.

Ejidatarios at San Pedro had an option to access Mennonite capital that ejidatarios at Pancho Villa historically lacked, which was used both for living costs (through land rentals) and out-migration costs (through land sales). It was very common for ejidatarios on San Pedro to rent or sell land to Mennonites from Buenos Aires, while similar land transactions have been relatively rare on Pancho Villa. Colonia Las Virginias was historically less land-limited than was Buenos Aires and there was thus less interest in buying or renting ejido land, and distances between Las Virginias farms and Pancho Villa farms are longer, decreasing convenience. The Mennonite acquisition of San Pedro was facilitated by the fact that areas originally designated for grazing were also adjacent to roads, power lines, and Colonia Buenos Aires itself, which provided an opportunity for Mennonite buyers to convert grazing land to crops relatively easily once a legal process for doing so was established in the 1990s. By being able to farm parcels originally designated for either farming or grazing, Mennonite buyers were better able to establish large fields and center pivots that take advantage of economies of scale.

Out-migration has been a common feature of all four communities, though at different times and for different reasons. Differences in out-migration trends between Mennonites and ejidatarios are subtle but important. Other than the fight over technology in Buenos Aires and El Cuervo that led to a mass exodus in the early 1990s, out-migration by Mennonites has generally been due to a fundamental lack of available land. Young Mennonite men who can find no land to buy (due either to price or availability at the time they marry and start their own household) often choose to emigrate to Canada or, less often, the US to find wage work rather than taking a job in Janos. Men I talked to who had returned to Janos after working in Canada or the US reported that they can earn in one hour of work in Canada what they might earn in a hard day in Janos. Even though cost of living is significantly lower in Mexico, I was repeatedly told that saving money from wage labor was easier in Canada than in Janos, and thus more conducive to eventually buying land to farm. Much of the machinery for farming can be borrowed or scrounged, but lack of available, affordable land is a fundamental barrier to entry. For reasons that were never entirely clear to me, individual Mennonites had a hard time securing loans to buy land, so lack of capital to buy expensive land could not necessarily be overcome through credit access the way that buying an expensive harvester or irrigation system could be.

For ejidatarios, on the other hand, out-migration and/or land sales were driven primarily by a lack of income opportunities rather than a lack of land. Land sales and abandonment were rampant in the early years, when the difficulty of starting from scratch sent many ejidatarios back to wherever they had come from or to seemingly easier ways of earning a living. In the decades that followed, countless ejidatarios emigrated to the US (generally illegally, unlike most of the Mennonites) because they couldn't make a satisfactory living on the ejido, even though land was generally available. Indeed, many owned land when they emigrated. Generally, this was due to an inability to fully put their cropland into production. Production was variously undercut by lack of irrigation water, machines for planting/harvesting, or cash/credit to buy seeds and other inputs, shortfalls that better access to credit could have mitigated.

At least some of the ejidatarios who emigrated to the US could have done what Mennonites do: work a job, save as much money as possible, and return to Mexico to buy land and start farming. I cannot say what jobs emigrating ejidatarios found in the US because I could not talk to them, but those I interviewed who had worked temporarily in the US and then returned had worked a range of jobs, some of them with decent wages: concrete work, carpentry, truck driving, building swimming pools. Two older men I interviewed had worked as legal migrant laborers in the US under the US Bracero Program (1942-1964), but no one I talked to had conducted such work since. It is likely that Mennonites working in Canada earn, on average, more than do ejidatarios working in the US and that low wages partially explain the dearth of ejidatarios who returned to Janos with cash savings to spend on getting into agriculture, but I strongly suspect that simple lack of desire plays prominent role. When I asked one man back in Janos to visit his parents if he would move back to Janos eventually, he responded that his kids were in school, so moving would be hard. And later, I asked? He smiled and gave the classic Chihuahuan soft negative: “*Quién sabe*” – “Who knows.”

Even for some of those ejidatarios who were still working their land in 2017, the small size of both crop and livestock parcels, declining farm gate prices through the 1990s, the drought of the 1990s that limited cattle forage, and frequently low crop yields often made agricultural incomes dangerously skimpy. But owning land and being a part of the community still held some appeal. Many of the ejidatarios I met had found local jobs and stayed on at the ejido even though they made little money from their land. As many ejidatarios pointed out, the ejidos are beginning to look like retirement communities, with relatively few young people still in town.

This outcome was not inevitable. As multitudes of scholars of Mexico’s ejido system have observed, the government’s economic contributions to ejido agriculture were vast in sheer monetary value but painfully inadequate to create a viable ejido agrarian economy. It has only been in the last decade that a very small class of capitalist farms has emerged on Ejido Pancho Villa, and the further expansion of those particular farms is likely very limited. Had the ejidos received more functioning wells and better systems for delivering inputs and machine services, perhaps the situation would have been different. The Mennonites, in contrast, did have sufficient investments to start down the road toward full differentiation into agrarian capital and landless labor. The colonies are now experiencing some mild social turmoil as a consequence of the resulting inequity in opportunity and wealth. The “Protestant ethic” of the Mennonites, to quote Weber, has so far proven more powerful than the communities’ implicit values on mutual aid and egalitarianism.

Conclusions

The four focal communities described above utilized different sources of credit and relied on credit at different time periods. Credit from BANRURAL was crucial for ejidatarios to acquire the farm machinery and inputs need to establish farms after they arrived in Janos; they lacked the investment capital necessary to get started without a reliance on external credit. Mennonites, in contrast, arrived in Janos with the financial resources to start farms and it was only in the 1990s that credit use really took off. But this direct comparison hides a selection bias. Ejidatarios received (and accepted) land rights in Janos *because* they were poor. Mennonites

who came to Janos only did so because they bought land and had the resources to buy start farms – there would have been no point in coming otherwise. In other words, both types of communities needed capital access to establish farms, but ejidatarios had to borrow that capital while Mennonites brought theirs with them from Cuauhtémoc.

Both ejidatarios and Mennonites relied primarily on very specific – and different – credit sources. The termination of BANRURAL effectively shut off farm credit to most ejidatarios because they either did not qualify for other types of loans or because they perceived those loans to be too risky to use. Conversely, Mennonites' use of and even dependence on credit did not really take off until the time that BANRURAL ended in the early 1990s. For the Mennonites, credit from UCACSA came at relatively favorable terms, was perceived to have relatively low risk compared to other sources, and allowed farmers to maintain restrictions on social interactions with non-Mennonite institutions. UCACSA credit also became available just as NAFTA was opening profitable export crop opportunities, such as growing chilies for New Mexico buyers. These examples demonstrate that credit availability is highly contextual and specific to particular geographic and social factors and cannot easily be generalized to regional or national scales. They also suggest that the utility of agricultural credit depends on numerous other factors, including macroeconomic and social contexts that may change fairly rapidly.

Limits on what credit can be used for have important ramifications for agricultural land use and livelihoods on both the ejidos and Mennonite colonies. Mennonites had enough inherited and saved capital to start farms in Janos, though largely with relatively low-cost crops like maize, beans, sorghum, and wheat. When it became readily available, they used credit to intensify their operations by incorporating new irrigation technology and higher value crops. It is very difficult for an individual to secure credit for land and impossible to secure credit for wells, however, and those two items remain barriers to entry for young Mennonites particularly as property values have soared over the last 10-15 years. For ejidatarios, who received land for free, it was irrigation wells that constituted the fundamental barrier to entry, as they could not afford to drill wells. Both ejidos and colonies had systems for acquiring most of the means of production to access commodity farming. Credit availability allowed some ejidatarios to start farms and many Mennonites to expand farms, but agricultural expansion faltered where there were costs that could not be met by either inherited capital or credit.

Chapter 5: How to Farm the Desert: Strength in numbers

Mennonites continue to acquire new lands and expand farming across Janos County, which is just one area in Mexico where Mennonite agriculture is thriving, and Mexico is just one of many Latin American countries where Mennonites have established and are currently expanding. Despite their expansionist agricultural success, Mexican Mennonites have received little scholarly attention. The question at the heart of this chapter is *what makes Mennonite agriculture in Janos County so successful?* While the lessons of this case study should not be assumed to be universal among Mennonite colonies elsewhere in Latin America or even in Mexico, the patterns I observed in Janos aligned with my limited direct study of the La Oasis colonies near the Texas border east of Chihuahua (city) and the reports I heard of colonies in Bolivia and Colombia during my interviews. More research is needed to be able to properly compare colony dynamics between different geographies.

This chapter will largely focus on particular social and cultural characteristics of Mennonite society in Janos – attributable to large stocks of what I will call social and cultural capital – that are instrumental in both maintaining agrarian colonies over time and in supporting individual farms and farmers. Mennonite social and cultural capital, I argue, increase access to the economic capital needed to establish and expand irrigated farms in ways that are simply not available to most non-Mennonites in Janos. Secondly, social and cultural capital play a significant role in motivating Mennonites to remain primarily devoted to an agrarian lifestyle rather than diversify into other livelihoods, as have ejidatarios. By growing up in a Mennonite colony and being readily identified as a member of the Mennonite social group, young Mennonite farmers have particular advantages over, for example, ejidatarios when it comes to farming. Those advantages have nurtured a sizeable class of larger-than-family farms dependent on wage labor and credit. Such farms are now able to expand with virtually no fear of labor shortage or market saturation, limited only by the amount of available land and irrigation water.

Social and cultural capital are often left out of political economic analyses of agricultural capitalism and the agrarian question. They are, after all, difficult to include in economic calculations of investments and returns. But decisions about agricultural investments, and relationships between landowner and wage worker, emerge from complex social and cultural contexts and cannot be divorced from them. Vladimir Lenin, writing in 1899, complained that the capitalist transformation of the Russian peasantry was slowed by its conservative and traditionalist culture (Lenin, 1982). Weber (2002) postulated that moral philosophies of Protestant sects fostered and accelerated capitalist behavior. Modern attempts to address the agrarian question cannot overlook such factors in analyzing the economic trajectories of agricultural communities.

The remainder of this chapter is divided into four main sections, followed by conclusions. The first section introduces the concept of access regimes and provides theoretical background on social and cultural capital and their limited application to commercial agriculture. The second section discusses the role of Mennonite culture and the perpetuation of agriculture as a preferred livelihood, without which young Mennonite men might well have

abandoned agriculture altogether in favor of alternative pursuits, as was common among ejidatarios. Cultural fidelity to agriculture is a key driver of agricultural expansion of individual colonies and the founding of new ones. The third section focuses on the role of social and cultural capital in supporting individual farms and farmers, revealing how both culturally-important voluntary practices and merely being recognized as a Mennonite help farmers overcome the particular material challenges of intensive farming in the Chihuahuan Desert. The last section discusses the role of social capital – and its lack – among the ejidos. The ejidos demonstrate that social capital and cooperation have benefits even where there are fewer resources to share, and also highlight areas where a lack of social capital contributed to widespread challenges.

Access Regimes and the Sociocultural Context

Looking at geophysical maps of Janos County, ejidatario and Mennonite farmers appear to have the same challenges to deal with: heterogeneous soils, meager rains, spatial isolation, wind erosion, bad roads, spotty electricity, scorching summer high temperatures, and surprise shoulder-season frosts. There is a great deal more to farming than the physical characteristics of land and location, however, and ejido and Mennonite farmers operate under profoundly different social and cultural contexts. As a result, the ways that farmers of each group engage in agriculture are very different. A good lens for examining these differences is *access*.

Ribot and Peluso (2003) used the term *access* to refer to the ability to derive benefits from land or other types of property. While the now standard theorization of property is as a “bundle of rights” (Macpherson, 1978), Ribot and Peluso argue that merely having a right to a thing does not guarantee the ability to benefit from that thing. In the case of farming, farmers must leverage numerous means of production besides land, including labor, financial capital, and a method of delivering a product to market. The patterns through which organizations and institutions interact to affect access to land have been called ‘*access regimes*’ (Jepson, Brannstrom, & Filippi et al., 2010), which vary over time as both institutions and actors change (e.g. Ellis et al., 2017; Turner, Wear, & Flamm, 1996).

Access to material resources for income generation entails social interaction, whether that be for negotiating sales of goods, use of loans, transport, physical access to certain marketplaces or harvest sites, etc. (Bebbington, 1999; Scoones, 2009). In Bebbington’s words, “to conceive of livelihoods as partly dependent on households’ social capital offers a more integrated framework for thinking about *access to resources*” than merely thinking of resource access through investment costs alone” (1999, p. 2024; emphasis in original). Farming, as it is typically done in Janos, is an extremely capital intensive endeavor, and farmers gained access to necessary capital through social institutions. The ability of any individual farmer to leverage these social institutions to gain access to intensive farming largely depends on their stores of social and cultural capital.

One’s ability to leverage social institutions depends on one’s ability to gather information, make connections to other individuals, and be accepted by social networks, all traits of what is frequently referred to as *social capital*. Among the various capitals listed and discussed in the livelihoods literature, perhaps none has received as much attention as social capital, which suffers from an abundance of definitions. Working among a long list of

definitions, including those of such luminaries as Pierre Bourdieu and Robert Putnam, Woolcock (1998) defined social capital simply as “the information, trust, and norms of reciprocity inhering in one’s social networks” (p. 153), though this is far from a conclusive definition. Some of the luminaries of social capital theory (such as Putnam) have been critiqued for circular arguments, in essence claiming that social capital breeds more social capital, with insufficient attention to how social capital is created or what its material effects might be (Sutherland & Burton, 2011). Nearly regardless of the definition, authors generally describe social capital as a social good that enables individuals to lead better lives, whether that be by gaining access to and utilizing resources effectively (the materialist angle) and/or enjoying the emotional wellbeing of greater social connection and mutual understanding (the hermeneutic angle).

Bebbington (1999) foregrounds social capital as a key access mechanism for the rural poor, and it is important to note that some amount of it – both in terms of the span of one’s social network and one’s credibility within it – is necessary for different kinds of approaches by the rural poor to improving their livelihoods (e.g., intensifying agriculture, diversifying incomes, and migration).

It is in this sense that access and social capital are central elements to the [Sustainable Livelihoods] framework. They are the concepts for analyzing the relationships and transactions between the members of a rural household and other actors—relationships mediated by the logics of the state, the market and civil society. As rural people try and access resources they do so through engaging in relationships with other actors who are both present but more often than not usually absent from the day-to-day activities of rural people. Indeed access to other actors is conceptually prior to access to material resources in the determination of livelihood strategies, for such relationships become almost *sine qua non* mechanisms through which resources are distributed and claimed, and through which the broader social, political and market logics governing the control, use and transformation of resources are either reproduced or changed. (Bebbington, 1999, p. 2023)

Bebbington’s read on social capital is helpful but rather broad, and there is no clear conceptual mechanism to translate social capital to other types of capital. Pierre Bourdieu had a response to this, which is perhaps why his theorizations of social and cultural capital have become resurgent in agricultural studies (Sutherland & Burton, 2011).

Bourdieu (1986) follows Marx in reducing all forms of capital to labor. To build social capital, one has to invest time and effort building relationships, just as one has to invest time to produce a commodity. With labor as the common denominator, Bourdieu suggested that economic (as he calls it), social, and cultural capital are at least largely transferable; a person had to decide how to allocate their labor in order to accumulate the capital type they wished to acquire. Social and cultural capital were more similar and thus more directly transferable, while economic capital could never be as readily transferred to the other two; the exchange rate was unequal, in other words (my phrasing, not Bourdieu’s). One cannot simply buy social capital with cash, or readily trade prestige for income. Bourdieu’s definition of social capital helps to explain how it might be transferred to economic capital:

Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—or in other words, to membership in a group—which provides each of its members with the backing of the collectivity-owned capital, a ‘credential’ which entitles them to credit, in the various senses of the word. (1986, p. 248)

By being included as a member of a group, each member is entitled to certain assets possessed by the group. If a group has valuable material assets, members may be able to leverage their social capital, their membership, to access those assets. The particular quote above refers explicitly to the resources of a group rather than the group itself or the social relations between them, but those elements are also included. Sutherland and Burton (2011) use precisely this framework of Bourdieu’s to examine the sharing of labor and farm machinery between farmers in Scotland. Farmers who spend more time in positive interactions with one another, that is, who share more social capital, also tend to share more machinery and labor. I will come back to this point in reference to Mennonites and ejidatarios further on.

Sutherland and Burton (2011) also found that cultural capital mattered a great deal when it came to sharing labor and machinery between farmers. Cultural capital is very related to social capital, and the distinction between the two has not always been kept clear. This is evidenced by the fact that different authors variously refer to Pierre Bourdieu’s work on how French elites perform intergenerational transfer of elite class status as either a study of cultural capital (e.g., Baron & Hannan, 1994) or of social capital (e.g., Woolcock, 1998). Bebbington (1999) differentiates cultural capital from social capital in order to capture “the maintenance of a range of cultural practices that are valued for their meaningfulness” (p. 2034). This particular definition is helpful when considering the wide range of practices that separate Mennonites from other Mexicans, such as specific churches, dress, schools, and limited technology usage. Life in the Mennonite colonies is profoundly shaped by the maintenance of cultural capital within the group. On the ejidos, cultural practices are essentially Mexican practices writ large, which connect them to the greater national body and reify their contrast to the Mennonites.

For Bourdieu, cultural capital includes a wide range of personal traits or skills that carry meaning and, potentially, prestige within a group. He divides cultural capital into three forms: embodied, objectified, and institutionalized. Embodied cultural capital is the broadest and arguably the most important, as it includes the personal elements of what might (broadly) anthropologically be termed ‘culture’: a language and way of speaking, manners, beliefs, values, and even skills. Identification with a cultural group is thus a component of embodied cultural capital. Cultural capital can attract both social capital and economic capital, as a person recognized for having high cultural capital is more likely to receive favorable social interaction (social capital) and receive access to associated forms of economic capital. Sutherland and Burton (2011), for example, found that farmers who were recognized for having high farming skill and consistent reciprocity (culturally valued traits within this group) were more likely to be lent labor and valuable farm machinery by their neighbors. In Janos, one’s status as a Mennonite or as a non-Mennonite—as most readily identified by language and race—has

profound implications for social interaction and access to economic capital both as credit and as material goods like farm machinery.

Bourdieu is quite clear that embodied cultural capital is also the hardest capital to acquire because the amount of time it takes to garner is vast and usually unrecognized. During the entirety of one's youth, cultural capital is bestowed upon a person by their family, school, and associates – often upwards of two decades of full-time learning. While one can invest time later in life to make friends or earn money, acquiring cultural capital is never as easy for an outsider. Bebbington (1999) notes that the maintenance of cultural practices (which in his case of the high Andes Mountains include fiestas, volleyball games, and certain kinds of agricultural labor, among other examples) is a goal of community members that affects decision making about livelihood practices, particularly about residence versus migration. But cultural practices also serve as a source of community strength that are “also enabling and empowering. They enable forms of action and resistance that the other four types of capital would not, alone, make possible” (p. 2034). Bebbington's point that communities will struggle to maintain practices that reinforce or define cultural capital without necessarily having any (immediate) underlying economic incentive helps remind us how communities take on identities that direct livelihoods.

The connection between language, social identity, and livelihoods has been studied in the context of *ethnic enclaves*. An ethnic enclave is simply an ethnic minority population that lives within close social and spatial proximity to one another but is otherwise an island in an ethnic majority sea. Early ethnic enclave literature focused on immigrant communities in cities, where it was observed that members of such groups disproportionately engage in particular livelihoods (Li, 2004; Portes, 1981; Wilson & Portes, 1980). The ‘enclave theory,’ as first discussed by Wilson and Portes in the context of Cubans in Miami (1980), basically proposed that immigrants who arrive to immigrant (ethnic minority) enclaves are readily plugged into existing economic opportunities in sectors locally dominated by that ethnic group, and receive economic benefits in return (Li, 2004). In other words, ethnic enclaves foster access regimes that enable their members to benefit from specific types of resources and livelihoods.

The literature on ethnic enclaves does *not* use the terms social or cultural capital, though such concepts are shot through those studies. Numerous early works on the subject (e.g. Jiobu, 1988; Wilson & Portes, 1980) refer instead to human capital within enclaves, though the term is used far more broadly than it is typically defined in the livelihoods literature. Regardless, the thinking is the same: social connections forged largely by embodied cultural capital—language, dress, modes of address, standards of casual social interaction—allow group members to access jobs and other economic resources that would otherwise be inaccessible or at least difficult to attain. For example, in a review of the economics of ethnic enclaves, Li (2004) found numerous studies demonstrating that social connections within enclaves (i.e. one's social capital) provided access to informal credit, especially when access to formal credit sources was restricted. If we imagine the Mennonite colonies as ethnic enclaves (hardly a stretch), it is possible to see how shared cultural practices readily facilitate social capital accumulation that could in turn facilitate access to intensive agriculture.

Mennonite colonies in Janos are excellent examples of ethnic enclaves, with very specific access regimes devoted to agriculture. Mennonites support one another in agricultural endeavors, cooperate to buy land and construct necessary infrastructure, and regularly engage

in social practices specific to Mennonite faith and culture, such as attending their own churches and schools and speaking their own language. The tight connection between Mennonite cultural life, social interaction, and agricultural livelihoods facilitates access to agriculture for young Mennonite men and the spatial expansion of Mennonite colonies.

Identity, Cultural Practices, and a 'Good Life' in Relation to Farming

Why do Mennonites from Janos County who go to work in Canada so often return to buy land and farm in Mexico, while so few ejidatarios return from jobs in the US (voluntarily) to farm in Mexico? The answer has to do with how the two respective community types view farming as a lifestyle, and how individuals view their respective communities in the context of 'a good life.' The differences between Mennonites and ejidatarios in this capacity have important ramifications for the trajectory of each community and the amount of land it controls. Those differences emerged in interviews most clearly when I asked why people had chosen their respective livelihoods and residences, though of course such choices were also economically constrained. Social and, particularly, cultural capital are important factors. Strong social networks foster a sense of belonging in individuals, while high cultural capital fosters practices and institutions within communities that reinforce a collective 'us' that stands out from the surrounding world. For Bebbington (1999), cultural capital is more a motivator of decision making than it is a component of social capital, but clearly the two are related. The greater the cultural capital, the greater the likelihood of shared bonds and understanding that constitute an important part of bonding social capital. But high stocks of cultural capital can invest agriculture with meaning greater than its status as a mere livelihood strategy.

Over and above the meaningfulness of a particular set of assets, then, there is a meaningfulness associated with the set of cultural practices made possible (or constrained) by the patterns of co-residence and absence linked to certain livelihood strategies. This becomes one more (very important, though understated) dimension of the meaning of poverty or wealth to rural people themselves. (Bebbington, 1999, p. 2034)

For Mennonites in Janos, farming is not just a way to put food on the table. It is also a daily statement of fidelity to a cultural tradition of apolitical self-determination, of standing apart from the non-Mennonite world.

In his sweeping history of the Mennonite move across Europe and into Russia, and then to North America, C. Henry Smith (1957 [1941], p. 770) devotes only a few pages to the role of farming in Mennonite culture, but he includes this:

With the exception of the first colonists in Germantown, the American Mennonites have been almost exclusively a farmer folk. They were farmers in Europe, and they became farmers in America, as did their children and children's children for generations after them.

The centrality of farming is not a tenant of the religion, however, but merely a convenient lifestyle for a people long persecuted as religious and political deviants, who valued a large berth between the mainstream 'worldly' society and their own spiritually-centered communities. In many places, this is changing. A 1989 survey of over 3,000 Mennonites in Canada and the US revealed that just 15% of male and 1% of female respondents claimed to be farmers (Kauffman & Driedger, 1991, p. 38). In Janos, however, farming still continues to be an important determinant of what makes a 'good life.'

For all the Mennonites I talked to, farming and living in a Mennonite community were not merely convenient or profitable lifestyle options among other suitable possibilities. They sought out this lifestyle deliberately and worked hard to maintain it. I interviewed Mennonites who had been unable to acquire land as young men and so found wage jobs, in some cases starting their own businesses, both in Canada and locally. When these ventures paid off with profits and savings, these men bought land and started farming, sometimes keeping another business on the side. They made money in order to farm, not the other way around. The owner of an electrician business and the co-owner of a grocery store in Colonia Las Virginias started farming only after their commercial ventures earned enough money for them to buy farmland. Young Mennonite men who inherited no land from their fathers often chose to migrate temporarily to Canada to find jobs, but often came back to Mexico once they had saved enough money to buy land and a tractor. The goal of these men was always to farm in a Mennonite-dominated community; the only question was how to make it happen.

If a Mennonite farmer makes a huge profit on onions one year (the onion market was frequently likened to a lottery), he will almost always reinvest that money in agriculture, either by buying land or equipment. Agricultural profits, even for the wealthiest Mennonites with the largest land holdings, are almost always plowed back into agricultural expansion. Mennonites do not buy second homes on a beach somewhere or start a business with shorter working hours, they just buy another field and center-pivot.

Weber described precisely this pattern of ascetic financial success in *The Protestant Ethic and the Spirit of Capitalism* (1905). Weber's thesis was that Protestants were such prototypical capitalists because of the particular tenants of Protestant Christianity. For Protestants, neither a monastic life nor performing good works were any guarantee of eternal salvation. The best one could do was pursue worldly ends seriously, without giving in to temptations of the flesh; a life of hard, honest work was the ideal. If that hard work earned a lot of money, that just proved you were doing well at working hard and was not itself a problem so long as it did not lead to vice. Mennonite farming fits this mold, and Weber (2002 [1905], Chap. 1) called out Mennonites several times in his book as exemplars:

Even more striking, as it is only necessary to mention, is the connection of a religious way of life with the most intensive development of business acumen among those sects whose otherworldliness is proverbial as their wealth, especially the Quakers and the Mennonites. The part which the former have played in England and North America fell to the latter in Germany and the Netherlands. That in East Prussia Frederick William I tolerated the Mennonites as indispensable to industry, in spite of their absolute refusal to perform military service, is only one of the numerous well-known cases which illustrates the fact,

though, considering the character of that monarch, it is one it is one of the most striking.

It is perhaps only fitting, then, that 'hard-working' was a description I heard often in interviews with ejidatarios and ranchers when describing Mennonites. Despite their other complaints and accusations of the Mennonites, the Mexicans I interviewed universally acknowledged that Mennonites worked extremely hard, were tight-fisted with their money, and were generally true to their word. Conversely, Mennonites often described ejidatarios as drunkards and spendthrifts, though some also employed ejidatarios as farmhands and spoke well of them. Negative stereotypes served to reify Mennonite's negative opinions of the outside world, and to motivate them to stick together and work until dark.

Mennonite Cultural Capital in Janos

The very reputation of the Mennonites as productive farmers with no political ambitions was instrumental in them securing citizenship and permission to buy land in Chihuahua from President Obregón following the Revolution (Dormady, 2014; Sawatzky, 1971). As part of the concessions granted to the Mennonite immigrants, they were allowed to become dual Mexican-Canadian citizens. Each subsequent generation of Mennonites has been able to attain Canadian citizenship based on the Canadian citizenship of their parents (or at least one parent). This status has been an advantage for many Mennonites, and one that facilitates access to farming via indirect channels.

For one, Mennonites who are not able to make a living in agriculture and instead decide to pursue wage labor have the option of legally pursuing labor opportunities in Canada, where salaries are higher. During one interview with a colony leader (*jefe de colonia*), I was told that the population of Las Virginias has been essentially stagnant for more than a decade because so many people had left for Canada. Leaving for Canada to find wage labor has two advantages over seeking jobs in Chihuahua: it pays better, and Mennonites usually avoid the necessity of learning a second language by working for other Mennonites in Canada (who all speak the Mennonite dialect of German). In 2009 the Canadian Citizenship Act was amended to allow only one generation born outside Canada, after 2009, to gain citizenship, meaning that most Mennonite children born after 2009 are not Canadian citizens (<https://www.canada.ca/en/immigration-refugees-citizenship/services/canadian-citizenship/act-changes/rules-2009-2015.html>). That change may have important implications for labor migration in the future. For the time being, however, most Mennonites in Janos are dual citizens.

Many of the young people who leave for work in Canada eventually come back to Mexico, unlike ejidatarios. I interviewed several Mennonites in both colonies that had spent several years working in Canada, earning enough money to return to Janos and buy land. One interviewee's parents had sold land in Las Virginias after financial problems, gone to Canada for some years, and come back to Las Virginias and then repeated this cycle twice more, each time buying larger parcels of land but still running into financial problems. This story lent some credit

to a generalized rumor I heard sometimes from ejidatarios, who said that when Mennonites are unable to pay off loans (or get in trouble with the law), they simply emigrate to Canada and potentially return once things have blown over. Regardless of the circumstances, many people do return to Chihuahua from Canada, though not always to the same colony. When I spent a week doing interviews at a set of Mennonite colonies near Ojinaga in eastern Chihuahua, near the Texas border, I met many people who had purchased their land there while working in Canada. Land in new colonies is especially affordable, so Mennonites who save up a nest egg in Canada can often buy a sizeable parcel in a new colony in Chihuahua or elsewhere. One odd parcel of land adjacent to Pancho Villa was owned by a consortium of Mennonites who were mostly non-residents from outside Las Virginias, including Canada. The back-and-forth movement between Mexico and Canada is both a result of an unusual legal privilege (i.e., visas) and an enculturated commitment to religious conservatism and an agricultural lifestyle.

Many Mennonites were at least partially motivated to live on colonies because of the religious conservatism. For those that had lived in Canada or the US and then come back, the two reasons I heard for their return were that farmland was cheaper, and that even the Mennonite communities in Canada and the US where they had worked were too modern, too far from the Mennonite culture. They complained that the schools were government-regulated rather than being 'real' Mennonite schools, taught in English rather than Plautdietsch. Towns were almost never all-Mennonite, but instead mixed communities that precluded the sole use of Plautdietsch and meant widespread exposure to the public school system and social conventions that did not adhere to conservative Mennonite standards of dress and personal appearance. The men I talked to came back to Janos because they were more comfortable there than anywhere else they had been.

The exemption from public education standards garnered upon their immigration to Mexico in the 1920s has played an important role in maintaining the Mennonite focus on agriculture. The quality of traditional Mennonite education in Mexico is low by any outside standard (Sawatzky, 1971; interviews). Two Mennonite teenagers I talked to who had been first educated in Canadian public schools told me they were utterly appalled by how poor the schools are on the Janos colonies. Schools are taught in Plautdietsch, and Spanish is not taught. Plautdietsch is rarely written, so reading and writing are taught primarily in standard ("high") German so they can read the Bible, for which the standard version on the colonies is in standard, modern German. In addition to studying the Bible as a way to learn reading and writing and "high" German, students also learn basic arithmetic. This comprises the vast majority of their education. Upon completing school as early teenagers, many Mennonites still cannot speak "high" German nor read the Bible with any fluency. If they learn Spanish at home or through work interactions with Mexicans, which most men do and most women do not, they usually gain a limited degree of literacy in that as well, but this education comes purely through informal channels.

The limited schooling of Mennonite youths in Janos has both positive and negative effects in relation to earning potential and livelihoods. It certainly does limit the wage labor opportunities anywhere outside of Mennonite communities, with consequences for economic diversification. What it enables, however, is a local focus on practical, skills-based education rather than abstract academic studies. Mexican children on the ejidos, for example, generally lead a lifestyle functionally identical to that of most children in the US: they go to school for

much of the day, and after school they may have limited family chores but also have unstructured time for play, social interaction, and consumption of mass media. They do not necessarily have the opportunity to learn farm skills from their families the way that Mennonite children do. Mennonite children, in contrast, do comparatively little playing. Instead, they work. I saw boys under the age of 10 driving trucks, tractors, combines, and, in one case, a bulldozer. Boys help in the fields, they watch their dads fix tractors, they hang around on job sites, they work in the grocery stores, and in one unusual case, a 14-year-old boy ran his own carpentry shop. Girls, like Mennonite woman in Janos more generally, are largely constrained to the house and yard, though they were instrumental in helping to prepare meals, garden, tend milk cows, and tend younger kids. While I did occasionally see a young boy riding a bike or playing in a yard, this kind of activity was far less common than helping with some type of family labor. The participation in nearly non-stop labor from a very young age helped instill an extremely strong work ethic and a set of very practical skills specific to that lifestyle, an element of embodied cultural capital.

The participation in family farming, dairying, and homemaking has important benefits. In a region where agriculture is the dominant (legal) economic activity, being skilled in this trade pays dividends. By the time young men start their own households (typically at 18-23 years of age), they have the skills to grow their own crops, tend their own dairy herds, maintain and repair much of their own farm equipment, or perform these skills at a high level in a wage context. Wealthy Mennonites who own more land than they can or care to work themselves typically prefer to hire at least one full-time Mennonite assistant even though they command higher wages than Mexican workers, as the higher wages are more than compensated by a higher degree of agricultural and mechanical skill. One proud Mennonite father told me a story about his son, then working as an agricultural laborer in Texas. A combine on the farm where the son worked broke down, and the owner hired a farm mechanic to come out and fix it, at significant expense. A few days later, the combine broke down again with the same problem. The son asked his boss if he could take a shot at fixing it rather than calling the expensive and now dubious mechanic again. The son did fix the problem, at nearly no cost. When his boss asked where he'd learned farm mechanics, he replied that it was just something he had picked up as a kid on his dad's farm. The boss gave the young man a 50% raise and hadn't called the farm mechanic since.

The skills gained by Mennonite boys and young men growing up on a farming colony prepare them to run their own farms in the future, and their relative lack of formal education make them poor candidates for non-agricultural wage labor, especially off-colony. The values of the community favor agriculture, a conservative lifestyle, and adherence to Mennonite social mores. It thus should not be surprising that so many young men grow up wanting to become hardworking farmers on their own land, and to be quite capable at doing so. The cultural capital gained by growing up Mennonite tends to instill a desire to farm in a Mennonite community and the ability to do so, perpetuating a specific form of rural ethnic enclave. Strong social capital facilitates access to capital and fosters social bonds that breed loyalty to the community, enabling and motivating Mennonites to stay local and farm.

Cultural Capital and Out-Migration

The different cultural attitudes toward agriculture and community between Mennonites and ejidatarios combine with different levels of local economic opportunity to cause demographic consequences. While both Mennonites and ejidatarios had sometimes remarkably large families, it was the Mennonites who tended to have more kids, and a higher percentage of Mennonite children settled down in Janos County. Nearly every Mennonite son grew up trying to figure out how to get a farm of his own (essentially all women in these communities are housewives, though a few work as cashiers in Mennonite-owned stores). The Mennonite agricultural access regime and wage labor opportunities on large farms created numerous – though not guaranteed – local livelihood opportunities. In contrast, the children of ejidatarios looked around and saw impoverished communities, poor educational opportunities, few decent jobs, and farmers that struggled to make it from one year to the next. It should hardly be surprising that the children of ejidatarios, of all genders, sought better opportunities elsewhere. Young ejidatarios left Janos both because they perceived economic opportunities to be better elsewhere and because there was little compelling social or cultural motivation to stay in Janos.

One ejidatario we interviewed, who I'll call Enrique, told us about how his son ended up emigrating to the US. Enrique's son had been working as a wage laborer in Janos and had saved up some money. He came to Enrique one day and asked for advice on whether he should use his savings to buy a car or go to the US. Enrique told him to go to the US, that it 'would be a school for him', whereas if he just stayed on the ejido and bought a car, then he would get a girlfriend and spend money all the time, and he'd never do anything with his life. This is not the type of advice that a young Mennonite man would receive. It is important to note here that Enrique has 6 kids, three of whom still live on ejidos in Janos. Some ejidatarios do stick around but there is not necessarily any great social or cultural value placed on this outcome.

Economic incentives drive some young Mennonites and children of ejidatarios alike to emigrate, but the former are more likely to return to Janos with the explicit intention of farming. Ejidatarios I talked to who had come back to Janos after working in the US generally did so because of visa-related reasons, or because they returned to their families who could not accompany them to the US. Any savings accumulated from working in the US were spent on a wide variety of things: trucks, houses or house remodels, land, and cattle, to name a few. Mennonites who returned to Janos did so with the specific plan of starting farms with the money they had saved. Young Mennonite men who felt that they could not earn the money to start farms quickly enough in Janos emigrated temporarily to do so, and returned when they had enough money to buy land, an irrigation well, and the other means of production needed for commodity farming. They left to acquire start-up capital, and they returned because they wanted to live in the comparatively conservative Mennonite colony culture of Janos.

Rather than emigrate, some young Mennonite men who cannot start farms right away choose to work locally for wealthy farmers or in ancillary agricultural industries, such as making cheese from Mennonite cows, operating well drilling rigs, or working in the cotton gins. The desire of many to stay on the colony motivates them to find diversified incomes locally rather than try their luck in Canada or the US. Many of these men will eventually save enough money to start farming somewhere when the opportunity arises. Between Mennonites returning from

abroad and local Mennonites looking for their chance to get started, there is a consistent demand for affordable farmland which ensures that Mennonites will continue to expand whenever land becomes available. With few exceptions, no one will pay a higher price for land than Mennonites, because for them land is more than just a financial investment with potential profits and losses; it is central to leading a good life.

Bebbington's (1999) conception of cultural capital as "the maintenance of a range of cultural practices that are valued for their meaningfulness" (p. 2034) helps to shed light on ejido depopulation and Mennonite colony expansion in Janos. For the ejidatarios who had first settled in Janos as well as most of their children, there was no particular connection to either the land or the other members in the ejido. The land reform had thrown the ejidatarios together, frequently with little or no family, in a landscape they did not know and frequently did not particularly care for. They wanted land because they wanted security; farming was just one possible way to achieve a decent livelihood. When the economic outlook in Janos appeared too grim, or good opportunities arose elsewhere, they left. Most Mennonites worked hard to achieve an agricultural livelihood even if it meant working a wage labor job for some years to save up the necessary investment capital. To be sure, some did emigrate and settle permanently in Canada or the US, but many instead returned to Janos to establish farms. That preference for farming, for living in a Mennonite community, attending Mennonite churches and sending their kids to Mennonite schools, has maintained population growth and expansionist pressure around the Janos colonies.

The Material Benefits of Social and Cultural Capital for Mechanized Farming

Mennonite and ejidatario farmers must both find ways over the hurdle of high investment costs for the type of intensive farming that has long been common in Janos County. A substantial cash flow is required to pay for drilling irrigation wells, running irrigation pumps, buying and fueling tractors and combines, buying seeds and farm chemicals (fertilizers and pesticides), and hiring laborers for specialty crops like chilies and onions. Ejidatarios, because of their general lack of access to other financial resources, relied almost exclusively on BANRURAL until it folded in the early 1990s and, with some exceptions, have since struggled and mostly failed to pay those costs. The Mennonites, in contrast, have relied on very different institutions to meet their farming costs, institutions that few non-Mennonites can access.

The enduring features of crop agriculture in Janos have been irrigation and mechanization. Both elements entail significant up-front costs that act as barriers to entry for many, and both entail ongoing maintenance costs that forever threaten to outstrip crop sales. The use of irrigation practically requires mechanized farming, as the costs of operating a well and irrigation system can only be paid off by farming a larger area than can be achieved with animal power alone (barring higher-value crops than are typical in Janos). It is the costs of acquiring and maintaining groundwater irrigation, farm machinery, and farm inputs (e.g. seeds, chemicals, fuels) that have constituted the single biggest challenge to farming in Janos. In general, Mennonites have had far greater success in meeting these costs than have ejidatarios, which largely explains why Mennonite-owned agriculture continues to expand while ejidatario-owned agriculture continues to dwindle.

As will be revealed below, Mennonite farmers are not isolated actors who earn profits purely through economic rationality. The Mennonites benefit from extensive social networks, social institutions, and preferential treatment that are based on their identity as Mennonites – their embodied cultural capital. The subsequent section will highlight the role that social and cultural capital play in securing access to farming in the Mennonite communities with a focus on the three primary non-land farming costs: drilling wells (a rare activity), acquiring farm machinery (a periodic activity), and paying for inputs needed every year (fuel, seeds, fertilizer, and pesticides).

Agricultural Access Hurdle #1: Crop irrigation

The Mennonites did not receive any free wells from the government, though Colonia Buenos Aires had a small number of them already installed when they bought the property. Everyone I talked to said that there was never any dry farming on the colonies, so everyone needed access to a well in order to begin farming. Because most parcels were initially small (50 ha and down), one well could irrigate several parcels and many neighbors shared the cost of installing a well and buying diesel to run it. Mennonites had been drilling wells in Cuauhtémoc practically since they arrived in the 1920s (Sawatzky, 1971), so there were many drill rigs around and people who knew how to operate them. Most colonists hired someone to do the drilling, while others found it cheaper to buy a used drill and run it themselves (drilling a deep well can take up to two months, so labor accounts for a significant share of the overall cost).

It is essentially impossible to get a loan to install a well, so anyone who wants to drill a new well has to have a significant supply of cash on hand. This is because there is a non-negligible risk that any new well will not produce enough water for irrigation, which would preclude the initiation of irrigated farming with which to pay off the loan for the well. The cost of drilling a well today can be anywhere from \$25,000 – 50,000 USD depending on depth, type of machine used, and substrate. For the government-installed ejido wells, well sites were selected by government geologists. Ejidatarios, Mennonites, and even ranchers, however, rely on water ‘witches’, or dowsers, people who can sense the presence of groundwater (or other things) beneath them with the aid of copper or wooden sticks or sometimes a pendulum.¹⁷ Drilling dry holes was a relatively common occurrence no matter who selected the site. I interviewed one Mennonite who had drilled eight dry holes on his property and still had not found water. Drilling a dry well costs nearly as much as drilling one that hits water, so the financial risk is significant. Once the well is drilled and hits good water, then loans can potentially be secured for the motor, pump, and cost of hooking the motor to the power grid (after this became standard in the 1990s).

There is one additional cost for wells, which has to do with permits. In theory, every well in Chihuahua is supposed to receive a permit from the National Water Commission (*Comisión Nacional del Agua*, or CONAGUA). Due to concerns about the longevity of the Janos Aquifer, however, CONAGUA no longer issues new permits for that aquifer. The whole of the Janos Aquifer was actually closed to new extractions by two different federal decrees, one in 1979

¹⁷ Hiring a water witch/dowser was the standard way to site wells on the U.S. side of the border, too, as well as where I grew up in New England.

and a second in 2013 (Diario Oficial de la Federación 1979, 2013). In practice, people continued to receive permits for wells at least until 2000, though with how much bribery is unclear. More recently, almost everyone I interviewed reported that it is indeed impossible to receive a new permit, so instead there is a very lively market in 'reposition' permits and divided permits.

Historically, when permits were easy to get (even after 1979), people sometimes received permits they either could not use or else had a well run dry, which left a permit with no well. In these cases, it is relatively easy (though administratively slow) to receive a reposition permit, which allows one to replace an existing or defunct well with a new well anywhere else within the same aquifer. Now that no new well permits are available, there is a very lively market for reposition permits, and the going rate reported by Mennonites was about \$50,000 USD. Reportedly, Ejido Janos had received a lot of well permits over the years that they were not using, and so Mennonites especially in Colonia Las Virginias were buying them up.

Permits can also be divided, though this approach to securing new wells seems to be less common. Each permit is limited to a set maximum annual extraction by volume; if the owner of a well is using less than the maximum, they can divide the permit and sell off the water extraction allotment they are not using. Because the actual amount of water extracted per year is rarely, if ever, monitored, permits can in theory be subdivided several times over. This is, in fact, how well permits were being allocated at a new block of land adjacent to Las Virginias. The rancher who had owned the land had several large-volume permits that the buyers subdivided to create small-volume permits for each block of subdivided land. The permitted volumes of the subdivided permits were in fact too small to irrigate the designated amount of land (based on the crop water demand farmers in Las Virginias reported to me), but this fact was made irrelevant by the lack of enforcement.

In general, the lack of enforcement regarding new wells significantly mediates whatever the law says. Some people drill wells with no permits and simply bribe the power company to overlook the lack of permit when they connect the well to the power grid. Others buy the reposition permits legally, others buy cheaper reposition permits from other aquifers and bribe officials to certify the paperwork anyway, and others find ways to get cheap divided permits. I even heard of one extremely wealthy Mennonite from Cuauhtémoc flying to Mexico City to get a handful of permits from the head CONAGUA office directly, with bribery being the implied method. The fact that most people seem to either buy legal reposition permits or find ways to bribe their way into getting a well up and running simply means that the cost of entry to farming is that much higher. What is remarkable is that so many Mennonites are able to afford these costs with earnings from farming. If one is just trying to get started, however, this cost is a high hurdle.

I only interviewed two Mennonites who owned good farmland but were unable to irrigate it due to being unable to afford to drill a new well. Unlike in the ejidos where land was originally free, few Mennonites own land they cannot irrigate because they will not buy land unless they can afford to also install a well there. In those cases where a landowner could not afford a new well, they sold the land to someone who could afford to drill a well or sold to a neighbor who could irrigate it with an existing well. In essence, for at least the last ten years, there have been enough Mennonites with enough money to drill wells so that decent farmland rarely sits unirrigated.

Even without credit, there are ways to mitigate the high cash costs of drilling wells. Among all landowners in Janos, it is common to pay for the service of drilling wells in installments. If trust is low, as it often is when an ejidatario group or a rancher hires a Mennonite drill rig, the payments might be half up front and the second half the following year. If trust is high, as is often the case between Mennonites, payments might be stretched out over three or four years, reducing the financial risk and making the cost more affordable.

There are three ways that Mennonites on the colonies get new wells cheaper than simply hiring someone to drill one. The first, which was more common in the early years of the colonies when farm fields were smaller, was for a group of neighbors to pool their money together and drill one well that could irrigated all their land. The second method is to buy a used drill rig and drill their own well, and then either resell the rig to someone else or drill wells for other people as a side job. Old drill rigs can be purchased relatively cheaply in the US or in Cuauhtémoc, and can be purchased with credit. The third and probably most widespread way to secure a cheap well is for family members to share the use of a drill rig, especially for fathers or fathers-in-law who own the rig to lend it to sons or sons-in-law who need the well. Drill rigs, especially the old ones, are not terribly complicated to operate (maybe not to operate well, but sufficiently), and Mennonites learn how to operate them through peer instruction. All three of these methods require some degree of social capital, as they require working together with others and finding someone who knows how to operate a drill rig to teach the person who wants to use one. While ejidatarios do periodically cooperate to fund shared wells, they almost never buy their own drill rigs, due both to costs and the lack of knowledge about how to run one. Mennonites' privileged status when it comes to securing loans (more on this below), greater financial resources more generally, and willingness to work closely with other Mennonites make them far more able and likely than ejidatarios to pursue the cost saving measures described here.

There is one additional way that Mennonites secure irrigation water when they cannot afford to drill their own well: they use water from an existing well. Especially when land was more available, many young Mennonites started farming on a piece of their father's land or on a neighboring parcel, and irrigated their fields with water from their father's well. This is generally accomplished by running a pipe from the wellhead to wherever the other field is, in one case over a kilometer away. If a farmer already owns land with a good well, they sometimes buy a cheap piece of land nearby that does not have its own well, and irrigate both parcels with one well. Utilizing an existing well in this way is much easier when there is only one well owner to negotiate with, and especially if that person is your close relative. Ejidatarios typically own wells as groups, so connecting a pipe to water a remote field would require the approval of the whole group. This is just one of the social institutions that allows each generation of Mennonites is able to help the next generation get started in farming, and it is one that depends on existing resources. Water, like other forms of wealth, is passed down through generations.

Agricultural Access Hurdle #2: Farm machinery

Mennonites have three different ways of accessing farm machinery and all of them rely to some degree on social and cultural capital. Unlike ejidatarios, I never heard of a Mennonite

plowing a field with draft animals even in the early days of Buenos Aires. Despite various limits on technology adoption, including the longtime use of horses and buggies for personal transport, tractors are very firmly ensconced in Mennonite society. Farm machinery is expensive, however, and as such acts as a significant barrier to accessing farming. This is why BANRURAL gave farm machinery to groups of ejidatarios on credit as a first step in launching commercial farming. Mennonites have a significant advantage in that they typically start farming without having to acquire their own machinery at all.

The vast majority of Mennonites that I interviewed relied on their father's, or sometimes father-in-law's, machines to get started in farming. Traditionally and ideally, young men receive a piece of land from their parents when they get married (usually before the age of 22, in my interviews) as the means to start their independent life. They then farm this land with machinery they borrow from their families until they earn enough money to buy their own. In recent decades at Colonias Las Virginias and Buenos Aires, and for reasons I was not able to fully parse, it has become less common for young men to be given land as a wedding present, and they often have to work for their fathers or a larger landholder for a time before buying or renting their own land. Even so, they typically start farming with their father's (or other family member's) machinery whenever they do acquire land. Even as they start accumulating their own machinery, they continue to borrow the machinery they need from family. This is a significant boon, as different crops require specialized machinery. For example, corn and small grains (wheat, barley, oats) can be harvested with the same combine but need different attachments; cotton requires a specialized picker; alfalfa requires a cutter, rake, and baler; and boom sprayers are required for pesticide applications (though some people contract aerial spraying, especially when the soil is wet). Given that all farmers plant multiple crops in rotation, the equipment needed can be extensive. Borrowing equipment from family significantly reduces the barrier to entry for beginning farmers.

When the Mennonites do buy equipment, it is rare for them to buy anything new. Instead, they buy older machines, often at auctions. Any big farm auction in southern Arizona, New Mexico, southwestern Texas, or even southern California is likely to have Mennonites from Chihuahua there bidding on items. The biggest stacks of US dollars I've ever seen in my life were pulled out of Mennonite pockets at a big farm auction I attended in Cochise County, Arizona, where Mennonites from colonies around Janos County and Ascension County (immediately northeast of Janos) were buying tractors, combines, pickup trucks, tractor trailers, water and fuel tanks, and more. Local farmers at that auction complained that the Mennonites buy all the good stuff; they are simply willing to pay more. The practice of buying farm machinery in the US is not new. The Chihuahua Mennonites have relied on the US for farming equipment since the first arrivals in the 1920s, as local supplies in Mexico were often so lacking that some colonies resorted to manufacturing their own equipment (Sawatzky, 1971, pp. 251-7).

Crossing the US border to buy farm machinery at auctions is a luxury that many non-Mennonites do not have. Acquiring a tourist visa to travel temporarily in the US is fairly easy for most Mexicans who live in northern states *and* who have good jobs or established families *and* are able to complete the paperwork. But it is not guaranteed. I met numerous Mexicans who had had visas revoked or denied for uncertain reasons. Others had run afoul of US Customs and Border Patrol or Immigration and Customs Enforcement in the past and were no longer eligible

for visas. Mennonites, on the other hand, are typically Canadian-Mexican dual citizens, a fact that makes it far easier for them to cross into the United States. Structural racism no doubt plays a role in this as well, as Mennonites do not fit the racialized stereotype of an illegal Mexican immigrant.

The third method that Mennonites use to acquire farm machinery is to buy it from used farm equipment dealers on the colonies, such as the one at Las Virginias. The dealer at Las Virginias will sell machinery to anyone, not just Mennonites. The difference is in the terms. Ejidatarios buy equipment in single cash payments or, if they have a good reputation, on credit at moderate interest rates. Mennonites, however, are often able to buy used equipment in multiple annual installments without any interest. The difference between paying on credit and paying in multiple installments function similarly at face value, but the latter can be significantly cheaper in the end. This is another instance where Mennonites receive a financial benefit for being recognized as Mennonite and from traveling in the same social circles as the people they deal with financially.

Agricultural Access Hurdle #3: Farm inputs

Like commodity farming everywhere, Mennonite farming was profoundly influenced by the Green Revolution. While Mennonites in Chihuahua in 1950 largely saved their own seed and used fertilizers and pesticides sparingly if at all (Sawatzky, 1971; interviews), farmers in Janos today buy the latest hybrid or genetically modified seeds, use a variety of synthetic fertilizers, and apply a suite of herbicides and pesticides that vary by crop and by year. Essentially all Mennonite farmers use at least one source of credit every year for acquiring seeds and other inputs, partly because one harvest season per year translates to highly irregular cash flows. Chapter 4 included a history of Mennonite credit use, which largely tells the story of how Mennonite farmers have historically paid for annual farm inputs. I will provide a recap below, with a particular focus on how social and cultural capital contribute to accessing these credit sources.

Mennonites have largely gone without formal credit for most of their history in Mexico (Sawatzky, 1971). This was due in part to principled avoidance of non-Mennonite financial institutions and in part to the fact that Mennonite colonists did not historically have fee title to their own land to use as collateral. Farmers typically saved seed from their own harvests to plant the following year, and saved money from crop sales in the fall to buy other inputs the following spring and summer. Limited cash inflows from daily milk sales¹⁸ might also be used to pay for farm chemicals or diesel fuel to run tractors and irrigation pumps. Cooperation among extended families was helpful in smoothing out any financial wrinkles associated with getting the crop to harvest.

¹⁸ Dairy cow ownership in Janos is relatively limited, as most farmers found the profits to be too slim to justify the daily labor. Instead, a few larger dairies had replaced the small, distributed herds of the past. According to Sawatzky (1971), most early Mennonite farmers in Mexico had both farm fields and a small herd of dairy cows, the milk from which went to a local cheesemaker. While milk sales from such small herds do not garner large sums, it does provide steady cash flow in an economy that otherwise sees nearly all of its earnings come in following the fall harvests.

Prior to 1992, when Mennonites in Janos did want operating credit, they typically went to informal sources: the hardware store on their colony or local loan sharks. Such credit sources came with high interest rates, however, and I heard complaints from former colony leaders that such informal loans too often led to default and low-grade social turmoil. Still, loans from the hardware stores were essential for some to grow their farms. In Janos, few Mennonites used BANRURAL for credit, though they were eligible to do so. The three farmers I interviewed on Colonia Las Virginias who had used BANRURAL for operating credit (3 years maximum) had no real complaints about BANRURAL, and they thought it was not more widely used primarily because most Mennonites simply did not like it.

The Mennonite-founded credit union UCACSA opened its doors in 1992 in the wake of national financial reforms that shunted government credit supports away from federal lenders like BANRURAL and toward intermediary lenders. UCACSA fundamentally changed the way Mennonites in Janos farmed, though it took about a decade for the changes to become widespread. UCACSA was the first formal lending institution that widely served Mennonites in Janos, and it did so at interest rates that were a fraction of what local loan sharks were charging. In theory, UCACSA is a credit union that is available for anyone to join. In practice, no one I interviewed had ever heard of a non-Mennonite getting a loan directly from UCACSA. UCACSA does not advertise in Janos, and the only way to learn about it would be through word of mouth. The employees speak Plautdietsch and are very used to lending to Mennonites who have a colony certificate but no fee title to their land. In other words, the preferred lender of operating credit in Janos today is a Mennonite institution in Cuauhtémoc that lends exclusively to Mennonites.

Having a reliable and affordable source of operating credit made it possible to purchase better seeds, more chemicals, and to start growing high-investment crops like chilies and onions. The use of top hybrid corn seed or GM cotton seed is only common because operating credit spreads out the payments. Chilies have to be purchased as seedlings and planted with manual labor, an enormous cost that few could bear without operating loans. The adoption of high investment, high profit farming by Janos Mennonites was largely launched by the availability of UCACSA operating credit.

In the 2000s, UCACSA began offering colonies in Janos lines of credit for purchasing agricultural goods. The system worked essentially as a cooperative. Credit from the federal financial agency Financiera Rural was passed through UCACSA to the colony, and thence on to individuals. As I was told by both the elected colony leader (*jefe de colonia*) and the fund's accountant at Colonia Las Virginias, the interest rates for borrowing from this colony cooperative were nearly the same as borrowing from UCACSA directly, with the advantage of being more convenient. The colony as an institution collected a small cut of the interest from these loans, which was used to pay for colony public works such as roads. Like UCACSA itself, credit from the colony cooperatives was not strictly limited to Mennonites but the level of trust required to gain access was such that I only met one ejidatario who had ever utilized it.

In the last decade, another source of operating credit has emerged: the cotton gins. The Mennonite-owned cotton gins in Colonia Buena Vista and Colonia Las Virginias, as well as the large Mexican-owned gin on the Janos-Casas Grandes road all offer cotton seeds and associated chemicals on credit to their members (the gins function partially as cooperatives). A cotton gin representative actually maintains an office in the hardware store in Colonia Las Virginias. While

limited in scope, this credit is important because of the high cost of the genetically modified (GM) cotton that is now ubiquitous in Janos. Like UCACSA or the colony cooperatives, the gins ostensibly loan to any members, not just Mennonites. In practice, none of the few ejidatarios I met who farm cotton get credit from the gins, only Mennonites do.

The common trait among sources of operating credit employed by Mennonites in Janos is that they are largely available only to Mennonites. This is a result of both social and cultural capital. Social capital is important because access to operating credit is based on trust, and trust is built in part through familiarity and recommendations. Farmers in Janos do not use private accountants and maintain few, if any, financial records. A loan officer cannot simply review a farm's books. It is relatively easy, however, for an account manager at UCACSA or a colony cooperative to call around the colony and find out information about a particular Mennonite's financial history. Such calls can be made in Plautdietsch, and it is common knowledge who the business leaders are. It would be far more difficult for an account manager to find out information about an ejidatario or a rancher, however, as those social circles are so disconnected that it would be difficult to know who to talk to for reliable information.

Embodied cultural capital is also important because of the very basic fact that, in general, Mennonites trust other Mennonites when it comes to farming and financial matters more than they trust outsiders. The stereotypes so prevalent in Janos are important here. The general opinion I heard of Mennonites in Janos is that they are stereotypically stingy, hardworking, honest, and knowledgeable about farming. Conversely, ranchers and Mennonites tended to describe ejidatarios as spendthrifts, lazy, slow to adopt new farming practices, and simply not as good at farming as Mennonites. I heard riffs on such stereotypes from ejidatarios and Mennonites alike. Despite the fact that I witnessed numerous counterexamples to these stereotypes, they still affect credit access. It is easier for a Mennonite to receive operating credit from UCACSA, a colony cooperative, or a cotton gin than it is for an ejidatario or other non-Mennonite.

Social Capital and its Lack on the Ejidos

Ejidatarios were at a material disadvantage in establishing profitable crop agriculture in Janos from their inception. The vast majority had been wage workers in towns or cities before being granted land rights in Janos, and they started with little relevant knowledge of irrigated farming and almost no financial capital or farming equipment. They also had surprisingly little social capital, considering that the very institution of the ejido requires assemblies, elections, group decision-making, and other governance procedures that should foster cooperation. Some of the governmental support for agriculture, such as irrigation wells, required group cooperation for each farmer to get the resources they needed for their own parcel. I did encounter examples of effective group cooperation around irrigation wells and around cattle management, where groups of 4-6 ejidatarios established processes to share costs and resources. On Pancho Villa, some such groups have operated for decades and have been able to share the cost to drill a new well when their old one went dry. The problem is that such examples were rare compared to the Mennonite colonies.

Had functional relationships that resulted in sharing farm equipment, irrigation water, and labor been more widespread, more ejidatarios might have been able to establish farms and

keep them running after BANRURAL stopped lending in the early 1990s. But this is speculation. The fact is that examples of cooperation between ejidatarios for the purpose of supporting crop agriculture were relatively rare, and that out-migration in search of better wage labor opportunities was the preferred option for improving household income. This was one arena where ejidatarios did extensively draw on their social capital: family and friends already in the US were instrumental in providing contacts, places to stay, and jobs to new arrivals from Janos, thus facilitating migration *al otro lado* ('to the other side' [of the border]).

Just as the ejidatarios who arrived on all but three of Janos' 14 ejidos generally had low levels of agricultural expertise, they also reported little connection to their fellow ejidatarios or to the land itself. Due to the way the ejidos were created (see Chapter 3), it was uncommon for ejidatarios to be granted land rights to the same ejido with either friends or extended family. Most showed up to Janos with their wives and children (if they had any; note that I did not hear of *any* founding female ejidatarias) and no other social connections. Because of their class status, ejidatarios tended to have very few social connections to wealthier individuals they could draw on for support. In other words, their social capital was low. This lack of social capital meant that cooperation among ejidatarios that might have fostered the establishment of social or agricultural institutions (an access regime) rarely occurred.

Failures in cooperation were evident in the first years of farming on Ejidos San Pedro and Pancho Villa, when government officials assisted with the formation of an agricultural cooperative on each ejido.¹⁹ The cooperatives shared labor and investment costs to establish irrigated farming with a small number (just one on San Pedro) of government-provided wells, and to share the profits. Both cooperatives were abandoned within a few years due to widespread dissatisfaction and inability to resolve internal conflicts. As one ejidatario put it: "With time you discover things like who works and who does not. I am not going to work so that others do not have to work" (Hruska et al., 2017, p. 73).

The lack of cooperation that led to the collapse of the cooperatives also made farming difficult for ejidatarios clustered around an individual well. As will be discussed in more detail below, farming plots were clustered around irrigation wells, meaning that 4-6 ejidatarios had to share the water from one well and were also put into a group for securing credit from BANRURAL to buy shared farm machinery. While many of the current farmers on Pancho Villa I met described relatively sanguine relations with their fellow well-mates at present, these cases seemed to exist in 2017 *because* of the good relations; groups with poor cooperation had long since broken up. Conflicts between members over water, machinery, and loan payments on that machinery drove many ejidatarios out of farming altogether. Of the ejidatarios I interviewed who were still profitably farming at scale (five of them), all of them had established their farming operations in cooperation with family members, either fathers or brothers.²⁰ Familial cooperation allowed pooling of multiple farming parcels while sharing equipment and labor costs, effectively increasing the scale of production while keeping down costs. Nearly all the instances I heard of where ejidatarios paid to either install or extend irrigation wells

¹⁹ Throughout Mexico, Such cooperatives were sometimes fostered by and sometimes actively undermined by government authorities, depending on the political regime and prevailing socialist or anti-socialist sentiment (Otero, 1999).

²⁰ Sons of ejidatarios sometimes acquired ejido land rights through redistribution of rights after large numbers of the original ejidatarios had been culled from the rosters because they abandoned their land.

involved cost-sharing between multiple partners. Had more ejidatarios developed successful mechanisms for this type of cooperation, there might well be more ejidatario-controlled farming in Janos. I provide two specific examples of this type of cooperation here, which were among the very few examples I encountered.

The family with the most land in Ejido San Pedro is the Martinez family. Gerardo and Rafael Martinez, brothers, started at San Pedro at the beginning, having petitioned for land while working in the mines near the town of Flores Magón (about 170 km southeast of Janos). The two brothers worked cooperatively to start their own farming operation, with Rafael working wage labor jobs in and near Janos while his brother worked on building up a small cattle herd and starting a farm. They pooled money to buy an old well drilling machine, which they used to drill two wells of their own. They then gave the machine to the ejido so others could drill wells, where it was instead promptly sold to Mennonites. The two brothers farmed around their own wells—with their neighboring ejidatarios—using BANRURAL until it collapsed, and then farmed without credit for several years. Rising costs eventually made such work financially impossible, and they have been renting their farm land to Mennonites ever since. In addition to the farms, Gerardo was able to buy up seven additional grazing parcels and a couple of the farming parcels surrounding his own by drawing on cash earned by his three sons, who had all moved to the US and found work. When one son—who had not previously been a rights-holding ejidatario—lost his US visa and decided to return to Janos full-time, he bought up several grazing parcels of his own and now manages the 80-cow herd that belongs to him and his dad. While the three Martinez households on San Pedro are far from wealthy, their cooperative efforts to establish land-based livelihoods have largely freed them of the need to find supplemental wage work.

The Gutiérrez family on Ejido Pancho Villa operates about 100 ha of irrigated farmland, on which they grow wheat, alfalfa, maize, sorghum, and beans. David, the man I interviewed, has been working land with his dad, Juan Manuel, since the 1990s. Juan Manuel started farming with BANRURAL, and then worked without credit for several years after BANRURAL quit. David worked in the US for 18 months during that time, and then came home to farm with his dad. Over time, they each bought additional farming parcels, eventually acquiring all but two of the parcels surrounding two government-drilled wells. Of the two parcels they do not own, one belongs to David's brother, who lives in the US and lets his dad and brother farm his land for free, and the other parcel is owned by an old man who does not use it but also will not sell it. David learned to drive a tractor-trailer and eventually bought one, taking hauling jobs when they are available and when money is tight, leaving his dad to tend the farm in his periodic absences. David does most of the hard work on the farm while his dad manages the finances. For operating credit, they were eventually able to get loans from a local Mennonite business, though it took years of inquiry to build up the trust necessary to do it the first time. They buy their machines from a used farm equipment dealer on Colonia Las Virginias, using dealer credit the first time and paying in cash afterwards. David told me that he and his dad have no plans to expand, in part because property values on the ejido have increased to the point where it no longer makes financial sense for them to buy it at market rate. When asked why he and his dad have done relatively well with farming compared to most ejidatarios, he replied "He who invests, collects" (*"El que le mete, le saca"*). The element he did not mention was that he and

his dad had an advantage just by joining their efforts together, allowing a division of labor and bringing in outside income while maintaining the farm.

The two examples above demonstrate that cooperation can play a strong supportive role in agriculture on the ejidos, as it does on the Mennonite colonies. Additionally, both examples suggest the utility in having start-up capital, something these two families were able to acquire that many others were not. Given the prevalence of off-farm wage work on the ejidos, however, the model of the Martinez family was certainly replicable for many other families with an interest in farming. That such cases are few and far between speaks both to the financial duress the ejidos operated under and to the preference of ejidatarios to pursue other livelihoods. The relative shortage of functioning well-based farming groups attests to the lack of social capital on the ejidos. While the ejidos did maintain requisite political structures enshrined in the ejido institution, those media of social interaction did not lead to widespread cooperation, though some instances did bloom. As the examples above and those presented in Sutherland and Burton (2011) demonstrate, pooling resources between two or three family members can make a huge difference. Had ejidatarios had more pre-existing relationships with one another when the ejidos were formed, as happened in some other parts of Mexico, such instances might have been far more common.

Conclusions

From the very founding of each of my four focal communities in Janos County, ejidatarios were at a disadvantage for establishing irrigated crop agriculture compared to Mennonites. Mennonites arrived in Janos with the material and economic resources to establish farms, even if only modest ones. Ejidatarios mostly arrived with only what could be carried. The Mennonites had a deep knowledge and experience with farming, held an agrarian lifestyle in very high esteem, and arrived with many pre-existing relationships and social institutions designed to facilitate colony operation. The Mennonites were also quite used to sticking together, being an ethnolinguistically distinct minority in Mexico that assiduously avoided assimilation for decades. The ejidatarios, in contrast, came from all over, did not generally know one another, and were mostly unfamiliar with the standard legal ejido governance system. Most of them came from working wage labor jobs in town and cities throughout Chihuahua and had little experience with farming, especially the mechanized and irrigated form that earns money in Janos. Creating viable farming communities out of the desert grassland was a difficult task for everyone in Janos, but especially so for ejidatarios.

Both Mennonites and ejidatarios arrived in Janos with their lands already essentially secured (though ejidatarios at Pancho Villa did have some run-ins with the former rancher in the early days); what they needed to get started was irrigation wells, farm machinery, and basic farm inputs (seeds, especially). Ejidatarios, having no economic resources of their own, were dependent on government services and credit, and in this they came up short in important ways. Neither Ejido Pancho Villa nor Ejido San Pedro received enough irrigation wells for every ejido to receive sufficient irrigation water for their farmland. Instead, groups were forced together to share wells and farm machinery, relying on BANRURAL for credit to secure the tractors, seeds, and fertilizers. Some groups were able to work together to share costs and resources and to intensify production over time, if only a little bit. More often, the groups fell

apart when BANRURAL quit offering credit in the early 1990s, or when wells ran dry. Those farmers who are still in operation – of which there are none in Ejido San Pedro who do not partner in some way with Mennonites – all farmed cooperatively with family members for at least most of their early years, and all started with access to a government-supplied irrigation well. Cooperation has proved to be a powerful advantage for maintaining profitable farms, but the basic capital to get started had to be provided to them.

The Mennonites had distinct material advantages over the ejidatarios when it came to establishing farms upon their arrival in Colonia Buenos Aires and Colonia Las Virginius. Namely, Mennonite colonists were selected by their ability to pay a down payment on land and to their conformity to general religious and lifestyle parameters of the group. Settlers arrived with sufficient economic resources to build modest houses, rent bulldozers to clear the land of shrubs and level it for farming, and to sink irrigation wells. A few wealthier colony members in each community quickly established grocery and hardware stores and issued limited informal credit. Mennonites were not reliant on government services or credit sources to build their communities and start farming the way that the ejidos were, and as such they lacked for less. As credit access for Mennonites improved starting in the 1990s, their economic advantages only increased.

Beyond their material advantages, the Mennonite's social and cultural capital fostered an access regime that both promoted agriculture as a virtuous and desirable livelihood and materially facilitated the establishment of farms. Start-up costs were reduced by purchasing used farm machinery at auctions in the US and by sharing expensive machinery between family members, a practice that Sutherland and Burton (2011) found to be rare among Scottish farmers despite strong economic incentives to do so. Traditions existed for saving seed (for maize, beans, wheat, and oats) to reduce or negate the need for operating capital, though buying seed became standard practice in the 1990s and 2000s once operating loans became more widely available through formal channels. An inherently higher level of intra- and intergroup trust for Mennonites allowed Mennonite farmers to pay for land, machinery, and irrigation wells in annual installments without the need for a bank loan or a lawyer-drafted contract (though sometimes seller/purchaser-written contracts were signed by a local notary public). Mennonites pooled resources to open cotton gins, cheese factories, bean sorters, and farm chemical suppliers, and they maintained and shared contacts to agricultural corporations that both purchased product and provided production credit. These connections translate to economic savings and resources that enable intensive farming in an otherwise difficult landscape.

The financial advantages of the Mennonites paired with their social institutions of cooperation and preference for working with other Mennonites has led to an agricultural ethnic hegemony in Janos and in other regions of Chihuahua. Mennonites own most of the cotton gins as well as dairies and cheese factories. They dominate international contracts for chilies, watermelons, and onions, among other crops. When land potentially suitable for crop farming or an unused well permit comes on the market anywhere near an existing colony, odds are good that a Mennonite will put in the highest offer. Mennonite colonies are prone to expansion for all these reasons, just as ejidos next to existing colonies are prone to sell or rent land to Mennonite farmers.

The fact that Mennonites are an ethnolinguistic minority in Chihuahua, and one that typically visibly stands out from the majority population, undoubtedly plays a role in colony social dynamics. Just as research on ethnic enclaves in the US finds that young adults and new arrivals are plugged into a very small number of industries disproportionately dominated by that ethnic minority, young Mennonites are steered toward agriculture by both cultural values and by economic opportunities. The narrow economic activity of many ethnic enclaves is limited by market size and competition. Mennonite agriculture is limited only by land and water availability, given that the most common crops they grow in Chihuahua are commodities with international markets that are practically impossible to saturate. The saturation of the New Mexico-based chili market in 2016 was talked about as a freak event, something farmers in Colonias Las Virginias and Buenos Aires had not seen in decades. The social institutions supporting young farmers and the seemingly endless market potential mean that young Mennonite men will continue to start new farms in and around Janos and other colonies in Chihuahua as long as there is flat land to farm and groundwater to irrigate it with.

The Mennonite access regime to agriculture provides benefits to early colonists, but the assets compound over time as a colony grows in population and infrastructure. In other words, as a colony grows, its ability to further expand increases, though the percentage of the population able to make new purchases may decline as property values soar. This pattern is due largely to socioeconomic hallmarks of capitalist agriculture described in the agrarian transformation literature, namely economic differentiation, intensification of production, and consolidation of landownership. As the colonies I studied aged, average parcel size and economic investment per hectare per year increased. These changes appear to expedite the conversion of rangeland to irrigated crops but with distinct impacts on social and cultural capital that may affect the long-term viability of these communities, to say nothing of limited groundwater. The process by which this evolution takes place will be detailed in the next chapter. There, I will explain how socioeconomic elements of agricultural production changed over time in Janos, and what that pattern means for the future of land use there and elsewhere in Chihuahua.

Chapter 6: Agricultural Expansion as an Evolving Process²¹

Over the course of 2017, the year that I was living in Janos and doing my fieldwork, I watched a gradual transformation of a section of landscape along the paved road between Ejido San Pedro, where I lived, and Colonia Las Virginias. As you drive out the north end of San Pedro, past the Mennonite pivots, and turn west onto the paved road, you first see the large center pivots of Rancho Salta de Ojos on the right hand side, followed by the 10,000 ha addition (*ampliación*) of Ejido Pancho Villa. Most of the addition is flat rangeland dominated by low-growing mesquite, though there are some recently established Mennonite fields in one corner. Just west of the addition, before reaching the edge of Las Virginias, there was formerly a large block of flat rangeland that belonged to the rancher who had sold the first 6,000 ha to form Colonia Las Virginias back in 1981. Throughout the long summer of 2017, Mennonite machines gradually worked to bulldoze the mesquite and push it into piles, where either local ejidatarios would collect it to sell to charcoal companies or else it would be burned in place. Well drilling machines then dotted the cleared area, rising above the horizon at irregular intervals out into the distance at the edge of sight. Giant graders smoothed out the lumpy ground to a level grade that would not hamper a center pivot's turn. Here was agricultural expansion in progress, and my assistant and I watched it proceed during our many trips up and down the Virginias road as if watching a slow-moving flip-book.

Agricultural expansion was still a very active process in 2017. The land reform brought ejidatarios and Mennonites to Janos County, and it was the land reform that drove the establishment of irrigated crops in what had been the middle of profitable cattle ranches. But the land reform was ended in 1992 by the constitutional amendments to Article 27, and with it all legal pressure on ranchers to divide or sell their lands and any direct state support of agrarian colonization. The neoliberal policy changes that occurred subsequently reduced state financial support for agriculture, especially for ejidatarios. The cost of many means of production (e.g. diesel, electricity for water pumps, fertilizer) has continued to rise ever since. Why is agricultural conversion still occurring 25 years after the end of land reform?

This chapter analyzes the expansion of irrigated agriculture in Janos as a historical, evolving process. Agricultural conversion there has not been a simple cause-effect phenomenon that can be neatly reduced to a single origin. Agriculture on the ejidos and colonies was first established by in-migrants from elsewhere in Chihuahua and even further afield, but in-migration is not an active force today and has not been for more than two decades. Since the 1990s, out-migration has been the more common theme. The fact that agriculture has expanded during times of influx and times of exodus strongly suggests that it has been driven by different dynamics at different times, and other evidence bears that out.

The argument I make for Janos, which can be applied to other cases of agricultural expansion, is that the forces that initiated expansion are very different from the forces that sustain it over time. Expansion can actually generate internal economic momentum that makes

²¹ Most of the content in this chapter was previously published in a slightly different format in: Hruska, T. (2020). Evolving patterns of agricultural frontier expansion in Mexico's Chihuahuan Desert: a political ecology approach. *Journal of Land Use Science*, 15(2-3), 270-289.

it more likely to continue until the conversion is halted either by a spatial barrier or some outside influence. Through aerial or satellite imagery, it is easy to present agricultural expansion as a simple before-after comparison, a juxtaposition of two fixed moments in time, and then to propose a simple explanation for how we got from Image A to Image B. But land conversion does not occur at discrete points in time, it is a continuous process, and that process changes over time. Common theories used to explain agricultural expansions tend to ignore such evolutions.

In Janos, the proliferation of irrigated farms was driven largely by the land reform, which directly and indirectly led to colonization by ejidatarios and Mennonites from beyond Janos County. State subsidies and ejido support programs helped to establish irrigated farming, though not as well as residents wanted or needed. In the 1990s, advances in agricultural technology and neoliberal policy shifts created economic opportunities particularly for Mennonite farmers, who began to expand their operations. Economic differentiation and land consolidation set in, forces that have been observed in capitalist agriculture for more than a century. Farming wealth led to farm growth, and wealthy Mennonites have been buying up whatever land they can access outside the original colonies. Increasing property values have spurred many ranchers to sell land suddenly worth more than can be earned through cattle sales. Now, expansion is only likely to stop when there are no more willing sellers or when some significant new force changes local farming economics, such as the drying of the Janos aquifer.

The rest of this chapter is organized as follows. First, I provide an introduction to land use/land change studies (LULCC) and the specific subfield of ‘agricultural frontiers.’ Through that literature, I present dominant theoretical perspectives on the drivers of agricultural frontier expansion. Much of this theoretical development emerged from research on the clearing of tropical forests for crop agriculture and has real shortcomings when extended to other types of land cover. I then present the empiric socioeconomic history of agricultural expansion in Janos from 1950 to 2017, focusing especially on patterns of landownership, farming practices, and livelihoods. I then discuss how the Janos case is representative of multiple theoretical explanations of agricultural expansion at different historic phases. Following that discussion, I present a short overview of findings from interviews I did in the La Oasis colonies of eastern Chihuahua, which demonstrate that the evolution of farming dynamics that occurred in Janos are common in other Mennonite farming areas. I conclude by describing where insights from Janos might help predict trajectories of agricultural expansion elsewhere.

Land Use/Land Cover Change and Agricultural Frontiers

Agricultural expansion has been a feature of human societies for ten thousand years, and was one of—along with genocide of indigenous communities—the most profound impacts of European colonialism on the rest of the world (Crosby, 1986). But concern over agricultural expansion has risen in recent decades due largely to concerns about conservation of native biomes. The rapid expansion and improvement of satellite imagery (such as by the US government’s Landsat Earth-imaging satellites, first launched in 1972, whose images are freely available to the public) and remote sensing software made the study of such land use changes

possible from anywhere. Analysis of land use/land cover change (LULCC) and agricultural expansion more specifically was being done long before such imaging was available, but measuring changes at large spatial scales or decadal timescales was at least difficult. Especially since the advent of personal computing and the internet, an explosion of scientific literature has emerged that analyzes LULCC over time, often to document anthropogenic environmental impacts (Turner et al., 2008; Turner & Robbins, 2008).

The literature on agricultural expansion is often framed around the notion of an ‘agricultural frontier.’ An agricultural frontier is an area where agricultural production is initiated for the first time, or else where it experiences significant upgrades in production technology or output intensity. The paradigmatic example from the US might be the westward march of Anglo agriculture across the grasslands of the Great Plains, sponsored by various editions of the Homestead Act and the extension of private railroads. Across Latin America, the bulk of recent literature on agricultural frontiers has looked at the expansion of farms and ranches into tropical forests (e.g., Barona, Ramankutty, Hyman, & Coomes, 2010; Brannstrom, 2009; Hecht, 1993; Jepson, 2006; Morton et al., 2006). The forest focus may reflect a conservation bias toward forests over other biomes (e.g., Overbeck et al., 2015), though it is also true that tropical forests were the source of most of Latin America’s agricultural expansion in the 1980s and 1990s (Baldi, Guerschman, & Paruelo, 2006; Gibbs et al., 2010; Hannah, Carr, & Lanckerani, 1995).

Less attention has been paid to the conversion of native rangeland to crops. While the conversion of grazed rangeland to crops has sometimes been labelled as mere ‘agricultural intensification’ (e.g., Piquer-Rodríguez et al., 2018), many scholars describe the transition as the expansion of an agricultural frontier (e.g. Brannstrom, 2009; Jepson, 2006; Spera, Galford, Coe, Madeco, & Mustard, 2016). The terminology may be context dependent. If, for example, Amazonian rainforest is cleared to create cattle pasture sown with African grasses (a common practice), it may not make sense to call the conversion of those cattle pastures to mechanized soy agriculture an example of agricultural frontier expansion; in that case, the establishment of cattle pastures in the first place was the more important marker of agricultural frontier expansion. I consider cattle-to-crops conversion to constitute an agricultural frontier when – as is true for my study area in Chihuahua – the land previously grazed was native rangeland and not cleared forest or sown pasture; the change entails altered land cover, production technology, ecological impacts, and increased output intensity (yield or value per hectare). The point of this definitional digression is not to call out Janos as an agricultural frontier but to situate the agricultural expansion that has been occurring in Janos with theoretical and empiric cases of its ilk.

Theorizing Agricultural Frontiers

The expansion of agricultural frontiers is often explained by one or a combination of two principle types of drivers: land rents or state interventions (Jepson, 2006; Jepson et al., 2010; Walker, 2004). It is well established, however, that LULCC cannot be reduced to a single causal driver and state action and land rent factors are both frequently involved (Lambin, Geist, & Lepers, 2003; Lambin et al., 2001). Less clear are the conditions under which each type of driver might be most significant. Problematically, both approaches often link national policies,

infrastructure development (especially transportation networks), and/or changing market conditions to LULCC while obscuring the people actually changing the landscape (Hersperger, Gennaio, Verburg, & Bürgi, 2010). This may well be due to methodological shortcomings of the remote sensing/GIS-based research approaches often used to study agricultural frontiers and other forms of LULCC (Turner, 2003). Identifying who wins and who loses in the process of LULCC, and why, is valuable for improving policy to achieve social and/or environmental outcomes but requires people-centered research methods.

Land-rent (or ‘bid-rent’) approaches to understanding agricultural frontiers draw on von Thünen’s model where land use and land valuation are determined largely by functional distance to markets (Walker, 2004; Walker et al., 2009). Von Thünen’s 1826 “Isolated State” conceptual model for land use, which predated automobiles and assumed high firewood needs, was based on a single urban center surrounded by concentric rings of land uses based on their required access to the urban market. In the model, job centers and housing would be within the urban core, then market gardens and dairies (to allow daily transport of milk and butter), managed forests (for timber and firewood), farm fields of grains and staples, and finally ranches for meat animals at the outer rim of the circle. The harder a good was to transport or more quickly it spoiled, the closer it had to be to the urban core and the more valuable the land where it was produced. But distance is actually just a proxy for transportation costs, and improving transportation works to decrease the functional distance between good and market. As the cost of transporting an agricultural product to market decreases—such as when a new road is built into an area formerly accessible only by horse or motorbike—the value of land where it was produced and the amount of money invested is expected to increase.

von Thünian land-rent theory is readily incorporated into LULCC models because measures of transportation distance and infrastructure are readily quantified (e.g. Walker, 2004; Walker et al., 2009; Weinhold & Reis, 2008). That said, land rent alone is typically seen as an insufficient explanation for LULCC in part because it occludes the political economics behind the infrastructure and commercial activities that shape von Thünian distances (Bockstael, 1996; Jepson, 2006; Walker, 2004). Transportation networks do not magically appear overnight; they are (usually) state projects reflecting years of policy work, budgeting, and use of tax revenue, and their location and construction are political projects.

State programs and policies are probably the most frequently cited category of LULCC drivers (Geist & Lambin, 2002; Lambin et al., 2001). Commonly cited drivers of expanding agricultural frontiers include: national policies promoting colonization of ‘underutilized’ land (e.g., Hall, 1989; Hecht, 1985), land titling programs (e.g., Gould, Carter, & Shrestha, 2006) and financial incentives to agricultural production such as commodity price supports, tax breaks, and subsidized credit or inputs (e.g., Heimlich, 1986; Pacheco, 2006). Such policies and programs have the explanatory advantage of being presumably temporally discreet and spatially uniform, helpful traits for generalization and extrapolation. But state programs and policies do not achieve homogeneous effects and thus require additional explanation to account for variable outcomes.

One common model of agricultural frontier expansion is for outward expansion to be driven by in-migration of farmers, thus creating—at least sometimes—a connection between increasing population and farming expansion. Colonization of formerly unoccupied or sparsely populated lands (excepting indigenous communities who may or may not have been previously

exterminated or forcibly relocated) is sometimes driven by state policies that serve as ‘pull’ factors – the provision of land rights, improved transportation, subsidized establishment costs, etcetera, that incentivize migration to the frontier. This type of colonization can be characterized as the ‘if you build it, they will come’ type. The establishment of ejidos in Janos and associated distribution of land rights and subsidies for establishing settlements is this type of colonization. But migration to an agricultural frontier can also be “spontaneous” (the term often used in the literature), driven not by state policy incentives but by various ‘push’ factors, such as war, poverty, or land shortage in the site of origin. Any decision to migrate is made in consideration of both ‘push’ and ‘pull’ factors, but the relative importance of the two forms varies by situation.

Numerous studies have documented cases where agricultural frontier expansion was driven initially by in-migration but continued subsequently due largely to expansion of existing farms. In one common pattern, state colonization policies and production supports drive a wave of migration that expands an agricultural frontier at a particular point in time, while in following years favorable (sometimes called ‘neoliberal’) market conditions foster capital investments that propel the growth of existing farms, pushing the frontier outward (e.g. Hecht, 2005; Jepson et al., 2010; Pacheco, 2006). In a second pattern, migration to a frontier may be “spontaneous,” while subsequent land titling and agrarian change propel capital investments, intensification, and expansion (e.g., Gould et al., 2006; Humphries, 1998; Southgate, 1990). The first pattern is initiated by explicit state activity that creates ‘pull’ factors, such as colonization programs. The second is initiated by varying push-pull factors other than explicit state activity, including land-rent factors like improvements to transportation networks not associated with colonization programs. In both patterns, colonization of new frontiers is performed by poor people looking for cheap land with which to create a livelihood, while subsequent intensification of production (generally capital investments to increase yields or produce higher value products) and consolidation of landholding is carried out by better capitalized individuals or firms. The fact that this evolution of production appears common regardless of what initiated expansion suggests a fundamental socioeconomic pattern to agricultural expansion.

Scholars of agrarian change have been documenting intensification of production and consolidation of landholding by commodity-producing farmers at least since Karl Kautsky’s and Vladimir Lenin’s pioneering work more than a century ago. A hallmark phenomenon of agrarian change is economic differentiation, wherein farmers who were economically homogenous begin to economically differentiate (e.g., Akram-Lodhi & Kay, 2010a; Bernstein, 2010). On one side of the spectrum are large-scale farmers who have invested profits in buying more land and intensifying production (increasing product or value generated per hectare) through higher-value crops and improved technology (e.g. hybrid seeds, specialized farm machinery, improved irrigation); at the other end are landless laborers who sold their farms due to economic shortfalls, a process sometimes called ‘dispossession by differentiation’ (Araghi, 2009). The process of agrarian change in capitalist farming is ubiquitous and may explain the two-stage frontier expansion described above, in that profitable farmers buy additional land to expand production beyond what was cleared during in-migration.

In cases where in-migrant farmers do differentiate over time, there is the question of what determines the trajectories—toward expansion or toward exit—of any given farmer. One possibility is simple path dependence based on wealth, where wealthier in-migrants are better

able to establish prosperous enterprises that increase their wealth, allowing them to buy out their less wealthy neighbors. This explanation is a difficult one to prove due to the need to record the experiences of people over long time periods and, at least in some cases, follow up with subjects after they move. One panel study of in-migrant farmers in the Amazon found strong though not invariable evidence of path dependence (Caviglia-Harris, Sills, & Mullan, 2013). Another study found that land consolidation was fairly widespread throughout three different agricultural colonial projects in the Amazon, though did not attempt to track the outcomes of individuals (Ludwigs, Brondízio, & Hetrick, 2009). Interestingly, this latter study found land consolidation occurring along opposite trends in land use intensity; two of their three study sites had seen small farming plots consolidated into large cattle grazing operations (less intensive production), while in the third site small, mostly un-mechanized farming plots were consolidated into large mechanized soya farms (more intensive production).

Intensification, another hallmark of agrarian change, has received widespread theorization and longstanding debate in reference to agricultural expansion. At large spatial scales, including globally, intensification of production (in this case largely defined by increasing yields per hectare) is thought to reduce or eliminate the pressure to expand the area in crops (Boserup, 1965; Byerlee, Stevenson, & Villoria, 2014). The idea there is that rising yields will raise total productivity, drive down prices, and reduce economic incentives to grow that crop elsewhere. Other scholars have pointed out, however, that this argument *only* holds at large spatial scales. At small spatial scales, increasing agricultural intensity can lead to greater profits, thus stimulating the further conversion of land to intensive agriculture (Byerlee et al., 2014). In efficiency terms, intensifying production increases the land efficiency (product per area) of agriculture. Resource and ecological economists, however, have widely noted the presences of 'Jevons' paradox' (Alcott, 2005) or 'the rebound effect' (e.g., Binswanger, 2001) in relation to resource efficiency, wherein increasing resource efficiency through improved technology can actually increase resource use, at least locally.

But converting land to intensive agriculture – a commercial enterprise – is a different and more complex endeavor than calculating how many miles one will drive based on the gas efficiency of one's car. If intensifying agriculture generates more profits, the accumulation of capital does more to facilitate agricultural expansion than simply provide motivation; it also provides improved access to the means of production necessary to bring new lands under cultivation.

Agricultural Frontiers in Mexico

In Mexico, the state played a strong role in expanding agricultural frontiers during the 20th century. The conversion of native forest to agriculture on the Yucatan Peninsula was driven largely by state colonization programs, including formation of ejidos, construction of roads, and funding of large-scale agricultural projects in the 1970s (Bray & Klepeis, 2005; Klepeis & Turner, 2001). More recently, direct agricultural subsidy payments have been positively correlated with agricultural expansion by ejidatarios (Schmook & Vance, 2009), but not by all landowners (Ellis et al., 2017). In Mexico's arid north, where agriculture is largely dependent on irrigation, expansion of high-intensity commodity agriculture prior to the 1970s was often driven by large-scale governmental irrigation schemes (Hicks, 1967; Lewis, 2002; Walsh, 2008; Whiteford et al.,

1998). Agricultural expansion outside of such irrigation projects is less predictable, sometimes driven by small incremental or government-subsidized improvements to land or irrigation (e.g., Doolittle, 1988), or privately funded development relying on groundwater irrigation (Scott & Shah, 2004), including by Mennonite communities (Pool et al., 2014; see also Ellis et al., 2017).

The important role that irrigation played in agricultural expansion in northern Mexico highlights the necessity of resources beyond land for establishing crops. A large body of literature highlights the role of land tenure in shaping land and resource management (e.g., Binswanger, Deininger, & Feder, 1995; Goldstein & Udry, 2008; Ostrom 1990; Schlager & Ostrom, 1992). Land tenure policy can be particularly important at a frontier, incentivizing land modification, consolidation, and investment (Alston, Libecap, & Schneider, 1996; Angelsen, 1999; Gould et al., 2006; Southgate, 1990). In order to benefit from land, however, users must also leverage social relations and other means of production, including labor, financial capital, and a method of delivering products to market. Ribot and Peluso (2003) termed the ability to derive benefits from land (or other things) *access*, which includes more than simple de jure or de facto ownership. People, organizations, and institutions interact to structure access to land in what are called 'access regimes' (Jepson et al., 2010), which may benefit some groups or individuals over others.

Three Phases of Agricultural Development in Janos County

Expansion of the agricultural frontier in Janos occurred continuously, but interviews revealed that the process of expansion can be described as three successive phases, each with different drivers. Each phase is typified by a different pattern of land ownership and technological and capital intensity of agricultural production. The phases are not distinct transitions between them were gradual and irregular; the time periods provided for each phase are approximations. Below, I present a summary of the phases (Table 6) followed by a historical overview of agricultural expansion in Janos County as a process that evolved over time.

Phase One – Land Reform and Migration, ~1955-1990

Agricultural expansion during this period was driven primarily by in-migration and the transfer of land from private ranches to both ejidos and Mennonite colonies. Land reform created four ejidos with areas designated for farming (and three more just for grazing) on rangeland expropriated from private ranches. Recipients of land rights to these ejidos had generally petitioned the government for land while working as wage laborers elsewhere in Chihuahua, and they typically arrived to County Janos with no farm equipment and little money. Threat of expropriation through land reform also motivated private ranchers to sell four separate parcels of land to groups of Mennonites from the Cuauhtémoc area for the purpose of establishing agricultural colonies. While colonies were purchased as single parcels from the rancher, individual households contributed money to 'buy' and farm their own plots of land within the colony. With the exception of 743 ha of farmland on the parcel purchased as Colonia Buenos Aires (Sawatzky, 1971, p. 174), all of what would become farmland on those initial four colonies and four farming ejidos was grassland with scattered shrubs, and had to be cleared and levelled for farming.

Table 6. The three phases of agricultural development in Janos County, Chihuahua. Transition from one phase to another was gradual and varied by exact location, so dates are approximate.

<u>Phase</u>	<u>Years</u> (Approx.)	<u>Ejido Trends</u>	<u>Mennonite Trends</u>	<u>Primary Drivers</u>	<u>Secondary Drivers</u>
<u>1.</u> Settlement by Smallholder Agriculture	1955 to 1990	Patchy settlement and establishment of farming with state support	Purchase and gradual settlement of farming colonies	Land reform paired with state agricultural supports	Land shortage in Cuauhtémoc (source of Mennonite in-migration)
<u>2.</u> Economic Differentiation	1990 to 2010	Widespread land sales and out-migration; consolidation of land ownership	Consolidation of land ownership; increased intensity of agricultural production	Changing agricultural credit access; reduced agricultural subsidies and price supports	NAFTA; introduction of new irrigation technology; drought (1992-2001)
<u>3.</u> Capitalist Agricultural Investment by Mennonites	2010 to present	Increasing ownership by Mennonites; replacement of ejidatarios by migrant farm workers	Continued consolidation; purchase of additional ranchland by small investor groups	Farmland shortage; von Thünian land rents	Mennonite population growth; economies of scale

In County Janos, with the exception of Ejido Janos, which benefited from the town within its periphery, it was rare for all listed ejidatarios of an ejido to actually live or practice agriculture on that ejido. A high percentage of initial land recipients never established residency at all, and either sold their land rights (illegal but generally accepted) or were stripped of their ejido membership in periodic expulsions of non-residents. San Pedro is exemplary: of the 103 initial land recipients, fewer than 30 participated in a farming cooperative using the ejido's first 2 wells, and even fewer farmed independently after the cooperative disbanded (it operated for only a few years) due to disagreements over rules and benefits. For those ejidatarios that did establish residence, raising cattle was cheaper to start than farming. Communal grazing land was fenced with government support, and cattle were either purchased or accepted as grazing fees for renting land to neighboring ranches. The government established a maximum 'sustainable' number of livestock allowed per ejido, which was then converted to livestock per ejidatario (e.g., 7 cows on San Pedro, 12 on Pancho Villa). Such numbers were The money that could be earned with cattle sales from one land right were too small to support an ejidatario household, requiring the purchase of additional grazing land rights or supplementation with wages or agriculture to make ends meet.

Farming on the ejidos has been limited by climate and lack of resources. Though farming parcels are large by ejido standards—10-20 ha—interviewees reported it challenging to grow a viable crop. With the exception of Monteverde, which received more rain due to its location, crop agriculture was unreliable without irrigation. Ejidos Janos and Casa de Janos received

limited surface irrigation from a small reservoir and the river, respectively, but irrigation elsewhere was with groundwater. The cost of drilling wells—currently \$30,000-50,000 USD—has been prohibitive for the vast majority of ejidatarios. Various government programs paid to install a small number of wells on San Pedro, Panch Villa, Monteverde, Ignacio Zaragoza, and Janos, mostly in the 1970s, but each well could only serve the fields of four to ten ejidatarios, meaning a majority of people did not benefit.

Those who did have wells for flood irrigation – as well as rain-fed farms on the comparatively well-watered Ejido Monteverde – were eligible for loans from BANRURAL for farm machinery and farm inputs. While many ejidatarios I interviewed on Ejido Panch Villa had farmed without irrigation and without BANRURAL support in the 1970s or 1980s, all but one gave up after a few years due to bad harvests. One man continued dry farming until 2012 despite declining harvests after 1992 but did not sell his crop harvests, using them instead to feed pigs for meat. Though ejidatarios did keep some crops for domestic use, production was generally for market and the most common crops – maize, beans, and sorghum – could be sold to CONASUPO at above-market prices. Many ejidatarios used animal-drawn plows in the early years but those were quickly replaced with tractors purchased through BANRURAL. Ejidatarios who did not have well access and thus could not farm made ends meet through wage labor or sometimes by buying/renting additional ejido grazing land to raise cattle, which was far cheaper than installing irrigation. Many others simply gave up and sold out to other ejidatarios or non-rights-holding ejido residents – such as the sons of ejidatarios, often trading cash for a simple hand-written sale contract before emigrating to the US or cities in Chihuahua. Formal recognition of these sales by ejido assemblies varied widely, one reason official records typically do not reflect real ejido membership.

The discrepancy between reality and the official records maintained by the Registro Agrario Nacional (National Agrarian Registry), whose office in Chihuahua (city) I had to visit on multiple occasions, can be surprising. My assistant and I made an official data request and paid to get the names of all current ejidatarios on both Ejido San Pedro and Poncho Villa, information they could only officially provide to my assistant and her Mexican citizenship. According to that official documentation, in 2017 San Pedro had 129 ejidatarios and Pancho Villa had 258. By their definition, as best as we could figure, an ejidatario was anyone who owned at least one grazing derecho or farming derecho (as discussed previously, these are often split). Even considering the number of half derechos out there, these numbers seemed exceptionally high based on what we knew. We took the Pancho Villa list to a well-respected former *Comisariado* who had lived on Pancho Villa nearly his whole life and went through the list together. Of the 258 names on the list, 87 were known to still own land, including 4 Mennonites living on Las Virginias; the others had emigrated or, in many instances, died. It was harder to get an accurate accounting at San Pedro because there have long been non-resident ejidatarios there, Mennonites own much more of the land (24 of the 129 names), and most of the ejido's official documents were burned up in a house fire many years ago. As best as we could figure based on ownership lists we assembled, there are probably less than 40 ejidatarios on San Pedro, compared to the official number of 129 from the Registro Agrario Nacional.

The first Mennonite colony in Janos was Buenos Aires, formed in 1958 when a group of Mennonites from Cuauhtémoc, Chihuahua bought the ~2,700 ha farm and ranch property from

a US citizen faced with possible occupation and expropriation. As is common for Mennonite colonies, a single church order in Cuauhtémoc organized interested households and collected down payments for small parcels, with the remainder of the purchase price secured with a bank loan. Initial purchasers/settlers only occupied a portion of the land, with the rest sold off in similarly sized parcels to subsequent settlers. Deed to the property was held by the colony, with internal documentation of who owned what land. This same process was repeated with Colonia El Cuervo (1979), Colonia Las Virginias (1981), and Colonia Buena Vista (1985), though in these cases the prior owners were Mexican or immigrant ranchers. The smaller Colonia El Berrendo (2005) was different, in that the sale was not organized through a single church and was purchased after being converted to farming, supposedly by a drug cartel.

Initially, Mennonite farm parcels ranged from 15-50 ha, depending largely on the wealth of the purchaser. Many settlers sold farmland in Cuauhtémoc at operational farmland prices and bought larger parcels in Janos at (lower) rangeland prices, bringing farm equipment with them. Settlers bought, rented, or hired bulldozers to clear and level land for flood irrigation. To install wells, many neighbors pooled finances to hire another Mennonite to drill a well at the juncture of their parcels and share the water; payments were often delayed to allow payment with subsequent farming profits. During this period, the most common crops were cotton, maize, beans, sorghum, and oats. Double cropping was not common, though oats or wheat were sometimes planted in the fall after harvesting maize, sorghum, or beans. Colonies collect taxes that were used to build/maintain dirt roads and, in the 1990s, to pay the requisite portion of installing electricity poles/lines.

Before the 1990s, the use of operating credit for farming was uncommon, and only a few Mennonites used BANRURAL loans to start farming. Instead, farmers relied on saving profits from each year's harvest to buy farm inputs the following year, often saving their own seed to reduce costs. Maize, beans, wheat, and sorghum were sold to CONASUPO, cotton to gins in Nuevo Casas Grandes (a much bigger town than Janos and the next town south), and milk and cheese through mostly local markets. Farm machinery was then, as now, usually purchased used in the US and trucked across the border, though young men usually start farming by borrowing machinery from family members until they can gradually buy their own with farm profits.

Phase 2: Economic Differentiation and the Neoliberal Turn, ~1990-2010

Four important changes occurred in the 1990s that spurred changes in landownership and agricultural production, leading to new forms of agricultural expansion. The first was the ending of BANRURAL, which largely eliminated credit access for ejidatarios. As a result, many ejidatarios were no longer able to afford the necessary inputs for farming, and some returned farm equipment purchased on BANRURAL credit. As an alternative credit source, a Mennonite credit union, UCACSA, opened up in Cuauhtémoc in 1994, offering operating and equipment credit to Mennonites with solid references all over Chihuahua.

Second, NAFTA was ratified in 1994, which, combined with the termination of CONASUPO and related domestic price supports, caused a decline in farm gate prices of maize and other staple crops across Mexico (Cornelius & Myhre, 1998b). NAFTA also allowed the ready sale of some high-value crops, especially chilies and onions but also melons and

cucumbers, to the US, making these lucrative, though volatile, crops for those with the capital to invest in the expensive plantings and manual labor (generally by migrant workers from southern and central Mexico). A significant share of chili production shifted from the border region in the US to northern Mexico during this period as more Mennonite farmers adopted the crop (see also Meyers, 2017).

Third, a decade-long drought started in 1992 (see also Ortega-Ochoa et al., 2008). The drought put an end to what little rainfed agriculture was still occurring on the ejidos, even on wetter Monteverde. The drought severely impacted forage production for livestock, forcing ejidatarios and ranchers alike to sell off mother cows at low prices.

Lastly, electricity came to Janos County in the early 1990s, paid for almost entirely by the government for ejidatarios, and with shared costs to the Mennonites. The real boon of electricity was for running water pumps and the newly arrived center pivot irrigation systems, as rising diesel prices (declining diesel subsidies) were making diesel pumps and flood irrigation unprofitable (center pivots are far more water efficient, requiring less water to be pumped). In addition to being cheaper to operate (after the initial purchase), center pivots also work better on sandy soils and by 2010 they had replaced flood as the dominant irrigation system in Janos County.

During this period, many ejidatarios who had been farming could no longer afford to do so, due to lack of credit, rising operating costs, and declining crop prices. Those who could no longer afford to farm frequently sold their land and emigrated, most often to the US. I interviewed many ejidatarios and Mennonites who had bought land from emigrating ejidatarios during the 1990s, usually with savings or by selling cattle. Sales were facilitated by policy changes enacted since the formal end of the land reform in 1992, namely amendments to Article 27 of the constitution and establishment of the PROCEDE program. With the exception of Ejido Janos (which includes the town of Janos and therefore jobs), the resident ejidatario population on all ejidos declined after this period. Many young people sought jobs in the US, often encouraged by their parents, because future prospects on the ejido appeared bleak. Mennonites from Buenos Aires also started buying land on neighboring ejidos, which was considerably cheaper than land within the colony. Mennonites bought both farmland and rangeland on ejidos, converting most of that rangeland to farming by clearing the land, drilling wells, and installing center pivots. Buenos Aires farmers bought land, and are technically ejidatarios, on four different ejidos, while Mennonites from Las Virginias own limited parcels on two more. Buyers were usually established farmers with significant annual profits and savings, though some young farmers get their start this way, often with family financial support. Loans are never used to buy land, though Mennonites often pay in up to five annual installments, which allows them to pay for land with profits earned from farming that land. For example, one interviewee on Buenos Aires bought his first 20 ha of farmland on Buenos Aires with earnings from working in the US for four years (legally). With farm profits, he went on to rent and then buy 110 ha in Buenos Aires, 100 ha in Ejido Janos, and then 50 ha in Ejido San Pedro, having to either extend or drill a new well on each property when he acquired it. When asked why the ejidatarios had first rented and then sold land to him, he shrugged and replied “Well, they don’t know how to farm.” Other Mennonites described buying land from ejidatarios who had family emergencies and no way to raise cash quickly except to sell their land rights.

For decades each of the first four Mennonite colonies had excess land, and any farmer successful enough to purchase extra parcels could do so, though there was some social pressure not to exceed 100 ha. Colonia Las Virginias, for example, did not sell off the last of its reserve land until about 2010. Rather than buy virgin rangeland, however, many successful farmers bought out their neighbor's farm instead; as state subsidies on farm inputs (e.g. diesel, electricity, fertilizer) declined, many owners of small farms sold out due to declining crop prices and rising production costs, frequently to seek wage work in Mennonite-dominated towns in Canada. The average farm size grew during this period as the smallest farms were absorbed into larger operations. While buying an existing Mennonite farm is more expensive than private rangeland or ejido land, it is also generally more conveniently accessible and requires less work to make it operational. When every piece of farm equipment needs to be driven between fields, having the fields close together can be worth a lot.

Phase 3 – Agricultural Investment and von Thünian Land Rents, ~2010-present

By now, crop agriculture on the ejidos generally takes one of three forms: low-investment, low-return fodder crops – namely alfalfa; farming by Mennonite renters or owners; and large-scale farming by a few ejidatario families who have bought up multiple farming parcels. Many *parcelas* designated for farming remain untilled rangeland or have been left fallow for years on end for lack of capital to put it into production. All crop farming at Ejido San Pedro, for example, is now conducted by Mennonite owners or renters. At Ejido Panch Villa, I interviewed three ejidatario families who each farmed at least 100 ha, having purchased numerous parcels from other ejidatarios. In all three cases, multiple family members (brothers or fathers and sons) had cooperated to acquire land and machinery, farm the land, and take outside wage labor jobs as needed to bring in extra income. One of these father-son teams had bought 96 ha of designated farmland within the last decade from a single family that had acquired adjacent derechos but no irrigation wells, and were thus simply grazing cattle on the land.

Few other ejidatario farmers on Pancho Villa owned more than a couple of parcels, with alfalfa as the most common crop. Alfalfa is the standard crop for ejidatarios with only one or a couple of derechos who lack the resources to invest in farm machinery and higher-value crops. Furthermore, it is not cost effective to buy farm machinery just to farm a derecho or two; in that setting, establishing equipment sharing agreements would make good sense but are challenging to negotiate because of the high degree of trust necessary to underwrite the lending of equipment so valuable (see also Sutherland & Burton, 2011). Instead of sharing, poor ejidatarios without their own equipment pay for services instead. For example, one older interviewee on Ejido Pancho Villa lives off the income from his 12 cows and 30 ha of alfalfa, which he – like many others – pays a Mennonite to cut and bale for him in exchange for about 22.5% of the harvested bales. He called alfalfa “a crop for lazy people,” but it provided a modest living with little investment and little labor, making it suitable for folks who were no longer physically capable of spending long hours in the fields.

Since 2010, the Mennonite colonies have continued to purchase more ejido land and have also expanded onto private ranches. Land sales are stimulated in part by von Thünian land rents; Mennonites pay significant price premiums for rangeland bordering existing Mennonite farms. Rangeland bought for grazing cattle might go for \$200-350 USD per ha, while rangeland

bought by Mennonites for farming goes for \$2,000-10,000 USD per ha, depending on existence of wells, roads, and electricity lines. As each new Mennonite field is brought into production, it is connected to a road (often dirt) and an irrigation well, and the well is connected to electricity, thus expanding the spread of agricultural infrastructure toward the next rangeland parcel to be converted. Ranchers and ejidatarios are motivated to sell farmland-adjacent parcels to Mennonites so as to capture what seems like windfall prices. For example, members of the Las Virginias Colony have recently begun to buy designated rangeland (*uso común*) on the addition (*ampliación*) of Ejido Panch Villa, close to the colony, and convert it to crops. By 2017 the addition had entered a positive feedback loop where expanding Mennonite crop fields drive up the price of remaining rangeland, inspiring more ejidatarios to sell.

Small groups of members from Las Virginias, Buenos Aires, and Buena Vista colonies have used farm profits to purchase blocks of rangeland adjacent to the colonies from neighboring ranchers and convert it to irrigated crops. In some cases, the buyers are resident Mennonites looking to expand their operations or buy land for their sons, generally by buying 50-100 ha parcels within the block. In at least one case, investment-motivated buyers purchased a block (several thousand hectares), installed wells, subdivided it into parcels, and sold off lots to other Mennonites at a profit. Other large parcels (e.g. 3,200 ha bordering Las Virginias) are owned by investors from Cuauhtémoc and/or Canada (some with profitable businesses, though I learned little about most of them), who hire local young Mennonites to prepare the land for farming and to run the farms.

The main changes in Mennonite farming during this phase were the increasing adoption of drip irrigation and the planting of pecan orchards. Both innovations require high up-front investment costs. The adoption of drip irrigation, which is the most water-efficient irrigation method available, is motivated by aquifer decline and superior performance for growing onions and chilies. Chili production has increased so much that, since 2016, Janos County farmers have been flooding the New Mexico-dominated market, with some buyers halting purchases halfway through the harvest. Pecans, on the other hand, are still relatively rare due to extremely high investment costs – the tree seedlings themselves, planting labor, costly irrigation systems, and maintenance for 5-7 years before the trees mature to produce a marketable crop. By my estimates from time in the field, there are still less than 500 ha of pecans in Janos County but the number is increasing. Pecan trees are more profitable, have higher start-up costs, and require more water per hectare than any other crop grown in the area. For a few farmers, they are a profitable investment.

Discussion

Much of the literature on agricultural frontiers in Latin America highlights the role of the state in initiating waves of expansion, and the case of Janos County fits this narrative. The Mexican state directly redistributed land from ranchers to ejidatarios and indirectly (unintentionally) precipitated the sale of ranch land to Mennonites through national land reform. Put simply, the land reform stimulated in-migration of would-be farmers to Janos County. Following settlement, the state also operated many agricultural support programs, especially for ejidatarios, that helped establish small-scale commercial agriculture on former ranches.

But the case of Janos County also demonstrates that state policies are not the only factors influencing land use and are insufficient to explain agricultural expansion. The communities in Janos that received the most state support, the ejidos, have had the least success with farming. Mennonites have been responsible for most of the agricultural expansion, and though they received little state support they also started with more private resources than did the ejidatarios. After the land reform and state support of agriculture diminished in the 1990s, agricultural expansion in Janos continued despite longstanding prohibitions on new irrigation wells and the legal ban on land conversion within the Janos Biosphere Reserve, established in 2009 (Hruska et al., 2017). This evidence suggests that state activities may be more important for driving internal migration and the establishment of agriculture in new regions than in facilitating agricultural expansion onto land adjacent to existing farms.

Similar to Janos, other research in Latin America has found cases where expansion of agricultural frontiers began with in-migration of settlers but continued due to internal economic factors (Gould et al., 2006; Hecht, 2005; Humphries, 1998; Jepson et al., 2010; Pacheco, 2006; Southgate, 1990). Because such studies do not focus on the process of this evolution, however, they do not identify how or why the changes occurred and can thus offer little predictive insight into other similar cases. The case of Janos suggests that this pattern of agricultural expansion is due largely to dynamics of agrarian change typical of capitalist agriculture anywhere, especially economic differentiation and expansion of the most profitable farms.

At their founding, each ejido and Mennonite colony in Janos County was relatively homogenous economically, though Mennonites were on average wealthier than ejidatarios. Economic differentiation within the communities led to intensification by profitable farmers, and land sales and out-migration by less profitable farmers, leading to consolidation of land ownership and outward expansion of existing farms. The acceleration of this process after Mexico's neoliberal policy reforms of the 1990s fits the global narrative of 'dispossession by differentiation' described by Araghi (2009). In this narrative, neoliberal trade and austerity policies initiated since 1973 limited state protections for small-scale farmers and reduced real crop prices, leading to 'depeasantization' and rural-to-urban migration throughout much of the world (see also Araghi 2000; Akram-Lodhi & Kay, 2010b). The sale of small farms and rangeland by both Mennonites and ejidatarios to the relatively few (<50) remaining Buenos Aires Colony farmers, for example, typifies this pattern in Janos County. In 1985, a stereotypical successful Mennonite farmer had 50 ha of cotton and maize on flood irrigation and saved their own seeds. Now the same farmer might have 300 ha of chilies, onions, genetically modified cotton, and hybrid maize watered with center pivots and drip irrigation, and hires 2-3 full-time employees plus seasonal migrant laborers. Similar, if less dramatic, changes have occurred on some ejidos.

Population expansion is one possible driver of agricultural expansion, as each new generation seeks virgin land on which to establish farms (Carr, 2009, 2004). Expansion driven in this way can either extend into the periphery surrounding existing farming areas or act as a push factor to inspire migration to find new agricultural frontiers in other areas. Lambin et al. (2001) label population increase as a driver of land conversion to be a popular "myth" or at least simplification, as there is no requirement for new generations or new arrivals to engage in land use/land cover change. Looking around the world, there is no simple correlation between population and, for example, rates of deforestation. The Janos case demonstrates how

population growth due to high birth rates has highly variable effects on land use depending on other factors, including traits specific to certain social groups. Among Mennonites, high birth rates do have some effect on local agricultural expansion as each generation brings more would-be farmers looking for new land. Among the ejidos, high birth rates were more than offset by high out-migration and adoption of wage labor as a primary livelihood.

The establishment of new Mennonite colonies on ranches not adjacent to other colonies is partly an artifact of infrequent ranch sales but it is also related to geographical differences in land values. Mennonites established the five colonies in Janos not because they specifically wanted to be in Janos but because land values in Cuauhtémoc and Canada were significantly higher, often prohibitively high for young families to establish themselves as farmers. High land values drove Mennonites to seek land elsewhere, and the land reform created motivated sellers out of ranchers who otherwise would have been highly reticent to subdivide their estates. Land prices around existing Mennonite colonies are so high in part because of the demand created by high population growth and the high cultural fidelity to crop farming. But those high land values are also elevated due to the profitable nature of Mennonite farming; expanding existing farms is typically a sound investment.

The Mennonites nicely demonstrate how intensification of production may not lead either to land conservation ('land sparing') nearby. There is an extensive literature on the question of land sparing, which is the idea that intensifying agricultural production in place can increase food supply and thus forestall expansion into undeveloped lands (e.g., Green, Cornell, Scharlemann, & Balmford, 2005; Rudel et al., 2009). Mennonite farming contradicts this theory, as intensification of production increases profits and enables individual farmers to invest in buying more land to convert to irrigated agriculture. As agricultural economists have shown, increasing production of a particular crop locally often does not significantly diminish crop prices to disincentivize further production – the markets are simply too big to saturate. A good example of this phenomenon came when I asked farmers in Janos or La Oasis (below) about the prices they received for cotton or maize – most simply told me to look up the current price on the Chicago Board of Trade or other US markets. The fact that farmers must rotate crops for soil health and pest reasons further reduces the likelihood that total production increases will decrease crop prices.

The case of Janos does confirm the notion of path dependence in agricultural differentiation and expansion, to a limited degree. I certainly did interview people who had successfully navigated rags-to-riches trajectories. The largest landowner on Ejido Pancho Villa – an ejidatario who still farms and runs cattle – was one example. Another was a Mennonite who had been a menial employee at the local hardware store for years, who was able to make money and acquire land largely through acting as a go-between for land purchases by wealthy Mennonites. Upward mobility is certainly possible. Without exception, however, the poor people I interviewed had started out poor; it is rare for someone to lose significant wealth and still remain in Janos – I never encountered such a person. Such people, if they exist, must have emigrated when their fortunes turned sour.

I have no data to suggest that the 'founder' effect – where early arrivals do better economically than later arrivals – holds in Janos, at least among Mennonites. Among both San Pedro and Pancho Villa, early arrivals did often have slightly more success farming because they were more likely to have access to a government-installed well for irrigation. Among

Mennonites, the wealth/arrival date relationship is inverted but the cause is completely different. Founders of Mennonite colonies are generally relatively poor and buy relatively small parcels, while later arrivals on and adjacent to the original colony are typically investors with significant capital stocks. Late arrivals to the Mennonite colonies are thus not wealthier because there is an advantage to arriving later, they are wealthier because they started with more money and resources and were able to make substantial investments. This point was made particularly clear when my assistant and I made a fieldtrip to eastern Chihuahua to visit a different set of Mennonite colonies there.

The Sweat-Drenched Pioneer and the Well-Heeled Investor: Modern Mennonite colony establishment

I asked all of my interviewees in Janos about the future of groundwater. Two of my Mennonite interviewees mentioned a set of colonies near Ojinaga in eastern Chihuahua where the groundwater had run out, which they referred to as La Oasis. At the very end of my field season in Mexico my assistant and I drove over there to investigate. Given the rapid decline of the Janos aquifer, I wanted to learn what happened to farmland once irrigation was no longer viable, and what happened to a colony that had lost its lifeblood. The reality of the situation did not really answer these questions for me but it did reveal the extent of economic differentiation in contemporary Mennonite farming development far more starkly than did Janos. Farming at La Oasis started far later than in Janos – in the late 1990s, after the land reform had already ended – and the patterns of landownership were far closer to Vladimir Lenin’s conception of a purely capitalist agriculture than were the Janos colonies.

The farming area we visited was not technically a single colony but a set of adjacent colonies—what I will call a ‘cluster’, each one purchased as a single block at a different time and by a different buyer. La Oasis was the name of the first colony, and so the name is sometimes applied to the whole cluster. Each of the colonies had previously been a ranch or part of a ranch, mostly in the 4,000-8,000 ha range. The landscape was significantly more arid than Janos, with none of the montane precipitation or cooling, and almost pool-table flat. The colonies were located in what appeared to be the middle of nowhere, more than a half-hour from any town and about an hour from the Texas border. A two-lane highway ran through the northern end of the colony, and disappeared into the horizon in both directions unburdened by signs of habitation or commerce.

The setting is important in the context of how the cluster began. The first colony was founded in 1996 by 12 arriving families. More families arrived in subsequent years. A single church order tried to restrict colonists to its own members but some members of other orders slipped in. Most of the colonists were from Cuauhtémoc but some came from Canada. One man I interviewed, who I’ll call George, arrived with his wife in 1997. He was born and raised in Cuauhtémoc but had been living in Canada for the previous ten years working as the sole permanent employee of a Mennonite farmer with several thousand acres of fields. In 1997 he bought 100 ha of rangeland on the new colony for 26,000 USD, moved down, built a house, and sunk an irrigation well to 380 feet with good water. For a while, everything looked rosy. Then the water started giving out.

By around 2006, the water table was dropping 40 feet per year. George dug three more wells over the next five years, including one down to 1,200 feet, but even with all of them connected together could not get enough water to irrigate more than half his land. So in 2015 he sold his field and three of the wells for 500,000 USD, down from its peak value of 1,500,000 when it had sufficient water. He used the profits to build a small motel and washed his hands of farming. George's situation was not unique. There was a large swath of the northern end of the colony where groundwater had largely run out and where the subsidence was so fast and so severe that they have to fix the roads that cross it every year or two. In one spot, we drove over "the crack" on one of the main roads, where colonists had built up a ramp of pavement almost a meter tall to connect the low side to the high side. Most of the farmers whose land had gone dry had purchased land elsewhere in the cluster where there was still water, but others had left the region entirely. One colony had so little water to start with that it was never even fully cleared of mesquite; it was largely abandoned shortly after it began. Uncultivated fields are sometimes grazed with sheep or cattle, but the colonists have not adopted livestock as a serious business.

The most common strategy when water starts running short is to reduce acreage and/or switch to more water efficient crops, such as sorghum, beans, or watermelons (watermelons are often sold to the US but have unpredictable price swings, though not as volatile as onions). Another strategy is to switch to higher value crops. For those with the resources and the ability to defer revenue for 5-7 years, planting pecans in fields with limited water can be a winning strategy. Pecans require more water than any other crop but are so much more profitable per hectare that it can still make financial sense to establish a very small pecan orchard rather than a medium sized field of beans or sorghum.

The most interesting aspect of the La Oasis visit for me was not the water issues but the landownership pattern. Early colonists in La Oasis and the other early colonies were similar to the colonists in Janos – they bought 50 or 100 ha of rangeland and worked hard to put it into production. The more recent "colonies" are of a different sort, however. Rather than individual families each buying a single field, they were purchased by small groups of wealthy buyers, each acquiring several hundred to more than a thousand hectares. Sometimes the buyers were farmers that had made money in other colonies in the La Oasis cluster – similar to what is happening in El Cuervo and Buena Vista colonies in Janos, for example. In other cases the buyers live in Cuauhtémoc and farm remotely, either by paying young men to convert the land and farm for them, or else by leasing the fields to local farmers. One single buyer from Cuauhtémoc had purchased a 4,000 ha "colony" by himself and was farming it remotely, including planting large fields of pecans – an investment of many millions of dollars.

The temporal pattern of land acquisitions in Janos was even more prominent in the La Oasis cluster. In about 20 years Mennonites from Cuauhtémoc and Canada had purchased over 100,000 ha of contiguous land, of which about half was in crops in 2017 according to maps produced by one of my interviewees (the only legitimately tech-savvy Mennonite I met, who made GIS and remote sensing-based maps for colonies all over Mexico). Early colonists were relatively poor and had moved to La Oasis as an opportunity to start a new life of farming there. Some of those colonists did well for themselves and were able to expand their operations by buying land in new colonies nearby. After those initial colonies had been established, after roads and powerlines had been extended out from the highway, and after a sizeable pool of

skilled farm labor had built up (mostly the grown sons of early colonists), wealthy buyers moved in and bought large parcels for remote farming, not as a lifestyle but as a financial investment. The money pouring into these colony clusters helps to explain why George was able to buy 100 ha of land for 26,000 USD and sell it 15 years later *with virtually no irrigation water* for 500,000 USD. The dramatic spike in land prices also explains why ranchers keep selling land to Mennonites around existing colonies, and why many young men have to work for a wealthy land baron rather than start their own farm.

Several of my interviewees in the La Oasis complex described exactly the same dynamics in newer colonies in South America. Compared to the Mennonites I interviewed in Janos, Mennonites I interviewed in La Oasis were relatively well travelled, used more technology, and had more contacts with friends and family in colonies in Colombia, Brazil, and elsewhere. The dynamics I describe above regarding land ownership, consolidation, and investment in La Oasis were described to be the same for colonies in Colombia and elsewhere in South America. Colonies are started by churches and initially populated by family farmers looking to buy land for the first time or to expand beyond the small amount they have in Chihuahua or Canada. The founding households work to establish a Mennonite presence and develop the contacts necessary for supplying their farms and selling crops, and also coordinate the construction of roads and power lines. Once a colony is up and running, it often becomes a target for investment by wealthy investors, who buy up parcels adjacent to the existing colony and conduct enough infrastructure improvements either to subdivide and sell the property at a profit or to farm it remotely by hiring local young Mennonites.

Conclusions

Expansion of crop agriculture into Janos County was initially promoted by state programs supporting migration and agricultural development, especially the land reform. But expansion continues decades after those programs were terminated even in the face of conservation policies designed to halt it (Hruska et al., 2017). The case of Janos County demonstrates that state action is important—though not necessarily required—for initiating expansion at an agricultural frontier. Once expansion is underway, however, it can continue under its own economic momentum given suitable conditions. In Janos, agriculture now appears likely to continue expansion until groundwater becomes either too costly or too scarce, which nearly all interviewees agreed will happen eventually. The investment in land in South America by a few Mennonite interviewees in Janos was explained, in part, as a reasonable hedge against future water shortages. It was also the standard response to my questions about what would happen if, or more likely when, groundwater depletion makes farming unprofitable.

Agricultural expansion, like many other forms of LULCC, entails significant social, economic, and environmental effects and its drivers are common subjects of study. No universal drivers have been found, and in fact multiple drivers are usually involved (Lambin et al., 2001, 2003). What is less credited, however, is that the drivers change over time. Any study that claims to have identified why agricultural expansion began may offer very little insight on why it is still ongoing decades later, and vice versa. State programs supporting land transfer, migration, and agricultural establishment were important drivers only in the first stage of expansion in Janos. Subsequently, economic differentiation of farmers and von Thüonian land

rent factors drove further land sales and LULCC. Differentiation creates an investor class of farmers who can afford to buy rangeland for conversion to irrigated farming, furthering agricultural expansion. These findings demonstrate the role that agrarian change can play in expanding agricultural frontiers.

I do not intend to claim that economic differentiation and land consolidation are universal forces for agricultural expansion, however. Agriculture is not always market-oriented, for example. In cases where agricultural colonists do not sell harvests or generate profits – which has often been true after land reforms in Mexico and elsewhere (e.g. Chimhowu & Hulme, 2006; McCusker, 2004) – agriculture may be abandoned rather than expanded. It is also possible to have consolidation of landownership without intensification of production, as in cases of small colonist farmers selling out to cattle operations (Humphries, 1998; Ludwigs, Brondízio, & Hetrick, 2009). While land consolidation in agriculture is a very common phenomenon, it is not necessarily tied to any particular production strategy, strategies which depend on local economic, environmental, and social factors. Where agricultural expansion does occur, it is important to examine local microeconomics and to differentiate between LULCC conducted by in-migrants from that by existing residents.

Economic differentiation of farmers and associated intensification/expansion of successful farms have important consequences for landownership and resource use and may affect social groups differently, exacerbating economic inequalities. The land reform gave ejidatarios land rights but not the resources necessary to establish self-sustaining intensive farms. Mennonites in Janos County benefited from better economic starting conditions than ejidatarios but also Mennonite institutions and social networks that facilitated access to credit, farm machinery, and agricultural services such as cotton gins and chili contracts. Mennonite farmers were also motivated to acquire large farms (sometimes >300 ha) so that they could pass on farmland to each son. The few large ejidatario farmers, in contrast, encouraged their children to pursue education and non-agricultural livelihoods, limiting motivation to acquire land.

Agricultural expansion in Janos occurred simultaneously with intensification of production. The more successful farmers in Janos were making investments in farm machinery, irrigation technology, crop inputs, and migrant labor to increase the profits extracted from every hectare of farmland. That intensification did not lead to shrinking farms, however. Not one farmer I interviewed responded to increasing monetary returns by reducing the size of their operation proportionally. Instead, the opposite happens: farmers make investments that boost yields and produce higher-value crops, and the generated profits are reinvested in acquiring more land, increasing yields, and adopting ever-more profitable crops. Intensification is thus not “land sparing” in these cases, it merely funds ongoing expansion and consolidation.

Chapter 7: Conclusions

The Historical Arc of Land Ownership and Land Use in Janos

Janos County is being transformed. The perennial grasses and shrubs that historically dominated this section of the Chihuahuan Desert are gradually being replaced by verdant fields of chilies, onions, maize, and genetically-modified (GM) cotton. The bawling of cattle and the calls of migratory songbirds are increasingly washed out by the low drone of center pivot engines slowly circulating the long boom arms over perfectly round crop fields. In the 1970s, horses were still the dominant form of transport. Now pickup trucks and heavy diesel farm machinery are visible all over, and a bright yellow airplane occasionally crisscrosses overhead, spraying crop fields with pesticides. The hum of activity has generated new wealth in the irrigable flatlands, and home construction is shifting from locally pressed adobe brick to mass produced cinderblock and sheetrock. The crosshatched steel columns of well drilling machines breaking the horizon are a common sight. Deep underground, the aquifer is declining every year, little by little. The expanding fields and growing wealth may be temporary booms and no one knows how much longer the development can continue.

At time of writing, a century has passed since the end of the Mexican Revolution. Northern Chihuahua was one of the first hot spots of the Revolution, and a number of Pancho Villa's officers grew up in Janos (Lloyd, 1998). Janos, like the rest of northern Chihuahua at the time, was dominated by vast cattle ranches, many of which were owned by American citizens. Elites used favorable land laws and survey crews to annex communal lands into private estates, leaving Mexican smallholders and commons users with little land to farm or graze livestock. Such were the conditions that set the stage for the Revolution and the national land reform that followed.

One hundred years after the Revolution, ranch sizes are much reduced and tens of thousands of hectares of rangeland have been converted to irrigated crops. The number of landowners has swelled, thanks to the land reform. Some of the owners are Mexican ejidatarios, children of landless peasants who came to Janos to claim land rights offered by the government as part of a national effort to reestablish communal smallholder agriculture. The ejidos are a significant part of the land tenure pattern in Janos County, accounting for about one-third of the land base. They account for only a relatively small share of the recent agricultural expansion, however, as most ejido land is used for extensive cattle grazing. Private ranches continue to compose the majority of the land area of the county but each operation is, on average, much smaller than a century ago.

The national land reform that emerged from the Revolution achieved many of its goals in Janos County. The very large ranches owned by US and, in one case, British citizens during the Revolution were subdivided and are now a hodgepodge of ejidos and private ranches under mostly Mexican ownership. "Mostly," because, while foreign landownership is still legally constrained near the border, there are a few ranches that are *de facto* owned by dual citizens or US citizens with Mexican residency, and three ranches totaling more than 50,000 ha for which the majority owner is a US corporation. In addition to the subdivision of ranches, Janos County is now home to thousands of agrarian households on both ejido and private land. To the

degree that the Revolution was fought for land distribution and agricultural access, the demographic change in the county is a further indication that the land reform accomplished a great deal.

But it did not work completely as planned. As other scholars of land reform have found in Latin America and elsewhere (e.g., Borras, 2010; de Janvry, 1981; de Janvry, Patteau, Gordillo, & Sadoulet, 2001; Kay, 2015), land reforms are never as complete or as successful at redistributing sustainable wealth as they are intended. In Janos County, the majority of those who received land rights on the ejidos did not live out their lives on those ejidos; many abandoned their land shortly after arriving, and many others moved away or emigrated to the US in the 1990s, when government supports for ejido agriculture declined precipitously and labor demands in the US were on the rise. Like most other parts of Mexico, small scale agriculture is still practiced on the ejidos but it has not been the predominant livelihood there; wage labor is what has kept the ejidos afloat.

Unlike much of Mexico, the ejidos in Janos County were not established as part of land restitution, with the exception of Ejido Janos. Elsewhere, ejidos were created to officially grant land rights to people who had already been living on or working the land, either as long-time agrarian communities or as plantation workers. Ejido Janos was established by an 18th century Spanish land grant, and its restoration in 1924 was the first act of land reform in Janos County. Excepting Ejido Janos and possibly Ejido Casa de Janos, however, the other ejidos in Janos County were created essentially out of thin air, and the founding ejidatarios moved onto the land without any long-term connection to it or established land use on it. That lack of long-term connection goes a long way toward explaining why land abandonment and land sales were so much more common among ejidatarios in Janos than elsewhere.

Economically speaking, the real beneficiaries of the land reform in Janos are part of a demographic that did not even exist in Mexico during the Revolution: the Mennonites. Mennonites brought with them from Canada capital, expertise, and culturally enshrined social practices and institutions that have continued to nurture Mennonite agriculture to this day. In the 1920s, Mennonites from Canada bought land in Chihuahua that might otherwise have been distributed as ejidos. Given the economic ruin the Revolution had wrought on northern Mexico, the federal government was apparently eager to receive a new population of farmers with a reputation for solid commercial output and no political participation. The manner by which Mennonite communities settled and established agrarian economies outside Cuauhtémoc in the 1920s foreshadowed the same process when new Mennonite colonies arrived to Janos decades later.

It was primarily land shortages and high property values in and around Cuauhtémoc that drove Mennonites to buy land and migrate to Janos County, circumstances that were caused by the population increase and gradual outward expansion of Mennonite farming communities. With functionally no conversion pressure in Janos, ranchland prices were still based on cattle economics, not the intensified production economies of Mennonite farms. Mennonites first bought land in Janos County under nearly identical circumstances to those under which their forebears had first purchased land in Cuauhtémoc – ranchers who were afraid of having land expropriated through the land reform chose instead to sell to groups of Mennonites who cooperated to buy land through one simple transaction. Mennonites were able to secure bank loans to buy land as a single legal parcel, and then informally subdivide it among individual

households for agricultural use. The same practice is still occurring in Janos today, as groups of wealthy Mennonites cooperate to buy large blocks of land near existing colonies. The periodic migration of large numbers of Mennonites from one country to another, or even one section of Chihuahua to another, bears more than a little resemblance to the mobile capital of transnational corporations. Households with resources pick up and move from a more developed area with high property values to a less developed area with low property values. Some households are able to increase their land holdings in the process by selling existing farmland in the former and buying rangeland in the latter. Others use savings from working wage jobs in areas with relatively high wages to buy cheap land and establish farms. These are options that ejidatarios – as poor and landless people by requirement – did not have access to. Even today Mennonites move back and forth between Mexico and Canada or, less often, the US. Wages earned and saved in Canada are invested in land and farm equipment in Mexico. While remittances are rare, currency is still flowing across the border.

After the founding of the original four Mennonite colonies in Janos, it took more than a decade to build up a demand for additional land outside the colony boundaries. At first, each of the colonies had extra land that was not owned or farmed by the original colonists, allowing for gradual in-migration and internal population growth. Eventually, however, the colonies put all of their land into commercial production, either as crop fields, infrastructure, or limited grazing areas for dairy cows. Once the surplus land was fully allocated, Mennonites began to look for additional farmland off-colony.

The land reform paved the way for off-colony expansion even after the government stopped expropriating and redistributing land in 1992. Mennonites were able to buy individual parcels from ejidatarios who either needed cash quickly or were looking to leave the area permanently. More recently, groups of Mennonites were also able to buy, or in three cases sharecrop, large blocks of land from ranch owners who were no longer making enough money from the ranch to justify keeping it. Just as Eric Perramond found in northern Sonora (2010), no ranch owners in Janos live on the ranch full-time; their daily lives are largely oriented elsewhere. This is especially true for heirs of old land barons who inherited small portions of an old family estate that had been subdivided as a way to stave off government expropriation. Ranch ownership today is less lucrative than it used to be due to changes in the beef commodity chain, reduced average forage availability per hectare due to climate change, and because the land reform shrank the average ranch size. A sizeable cash offer from a group of Mennonites is a windfall opportunity for a ranch owner living in Nuevo Casas Grandes, Chihuahua (city), or Ciudad Juarez to launch a more lucrative business enterprise closer to home.

The Mennonite purchase of ranch parcels in Janos County today conducted under a different set of dynamics than now than when the first four colonies were established. The settlers of the first four colonies I interviewed had sold expensive land in the Cuauhtémoc area and bought cheap land in Janos; migrants were basically cashing out of one place to make a new investment elsewhere. The buyers of ranch parcels today are rarely migrating in from somewhere else, and they did not sell other assets to acquire the new ones. Instead, farmers with saved farm profits buy additional lands to expand their current farming operations or buy land for their sons to start their own farms. In some other cases, young men use money saved from wage labor either in Janos or in Canada to start their farms. While the sale of land largely

funded agricultural expansion in the original four colonies, it is now the sale of agricultural commodities or labor that pays for expansion.

The land reform in Janos County started with the restitution of Ejido Janos in 1924 and ended with the formation of three contiguous, nearly uninhabited ejidos not far from the US border in the final weeks of the land reform, in 1992. Over two hundred thousand hectares were transferred from large ranches to thousands of different owners. Ejidatarios received land directly through the land reform, while Mennonites took advantage of opportunities created by the land reform to buy their way into the county. But after seventy years of land redistribution, new processes of land consolidation began nearly as soon as the land reform ended.

Direct state intervention in land tenure and landownership through the land reform drove the division of large landholdings and associated influx of smallholders that occurred in Janos County from the 1920s through the early 1990s. The shift toward consolidation of landownership, particularly of small grazing and farming parcels, was driven by changes in local economics, changes that were in turn related to liberalizing state policy. State action had directly and indirectly created a huge class of relatively small farms on ejidos and Mennonite colonies, and state subsidies and agricultural support programs helped to keep many of those small farms alive, if not exactly thriving. When those subsidies and support programs ended, the engines of economic differentiation and land consolidation roared to life. Small and poorly capitalized agricultural operations sold out, and larger and better capitalized operations got bigger.

The patterns through which irrigated agriculture proliferated in Janos County reveal the power of capital in agriculture. The form of mechanized commodity agriculture practiced in Janos is enormously expensive, in no small part to the necessity of irrigation and the very high costs associated with securing irrigation. BANRURAL and other forms of state support enabled some ejidatarios to start farms but very rarely enabled sufficient investment to generate the kind of farm profits that would foster truly capitalist agriculture. Ejidatarios mostly just farmed and raised cattle as a form of 'commodification of subsistence', where agricultural profits were used for domestic reproduction rather than reinvestment and expansion. In this sense, Janos is a cautionary tale for any policy maker hoping to jumpstart a thriving domestic agricultural sector through land reform and subsidies; giving away land is not sufficient if the recipients cannot afford the other means of production.

Mennonites, on the other hand, *could* afford the other means of production. Prior to the neoliberal policy reforms of the 1990s, Mennonites were able to establish profitable commodity farms in Janos but with relatively low capital expenditures and revenues compared to today, and the farmers were small by today's standard. Mennonite farmers in 1980 largely grew relatively low-cost crops, saved their own seed, and met the vast majority of their labor needs without hiring additional help; they also drove horse-drawn buggies, built their own houses out of local adobe bricks, and had no electricity. Twenty-five years later, those same farmers were growing specialty crops from improved seed for the export market, hiring seasonal migrant labor and semi-permanent local helpers to meet their labor needs, using large annual operating loans, driving pickup trucks, and building new houses and warehouses out of concrete and steel. The new form of agriculture came with higher costs and higher profits. The higher costs sunk some farmers, and while the higher profits enabled others to expand by

buying out their neighbors and investing in new lands off-colony, pushing out the agricultural frontier.

The Mennonite Access Regime to Commodity Agriculture

Mennonite colonies in Janos operate as ethnic enclaves, separated from the majority Mexican population by language, ethnicity, dress, religion, and a host of social norms. Fostered within these inward-facing enclaves are social institutions that promote agricultural expansion and help young Mennonite men establish farms. Mennonite formal and informal financing institutions provide agricultural credit and cost-deferral mechanisms that facilitate access to irrigation water, farm machinery, and annual operating credit. These institutions are part of an access regime that enables more people to access intensive, commercial agriculture, and which is largely off-limits to non-Mennonites. Had Mennonites arriving to Janos not already had some financial and material resources, these institutions might not have been sufficient to establish viable farming colonies. As it was, colonists were able to build their own financial resources locally as well as tap into regional resources that accelerated their operational growth.

Mennonites on colonies benefit from a large stocks of social and cultural capital that mediate economic benefits. Colonies act in some respects like incorporated towns: they organize planning and infrastructure projects, levy minor taxes, maintain an elected leadership, and have their own churches and businesses. Colonists engage with each other in numerous social and governance functions on a regular basis. Such practices are not merely the result of convenience or necessity borne of isolation but instead are cultivated as “the maintenance of a range of cultural practices that are valued for their meaningfulness” (Bebbington, 1999, p. 2034). Mennonites I interviewed frequently spoke about living in Janos as a deliberate choice because they preferred the relatively conservative and traditional (by Canadian standards) way of life. Through engaging in cultural expressions and culturally-specific social institutions, Mennonites build strong social networks that facilitate agricultural business.

Social and cultural capital foster trust and an ability to locate resources when needed (without the internet). Commercial farming in Janos calls for irrigation, farm machinery, and a variable quantity of annual inputs (seed, fertilizer, pesticides, etc.). Some crops also require additional labor for planting, weeding, and/or harvest, such as onions, chilies, and melons. All of these elements are potentially very expensive and often act as barriers to entry. Mennonites find ways around these barriers through a combination of intergenerational transfer, borrowing, paying for goods or services in multiple annual installments, and using credit sources that are largely available only to Mennonites.

Young men on the colonies trying to start their own farms often do so with land either given to them by their family, share-cropped from a family member, or purchased with wages earned from helping another family member with their farm. Such young men typically rely on farm machinery borrowed from their fathers or other family members for several years, until they can buy their own with farm profits. New irrigation wells, if needed, can be acquired by paying in multiple annual installments with farm proceeds, or buy using a drill rig borrowed from family. For operating credit, they can typically get informal credit through a local Mennonite business or (in more recent years) formal credit from the colony cooperative or directly from the Mennonite credit union UCACSA. Sutherland and Burton (2011) report that

such instances of cooperation are relatively rare in Scottish farming and in other industrialized farming areas around the world. Among the Mennonites in Chihuahua, they are still ubiquitous.

The social and cultural ties of the colony ethnic enclaves foster loyalty both to the colony and to farming more generally. Though farming is no longer as highly valued among Mennonites in Canada (Kauffman & Driedger, 1991), it is still the preeminent livelihood in Janos County and in the colonies near Ojinaga where I spent limited time. With strong social support, financial resources that favor agriculture, and cultural institutions that are difficult to replicate off-colony, young Mennonites strive to find farms close to their home colony, even if they have to emigrate to Canada for a time to afford it. This is very different from the ejidos, where young people felt no particular attachment to either farming or the ejido as a community. The desire to stay local pushes colonies to expand onto neighboring properties, edging the agricultural frontier outward.

The formal financial institutions of the Mennonites are difficult to replicate, and the patterns of familial and community cooperation are perhaps rare for good reason. Mennonite children on the Janos colonies grow up working long hours alongside their parents. There is no television and no computers, school lasts only half days and there is no homework, organized sports, or clubs. Just as Weber described, the Protestant work ethic is nourished from a young age on the colonies, and there is little frivolity. Children learn and practice the skills they will need to be productive farmers or homemakers later in life, and to tend dairy cows, fix tractors and trucks, and any other number of rural farm-based activities. Mutual aid is enshrined in the culture, and lending even expensive farm machinery is commonplace, perhaps made less risky by the fact that there are many men at hand to fix whatever might break. Such norms are prevalent on the colonies but relatively rare outside of them.

Policy, Capital, Technology, and the Scale of Crop Production

The increase in size and profitability of Mennonite farms since the 1990s cannot be explained by mere social or cultural capital. Social and cultural capital facilitated access to resources, especially in comparison to ejidatarios, but they do not at all explain the dramatic intensification of production that has occurred in the last thirty years. Well-capitalized Mennonite farms today spend and earn significantly more money per hectare than their equivalents did in the 1980s, and their farms are several times larger. Shifts in production and in farm size are the result of structural economic shifts as well as advances in agricultural technology. The Mennonites have been well situated to capitalize on these shifts, though with some reduction in ease of entry for new farmers.

The neoliberal reforms of the late 1980s and early 1990s created financial channels that funded the launch of the Mennonite credit union UCACSA in 1992. UCACSA made agricultural credit cheaper and more accessible for Mennonites than it had ever been, but opportunities to invest that credit were still somewhat limited in the early years. The 1994 North American Free Trade Act (NAFTA) and subsequent globalization of Mexico's agricultural market created new and profitable opportunities for crop marketing. Chilies, melons, and cucumbers all became possible to farm in Janos County because they could be sold directly to buyers in the US. The cotton market expanded as export-oriented textile manufacturing and assembling became serious business in northern Mexico. When I asked Mennonites about cotton prices, they often

told me to look them up myself on the Chicago Board of Trade, because their sale prices in the fall are set by global markets.

Chilies, especially fresh chilies (as opposed to those picked after they have started to dry on the vine and sold into the dried/powdered chili market), exemplify the benefits of cross-border trade for Mennonite farmers. As I learned from farmers on the US side of the border, US chili companies prior to NAFTA bought the majority of their chilies from farmers in the US Southwest, where climatic conditions were favorable and migrant labor was plentiful. There are still no commonly used mechanized chili harvesters, so chili farmers are dependent on laborers to pick the fresh chilies in the fall, as well as transplant chili seedlings into their fields in the spring and weed those fields throughout the summer. Labor typically comprises the biggest annual production cost. Migrant laborers in northern Mexico are paid significantly less than they are across the border, giving Mexican chili farmers a significant cost advantage. Once NAFTA allowed Mennonites in Janos to get chili contracts directly from US buyers, the chili market quickly migrated south of the border. Chilies are now a very lucrative—and fairly predictable—crop for Mexican farmers who can pay the investment costs and solicit the coveted contracts. Unlike most other crops, chilies are essentially only grown with a sale contract in hand. The only impromptu market is for dried chilies at significantly lower prices. Landing chili contracts is yet another case where Mennonite social capital pays dividends, as one farmer with a contract is likely to arrange for his friends and family to also get contracts.

The neoliberal reforms and functional end of government support for ejido agriculture in the 1990s actually helped to generate the steady flow of migrant farmworkers through Janos County that enable chili production. As I learned in interviews, most of the farmworkers come from the Mexican states of Guerrero or Oaxaca, and many speak an indigenous language as their first language (most often a Mixtec dialect). Many are ejidatarios/as, and return home to their ejidos for part of every year. Part of the reason they do not live on their ejidos full-time is that they can no longer make a living there. Their farm parcels are very small by Janos standards—three hectares or less—and current crop prices and credit constraints make it impossible to earn a livelihood from such little land.

Besides changing agricultural markets, the other major change has been in technology. The gradual replacement of flood irrigation by first the center pivot and then drip irrigation in Janos served to dramatically reduce the amount of irrigation water used per hectare per year, improved yields, and reduced labor needs. The modern Mennonite farmer can now control his center pivots with his smart phone (if he has adopted smart phones) rather than waking up at all hours of the day or night to move his flood irrigation syphons. Reduced water usage translates to reduced pumpage costs and an increase in the number of acres that can be irrigated with one well. Improving farm machinery has meant that one farmer can now farm more land with the same well, and work the whole farm with the same number of machines in the same amount of time. Seed and chemical improvements, now more available due to better credit access, have also boosted per-hectare yields.

The technological advance and increasing scale of agricultural production is not unique to Mennonites or to Mexico. The same story has played out across the US. There, intensification and growth in the size of the average farms has led to a massive reduction in the number of farmers but has not significantly improved per-household earnings or quality of life (e.g., Cochrane, 1993). In Janos, the increasing intensification and growth of farms is leading to

improved incomes and quality of life, while also contributing to rising property values and consolidation of landownership. There is no single explanation for this difference, but the structural economic factors of relative costs of living, costs of production, and farm gate prices play prominently.

Looking Forward

The agricultural future of Janos County is utterly dependent on the Janos aquifer. The aquifer has been in decline for decades, a fact that was universally acknowledged by the people I interviewed. A farmer drawing irrigation water from a declining aquifer is like the proverbial frog in a pot of water on the stove. For the frog, if the temperature of the water rises slowly enough, it will die before it becomes alarmed enough to jump out of the pot. For the farmer, the rising costs of pumping increasingly deep water might bring on bankruptcy before it causes enough alarm to move elsewhere or find another profession.

As the Janos aquifer continues to decline, the costs of irrigating crops go up. This has been offset by improvement in irrigation infrastructure, from flood irrigation to center pivots to drip irrigation. But whether one pays for more water or better technology, production costs increase. Increasing production costs can in turn be offset by adopting higher-value crops, but the opportunities in this direction are limited. Chilies are a favored crop for those who can afford the inputs because of the value. Moving up that chain further would mean going to tree nuts – which are now emerging as a crop for the already-wealthy – or investing in riskier ventures like onions or new crops with uncertain markets (e.g., sotol, a native plant to the region that is used to make a mescal-like liquor). But moving toward more valuable crops with higher risk or higher investment costs is simply not an option for those with limited financial resources.

A declining water table translates to rising barriers to entry for new farmers. Wells have to be dug deeper, center pivots and/or drip irrigation lines need to be purchased, water pumps burn out more often, and greater lines of credit are needed to farm high investment crops. Mennonite farmers currently grow maize and beans largely as part of a rotation to maintain soil fertility, and accept the low profits from those fields during those years. Some young Mennonite farmers, and also ejido farmers, grow corn and beans because they are a low-cost option. The rising cost of irrigation will gradually eat up whatever small profits these crops currently earn, motivating farmers to find other means to save their soils and taking off the table two formerly good options for poorly capitalized farmers. Alfalfa, with its very high water demands, is also at risk for this reason, and its loss as a profit-earner would be a major blow to the ejidatarios who farm it because they lack the equipment or capital to grow anything else.

Climate change is likely to exacerbate the challenges of declining groundwater, though indirectly. Rising summer high temperatures will increase water demands for plants. Most climate models show that the Chihuahua region will continue to get drier over time, with more frequent and more severe droughts. These drying trends hurt ranchers more than farmers in any given year because irrigation is such a strong buffer against drought. But a drying climate also means less water going into the aquifer, which means faster depletion rates.

Ranchers in and around Janos County can probably expect to see less grass per hectare in the future than now, due to climate change. Bad drought years will also be more frequent,

and more severe. These changes mean fewer cattle and fewer dollars earned per hectare. It is hard to know what the effect of declining ranch profits will be, in part because many ranchers have other sources of income. One outcome may be continued consolidation, where vertically integrated operations buy up additional ranches and take advantage of economies of scale and compensate for spatial heterogeneity in rain and grass growth. There might also be a shift away from ranching as a money maker and toward ranching solely for lifestyle amenities and social status. In either event, smaller, family-oriented ranches are likely to suffer economically and to become less common as a result, though the decline may be slow.

There may come a time when farming is simply no longer profitable in many areas of Janos because there is either not enough groundwater or it is too expensive to pump it out of the ground. If this happens, the Mennonites will pack up and move. A few are already preparing for this eventuality. A few farmers I met had already purchased plots of land in new colonies in Colombia or Bolivia, or were thinking about doing so. Many have immediate or extended family in South America already, which makes the move less intimidating.

If the Mennonites do ever begin to leave, it is hard to know what would happen to Janos County. The major economic driver other than drug trafficking would disappear, taking with it grocery and hardware stores, auto mechanics, and countless wage labor opportunities in businesses and fields alike. No one I spoke to, on either side of the border, knew whether intensively farmed Chihuahuan Desert soils can be turned back into productive grasslands, or on what timescale. It is entirely possible that wealthy ranchers would buy up farmland from departing farmers at bargain prices. Janos County might one day return to a state much like it was before the Revolution, dominated by a small number of vast ranches, only now with cows grazing on remnant patches of alfalfa, corn, and the turf grass growing in the shade of abandoned houses and machine sheds.

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