

In Search for Land and Water: From Chihuahua, Mexico, to Santa Cruz, Bolivia **En búsqueda de tierra y agua: Desde Chihuahua, México a Santa Cruz, Bolivia**

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ABSTRACT

This article analyzes the Mennonite migration process from the arid plains of Chihuahua in northern Mexico to South America's Santa Cruz in Bolivia, associating intensive use of underground water resources to migration as a trigger. The analysis in this research suggests that the Mennonite migration model has found social conditions in Latin American countries, particularly in their transition from Mexico to Bolivia, that has allowed it to flourish. The results indicate opportunities for devising social integration policies that promote environmental sustainability at the Mennonite migration host communities.

Keywords: 1. international migration, 2. water, 3. sustainability, 4. Mexico, 5. Bolivia.

RESUMEN

Se analiza el proceso migratorio de la comunidad menonita desde las planicies áridas del estado mexicano de Chihuahua hacia la región de Santa Cruz, Bolivia, con particular énfasis en el uso intensivo de los recursos hídricos subterráneos como detonante. El análisis realizado en la presente investigación sugiere que el modelo migratorio menonita ha encontrado en los países de América Latina, particularmente en su transición de México a Bolivia, condiciones sociales que han permitido a este modelo su florecimiento. Los resultados indican oportunidades para el diseño de políticas de integración social que promuevan la sustentabilidad ambiental en los sitios a los que migra la comunidad menonita.

Palabras clave: 1. migración internacional, 2. agua, 3. sustentabilidad, 4. México, 5. Bolivia.

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INTRODUCTION

I do not know that any writer has supposed that on this earth man will ultimately be able to live without food.

(Thomas Malthus, 1798/2004, p. 4).

Historically, causes of international migration have been a dominant research area on the migration research agenda; socioeconomic determinants such as income and poverty conditions are extensively documented as they represent common motives for the movement of people across borders around the world. However, until recently, less attention has been directed to environmental determinants of international migration. Yet, as migration patterns themselves have become more complex, the environmental dimension has been gaining attention after the recognition of the possible effects of changing climate conditions and the increasing possibility of experiencing extreme weather events (IOM, 2009).

In particular, the environmental dimension becomes important to specific population groups linked to major economic activities in the food production chain such as agriculture. These groups' primary productive enterprises are especially vulnerable to climate conditions and water availability. Among such population groups, Mennonite farmers, who have been creating rural communities across continents for centuries, provide a clear case through which we can understand the connection between environmental determinants and migration.

Although Mennonite farmers' international migrations have been studied by many scholars (Friesen, 2006; Loewen, Nolt, Duerksen, Yoder, & Hoover, 1996; Urry, 2006) the vast majority of these prominent research efforts document in detail the religious motives of their migrations, along with descriptive features of their social organization —a congregational structure in which the community determines its social integration— that can be traced back more than 400 years to Europe's Protestant Reformation.

Despite these efforts, a less-known step in this long journey is the migration from Chihuahua, Mexico, to Santa Cruz, Bolivia. Recent analyses of Mennonite migration by Latin-American scholars such as Cañas (2008) points to regularities that contribute to understanding a community that struggles to re-invent its future in a process that spans state borders. As documented by recent studies such as Kopp (2015), there is a growing interest within the academic community to study this collective international migration, whose implications present an opportunity to place in perspective the role that environmental determinants embody. Such a study could provide insights into the position that vital resources, namely water, may play for future movements of people around the world.

The purpose of this investigation is to examine the role that land and water resource scarcity has played in the Mennonite migration process from the arid central plains of

Chihuahua in northern Mexico to the region of Santa Cruz, Bolivia, in South America. To achieve this the present article is organized into three sections.

First, we consider previous studies that provide background on the shared determinants of previous international Mennonite migrations. For this section, our principal data source is a literature review with a historical perspective. The second section of the paper follows a spatial approach to discuss the geographic distribution of the Mennonite colonies in Chihuahua, building on insights from access theory associating the intensive usage of underground water resources to migration; the main information source is official geographically referenced data on wells drilled and underground water extraction volumes. Lastly, the migration process from Chihuahua to Santa Cruz, Bolivia, is explored in section three.

The Search for New Agricultural Lands as a Determinant for International Migration: The Mennonite Diaspora

The Mennonite colony named “Chihuahua” is located in Santa Cruz, Bolivia, a region in the heart of the Amazon drainage basin. It takes its name from the border state in northern Mexico, where Mennonite farmers from the Canadian provinces of Manitoba and Saskatchewan established in 1922, the first Mennonite agricultural village in Mexico. The “Chihuahua” colony is part of an extensive set of colonies created in Bolivia by Mennonites migrating from Chihuahua.

This organized 4,305 miles journey across the continent into South America started during 1967 and 1968 with the establishment of four settlements in the proximity of Santa Cruz City, Bolivia. These “mother”² colonies —named Riva Palacios, Santa Rita, Sommerfeld, and Swift Current— can be considered the starting point of a massive group migration that Mennonite farmers have undertaken to open new agricultural frontiers in Bolivia.

To approach the migration process leading to the establishment of the Chihuahua colony in Bolivia, it is rather important to consider some common determinants, at least from two previous stages of international Mennonite migration: from Russia to Canada and from Canada to Mexico, which led to the founding of the Chihuahua colony in Bolivia.

The Russia-Canada migration began with the establishment of the Chortiz colony in 1873 in the newly created Province of Manitoba in the Canadian prairie region. This pioneer settlement in an area known as the West Reserve, established by Mennonite immigrants from

²The term *mother* colony is applied in this context to refer to the first settlements from which further expansion, mainly in the region of Santa Cruz, took place.

Russia,³ is recognized as the first permanent agricultural settlement on the fertile open prairie in Western Canada (De Lisle, 1974). Meanwhile, the Canada-Mexico stage of the migration process, came with the establishment of the Manitoba colony in Bustillos Valley in the state of Chihuahua in 1922.

This historical course of events expresses the character of a particular group of Mennonite farmers in the Americas, as well as provides the background to establish the link between environmental determinants and further migration processes by Mennonite farmers towards Latin American countries during the second half of the 20th century.

An initial question that should be addressed is: who were the farmers migrating from Mexico to Santa Cruz, Bolivia? They were a part of a religious group known as Mennonites. Although the Mennonite grouping is diverse and made up of several branches, a common feature that has defined their identity over time had been their relationship to agriculture as a main occupation and to rural communities as a way of life. In their own words: “We are a rural community; we live on the land and till the soil [...] Our children are taught to live the rural life and our people from generation to generation continue to lead the simple life on the farm”⁴ (Manitoba Free Press, 1920, p. 19).

Over the years, sociologist, historians, and anthropologist have often portrayed Mennonites by their characteristic values, which promote intimate family and community relationships, religion as a way of life, mutual aid (Keim, 1998), the use of restraints to control the influence of technology and, borrowing the words from a classic author on Mennonite culture, Redekop (1969), “a limited structural assimilation to host societies” (1969, p. 251). Mennonite economic motivations represent a controversial, less documented aspect of the Mennonite farmer image and one, arguably with profound implications to understand its diaspora.

After 48 years of following a closed-colony settlement pattern in the Canadian prairies, the Mennonite community was confronted with two key realities that ultimately led to their migration in 1921. On the one hand, the pressure for social integration imposed by a mainly Anglo-Canadian host society, particularly in the provinces of Saskatchewan and Manitoba, and on the other, the need for additional land to further expand their closed-settlement model.

Regarding the first issue, the Canadian government in an effort to promote “consistent national policy aiming at the assimilation of ethnics to safeguard national unity and cultural uniformity” (Francis, 1953, p. 233) had been implementing, since 1890, public policy

³This colony took its name from the *Chortitzia* Mennonite settlement in former Russian territory.

⁴A fragment of a letter prepared to be submitted to the Manitoba legislature in 1919 by the Mennonite community in the context of educational regulations enacted by the Canadian government.

measures designed to include in a unified country all members of society despite their divergent cultural backgrounds and religious beliefs.

Compliance with Canadian laws regarding integration proved to be a significant challenge to some Mennonite farmers whose traditions included the use of their form of oral communication (the dialect known as *Plattdeutsch*) and their written means of expression that derives from the German language. In practice, they function as a micro-society on their own, isolated from the cultural customs of the host society except for commercial activity.

Although this particular set of social arrangements provided the Mennonites an opportunity to develop their affairs practically undisturbed by outsiders, it had a major drawback despite its social advantages. This was a fact of the human condition and a more practical matter that scholars such as the Reverend Thomas Robert Malthus (1798/2004) had described almost a century before regarding the question of the future improvement of mankind.

It is an obvious truth, which has been taken notice of by many writers, that population must always be kept down to the level of the means of subsistence; but no writer that the author recollects has inquired particularly into the means by which this level is effected (Malthus, 1798/2004, p. 7).

Mennonites found themselves confronting this inescapable fact of nature. By 1890, as described by Sawatzky (1971) and Werner (2013), among others, land in their Canadian reserves was becoming scarce and expensive. The portion occupied by the *Altkolonier*,⁵ “roughly the western part of the West Reserve, was becoming particularly overcrowded” (Sawatzky, 1971, p. 17). In addition, public resentment against the privileged status of the Mennonites was an increasing issue among Canadians in the years prior to WWI and then during the war when young Mennonite men refused to be conscripted, claiming conscientious objector status; resulted in court rulings against them. The *Winnipeg Evening Tribune* documented the following trial case on January 4, 1918:

“Their religion is just a cloak to evade military service,” said Judge Myers. It is not because of their religion, or because they go to any particular church that they want exception. They just don’t want to go.

Military authorities testified that the boys did not attend any church whatever, and Daniel admitted that during the past four years he had never attended services at the Mennonite church in Winkler, nearest to his residence.

⁵*Altkolonier*, also referred by The *Winnipeg Evening Tribune* (1918) as Old Colony Mennonites, defines a particular denomination prone to migration within the Mennonite social spectrum. In Canada, Mennonites established their initial colonies by settling in two reserves known as the east and west reserve located at the southern border of the Manitoba Province, close to the U.S.-Canada border.

“If there’s any way of sending these Mennonites to war, they’ll go,” declared Judge Myers this morning, when hearing the cases of Frank and Daniel Wiebe, farm laborers of Sandford, Manitoba, who appeared under the section of the Military Service Act which allows exception to members of such faiths as the Mennonites and Quakers (The Winnipeg Evening Tribune, 1918, p. 4).

Thus, the need for additional arable land, a *sine qua non* condition for their existence, combined with the Mennonite’s particular approach to integration, resulted in increasing pressure for them to leave Canada.

As reported by Francis (1948) the socio-economic institutions according to which these people intended to live were not sanctioned by the laws of Canada and “in part were directly contrary to them” (1948, p. 148). This perception was extended across some segments of the Canadian society, as stated by the press in other provinces, such as Saskatchewan, “the loyal Canadian feels that the Mennonite are slackers; they will not learn English, they have a distinct religion and they would not assimilate with Canadians” (Friesen, 1934, p. 119).

In 1919, the Canadian government explicitly prohibited further migration of Mennonites to Canada (Warkentin, 1960), adding even more pressures to their plans to expand their model of social organization in that North American country.

Notwithstanding, Mennonite conservative leaders conducted a series of attempts to persuade provincial governments. However, the authorities expressed that “a country within a country was impossible to contemplate in Canada” (Sawatzky, 1971, p. 35).

In that context, Mennonite *Altkolonier* leaders undertook a search across America for new agricultural lands to replicate their model of social organization. One of their first choices for the planned migration was Mississippi in the United States, where they procured a deal to purchase land and inquired about the possibility of obtaining the special status known as *privilegiums Gnadenbriefe*⁶ to which they were accustomed from previous host societies such as Russia and Canada. According to historical documents described by Sawatzky (1971), when they got to the U.S. border, however, “they were turned back and informed that no special status would be granted to them” (1971, p. 34).

After several attempts in other U.S. states such as Alabama and Florida to secure a land acquisition deal along with the corresponding set of special treatments requested, it became apparent that the U.S. would not allow Mennonite migration under such special terms, which U.S. law apparently prevented. It is not clear whether the *Gnadenbriefe* conditions were considered discriminatory or contrary to U.S. interests in national integration, but the result—as reflected by the evidence on Mississippi Mennonite migration attempts—was rejection

⁶*Gnadenbriefe* is a term used here interchangeably to refer to privileges. A set of special treatment and conditions requested by the Mennonites settlers to the host society. This practice began during their Russian migration.

by U.S. authorities. Thus, the farmers needed to extend their search for land to countries further south.

Their main efforts were aimed at Brazil and Argentina in South America. In Argentina, no *Gnadenbriefe* was granted to them. They also tried, without success, in Brazil. Apparently, these countries carefully reviewed the implications of opening their borders under the special status concessions, and as democratic States, they did not provide such differential treatment to their citizens.

A final and fortunate alternative was Mexico. As has been documented, migration to Mexico was not their first choice, nor was it considered a desired destination despite the relatively closer location to Canada. Yet, Mexico unexpectedly turned out to be a welcoming country, due to the approach of the federal government represented by then-President Álvaro Obregón, who personified the country's central power, characteristic of post-revolutionary Mexico. The following speech extract from President Obregón reflects this perspective:

For the development of the natural riches of my country, I propose to extend an invitation to all men of capital and enterprise, nationals and foreigners, who are disposed to invest their capital in the development of the said riches (Terrazas, 1920, p. 1).⁷

According to Sawatzky (1971), John F. D Wiebe⁸ is credited for being the contact between the Mexican government and the Mennonite community in the purchase of the needed land. Wiebe contacted Arturo José Braniff, son of Thomas Braniff, a prominent figure and member of the economic elite from the Porfirian era. Also, “historical evidence indicates that Arturo Braniff founded a company to manage and sell land with Federico A. Luna, an individual close to President Álvaro Obregón” (Collado, 2012, p. 742).

This particular tie with the central political power would open the door for a series of dealings in which the lines between politics and business would be freely crossed, unveiling the plutocratic relations that prevailed in Mexico as the country sought its identity after the violent awakening of the landless rural peasantry of the early 20th century. According to the research conducted by Collado (2012) due to Federico A. Luna's connections, the government sold him approximately 424 hectares belonging to the War Department on the east side of Mexico City as well as gave him an atypical loan to buy the land, “this loan from the government was an unusual transaction produced by corruption” (Collado, 2012, p. 742).

Despite President Álvaro Obregón's intentions, “he didn't make the effort to inquire what cultural peculiarities, beyond the most apparent, lay behind the Mennonite migration

⁷President Obregón, as President Porfirio Díaz before him, saw immigration as an instrument for development. Particularly in the agriculture sector and perceived the settlement of migrants in northern Mexico as an opportunity.

⁸He was a Mennonite from Herbert, Saskatchewan, who use to conduct real estate business in Canada.

proposal” (Sawatzky, 1971, p. 33). His apparent lack of diligence to conduct a thorough inquiry into the causes of the Mennonite migration cannot be attributed to a lack of talent or even poor judgment, but rather to a considerable degree of naivety along with the personal involvement of close family members in the commercial transaction that led to the deal between the Zuologa family, the owners of the *latifundio* where the first Mennonite colony would soon be established, and the new settlers of the Bustillos Valley in Chihuahua’s central plains.

Although the federal government welcomed new immigrants and settled business issues, matters at the local level were quite different. Feelings of rejection amongst the locals soon begin to emerge. The work of Martina Will (1997) provides an analysis from the perspective of the local inhabitants of the *Hacienda Bustillos* area, peasants whose hopes for land ownership, inspired by the promises of the revolution, suddenly vanished before their eyes. Will’s work describes in detail the initial fight conducted by local peasants, a rather contrasting reality from that imagined by Obregón, and certainly from that portrayed by Braniff. The work done by Mexican historian Luis Aboites captures the sentiment at the local level in those initial stages of the establishment of the first Mennonite colony in Mexico. The following passage from Aboites (1995) captures the situation at that time:

Governor [...] Ignacio Enriquez does not want any more Mennonite settlers in the state until the land is given to the habitants of the towns since he considers it one-sided that foreigners are given preferential treatment, as has been the case so far, while Mexicans are deprived in their homeland of rights that citizens of other countries readily obtain. [...] He added that Chihuahua landowners have found in this procedure how to leave our compatriots without land by selling their *latifundios* in good conditions to foreigners⁹ (Aboites, 1995, p. 176).

Apparently, public opinion about the Mennonite settlers coming to Mexico in the early migration years gradually begin to turn, based on awareness of the peculiar approach to integration that these immigrants were displaying in Chihuahua, as documented by the Mexican newspaper *Excélsior* on March 6, 1925, under the title “Coming from Canada”:

Mennonite Colonists are not considered as a good acquisition. Persons informed in the matter estimate that the colonization by Mennonites either is negative or, if not, nonetheless does not benefit the country at all. Given that these people live in communities absolutely isolated from the rest of the population, without any contact with native people, even placing between them and the inhabitants of the country, the unsurpassable barrier of their entirely exotic costumes and religion (*Excélsior*, 1925, p.13).

⁹Translation by the author.

The Mennonite migration from Manitoba, Canada to Chihuahua, Mexico, is often referred to as “one of the most impressive schemes of colonization in Mexican history” (Castro, 2004, p. 27). It has been the subject of additional research efforts by scholars in Mexico, such as Taylor (2005), who portrays the hardships encountered by the new settlers in their acquired land, as well as the local attitudes towards the newly arrived migrants in the central plains of Chihuahua.

With this start in Mexico, the Mennonites, who had decided to leave Canada, arrived in Chihuahua with their community’s priorities, plans, and projects. At the outset, they had to confront a set of rather hostile circumstances that eventually healed and developed into stable and productive relations with the locals, particularly with the indigenous Tarahumara population, whose labor force became a convenient local input.

However, as time passed, old realities that challenged the Mennonite model of rural community living started to manifest themselves. Again, after a few decades, they required land that would allow the new generations to establish themselves in farming activities in the future. Land scarcity in Chihuahua is considered relative to the Mennonite closed-settlement pattern that required considerable extensions of land isolated from local population centers.

The state of Chihuahua being the largest in Mexico with a relatively low demographic density along with few and scattered population centers had plenty of available lands. But, the arid conditions of the territory, particularly in the northern part of the state, contributed to the complexities of finding sufficiently suitable isolated arable land.

In addition to the land scarcity issue, this time, an essential environmental element evolved to become the central concern: water access. A key input for agriculture, as will be discussed below, became a central issue in the survival of the Mennonite model in Mexico. It provides a framework to explain their search for land both within Mexican borders and abroad in South American countries such as Bolivia.

From Chihuahua, Mexico, to the “Chihuahua” Colony in Santa Cruz, Bolivia: A Quest for Access to New Resources

Although motives of conscience, had commonly been cited by some historians as causes for the international Mennonite diaspora, contemporary and classic sources alike —such as Bender (1944), Rempel and Carlson (2002) and Urry (2006), among other scholars— as well as historical records reveal that finding land, the fundamental factor of production for agricultural activities, has been a significant priority for Mennonite farmers throughout their history. Loewen (2001) writes as follows about the early Mennonite migrations in North America:

Indeed, the Mennonite immigrants [...] expressed an almost obsessive interest in farmland. As immigrants, they debated its quality, and as farmers, they tested its potential. As neighbors, they treasured land if it was contiguous to the land of friends and relatives; as parents, they schemed for ways of acquiring more land (Loewen, 2001, p. 70).

This attitude reflects the close connection between their vision of the world and the implicit need to seek land that traced a migration journey across time and space, shaping well-defined patterns in a quest to create new rural communities. Since their first organization in Europe, they have migrated to Eurasia during the late 1700s, to North America in the 1870s, to Mexico in 1921, and more recently to several South American countries: Bolivia, Colombia, Paraguay, Brazil, Argentina, and Peru. It could be safely argued that their search for land to pursue a particular rural way of living reflects a successful set of social skills defined by a cultural organizational model that has allowed them to preserve their identity as a people across time and space.

This migration process, referred to for the purpose of this study as the “Four-Stage Mennonite Migration Model” (FSMM), consistently involved a four-stage cycle. First, a pioneer stage of colony integration, followed by the second stage of economic activity consolidation tailored to the local and regional market conditions. Then, the third stage of colony growth unfolded in parallel with an intensive use of resources. A fourth expansion stage was characterized by the search for additional suitable land for the next *Auswanderung*.¹⁰

Considering the Mennonite Mexican experience, finding suitable agricultural land was an initial prime target that generated a dynamic local migration process both within the state of Chihuahua and into the six additional Mexican states of Zacatecas, Durango, Tamaulipas, San Luis Potosi, Campeche, and Coahuila, before the Santa Cruz, Bolivia migration project fully materialized.

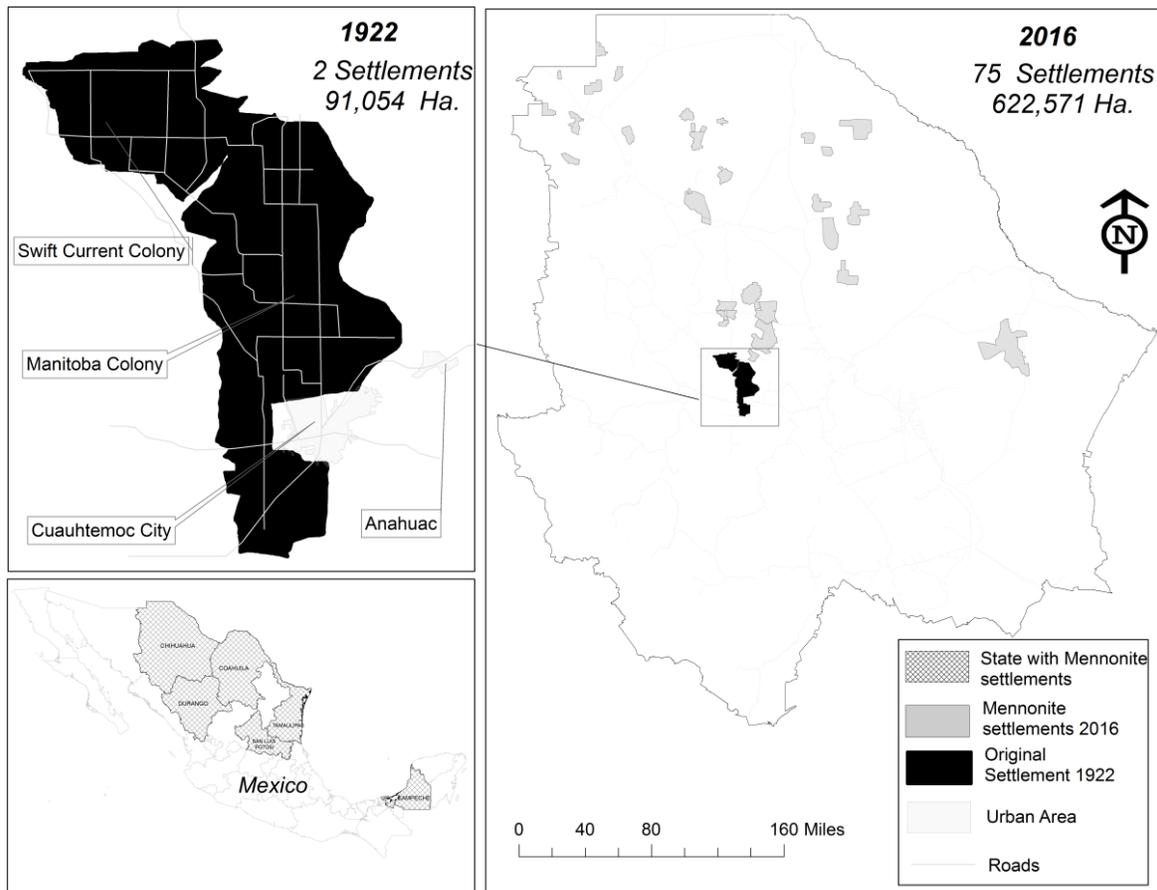
Indeed, environmental determinants in Mennonite colonies soon proved to be a significant factor in an early search for additional land. The state of Chihuahua is characterized by arid weather on its northern plains (Núñez López, Muñoz Robles, Reyes Gómez, Velasco Velasco, & Gadsden Esparza, 2007) and by low precipitation rates (Méndez, Nívar, González, & Vladimir, 2008). In terms of precipitation potential, the state of Chihuahua is part of Region II relative to the precipitation in the country, which is divided into four regions. Region II shows a mean annual precipitation of 445.54 mm, a figure considerably lower than the national mean annual precipitation of 777 mm (Méndez et al., 2008).

¹⁰A term commonly used within the Mennonite community to refer to the migration process to create a new colony.

Such features create difficulties for agricultural activities and make the land vulnerable to climate events such as droughts, which historically have been a recurrent environmental phenomenon in the state. Considering the Standardized Precipitation Index (SPI), a standard measure to define and monitor drought (WMO, 2012), the following drought periods during the second half of the 20th century occurred in 1947-1948 , 1950-1962, 1964-1965, 1969-1971, 1992-2000, and more recently during 2011 (Esquivel, 2002).

Despite these environmental restrictions, during the 95 years since their arrival, Mennonites managed to increase their landholdings in Chihuahua to 680% in relation to the original Swift Current and Manitoba settlement areas in the state, providing a clear pattern of agricultural development beyond the cultural hurdles inherent to the Mexican host society. Map 1 below shows the expansion of Mennonite settlements across Mexico until 2017 since the first settlement was founded in March of 1922.

Map 1. Chihuahua Mennonite Settlements Expansion (1922-2017)



Source: Elaborated by the author based on INEGI (2010). Topographic data: Mexican states boundaries and road network.

The set of environmental challenges presented by the process of securing additional lands for cultivation shifted the attention of Mennonite settlers in Chihuahua from land per se to another key input for agriculture: water. In particular, to underground water extraction, adding this element as a criterion for selecting new settlement sites. However, as time went by in the newly created Mennonite colonies, an increasing competition for underground water in the state emerged, and soon it became apparent that climate and water availability posed a significant constraint on future Mennonite development in Chihuahua.

Following a spatial approach, based on official geographic reference data on wells drilled and extraction volumes granted by the Mexican National Water Commission (CONAGUA, for its acronym in Spanish),¹¹ an underground water Extraction Index (EI) is estimated, a measure that has been documented in previous empirical studies as a reliable tool for evaluating water resource use in the state (Manzanares, 2016). It considers the volume granted for extraction in relation to a given aquifer's recharge capacity, according to the following specification:

$$EI = V / R - N^{12}$$

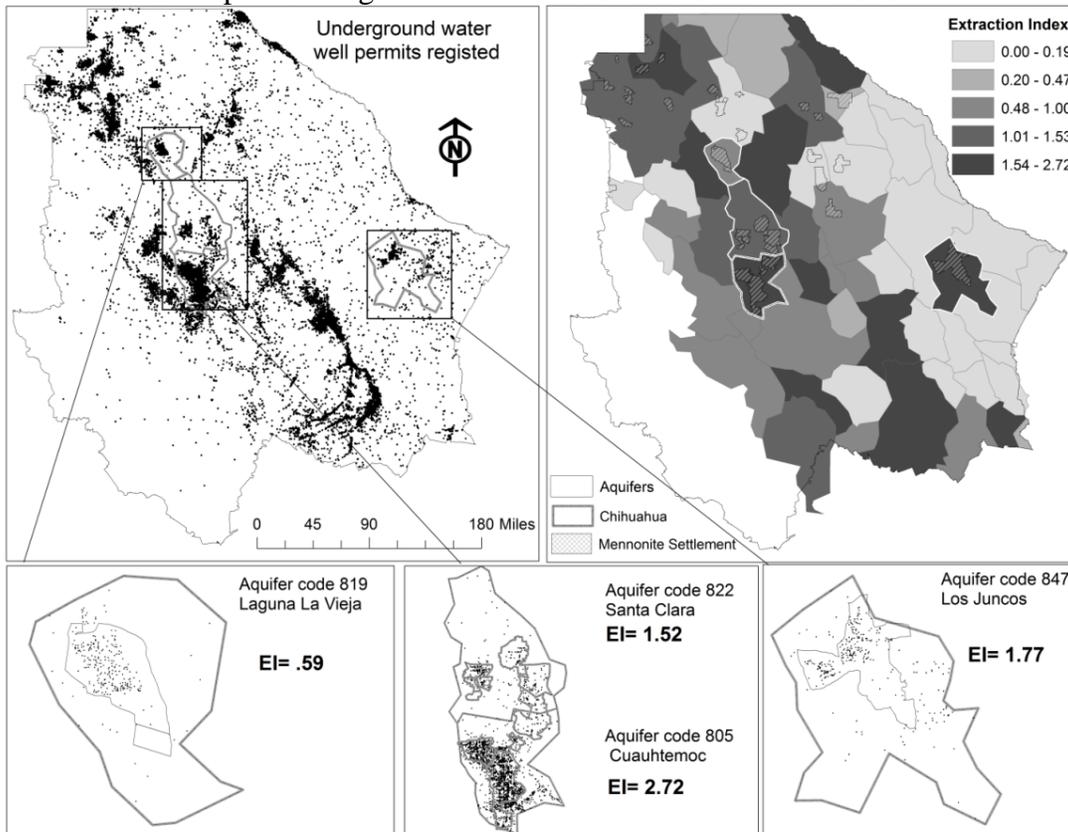
Where V= total volume granted for extraction, R= aquifer' recharge volume, N= volume assigned for environmental conservation purposes, not subject to concession for anthropogenic activities. Hence, two particular Extraction Indexes (EI) reference thresholds are $EI > 1$, which indicates an overexploitation scenario where extraction exceeds aquifer's recharge capacity,¹³ and $EI < 1$, indicating a relative low intensity use. This approach reveals the underground water extraction impact on Chihuahua's aquifers from a sustainability perspective in relation to Mennonite settlements. Map 2 below presents results.

¹¹By constitutional mandate, CONAGUA is the main institution that manages water resources in Mexico, and thus an official information source on the matter used by policymakers and scholars alike.

¹²All variables expressed in cubic hectometers (hm³).

¹³Whenever underground water extraction exceeds the aquifer's recharge capacity, $EI > 1$, over the long run, intensive groundwater use signals a sustainability concern via aquifer overexploitation.

Map 2. Underground Water Extraction. Chihuahua 2015



Source: Author's estimation based on CONAGUA's (2015) Public Registry on Water Rights (REPDA, for its acronym in Spanish).

The empirical evidence reveals a clear underground water utilization pattern associated with agricultural regions across the state. Four areas linked to Mennonite settlements are of particular importance. The first area of concern is the Cuauhtémoc aquifer, code 805, with an extension of 1,308.8 sq. miles on which 4,071 wells have been drilled for underground water extraction; it covers the entire area of the pioneer Mennonite *Altkolonier* settlements in Mexico, Manitoba, and Swift Current colonies established in 1922.

By 2015, this area had the highest well concentration by square mile in the state, with a density eight times higher than that observed in the entire state, implying that one in every five wells drilled in Chihuahua is located in the Cuauhtémoc aquifer.¹⁴ This high-density pattern implies an intensive groundwater use that is a direct result of the agricultural activities in the region over the long run and signals a sustainability concern through aquifer overexploitation.

¹⁴Established in 1922, the colonies of Manitoba and Swift Current were the first Mennonite settlements in Mexico.

In addition, the asymmetry between the aquifer's volume granted for extraction and its recharge capacity indicates that Cuauhtémoc aquifer, code 805, has the highest Extraction Index (EI) within the state, with an estimated EI = 2.72,¹⁵ which indicates that the volume granted for extraction almost triples the aquifer's recharge capacity. This extraction scenario leads to an annual deficit of 197.03 hm³ (DOF, 2016), the highest in Chihuahua, confirming an intensive use of underground water resources linked to dynamic agricultural activity in a major Mennonite hub.

Adjacent to this area and following the historical settlements' expansion path to the north, Santa Clara aquifer in the Riva Palacios municipality has an estimated EI=1.52, which also suggests intensive activity, not in line with environmentally sustainable performance.

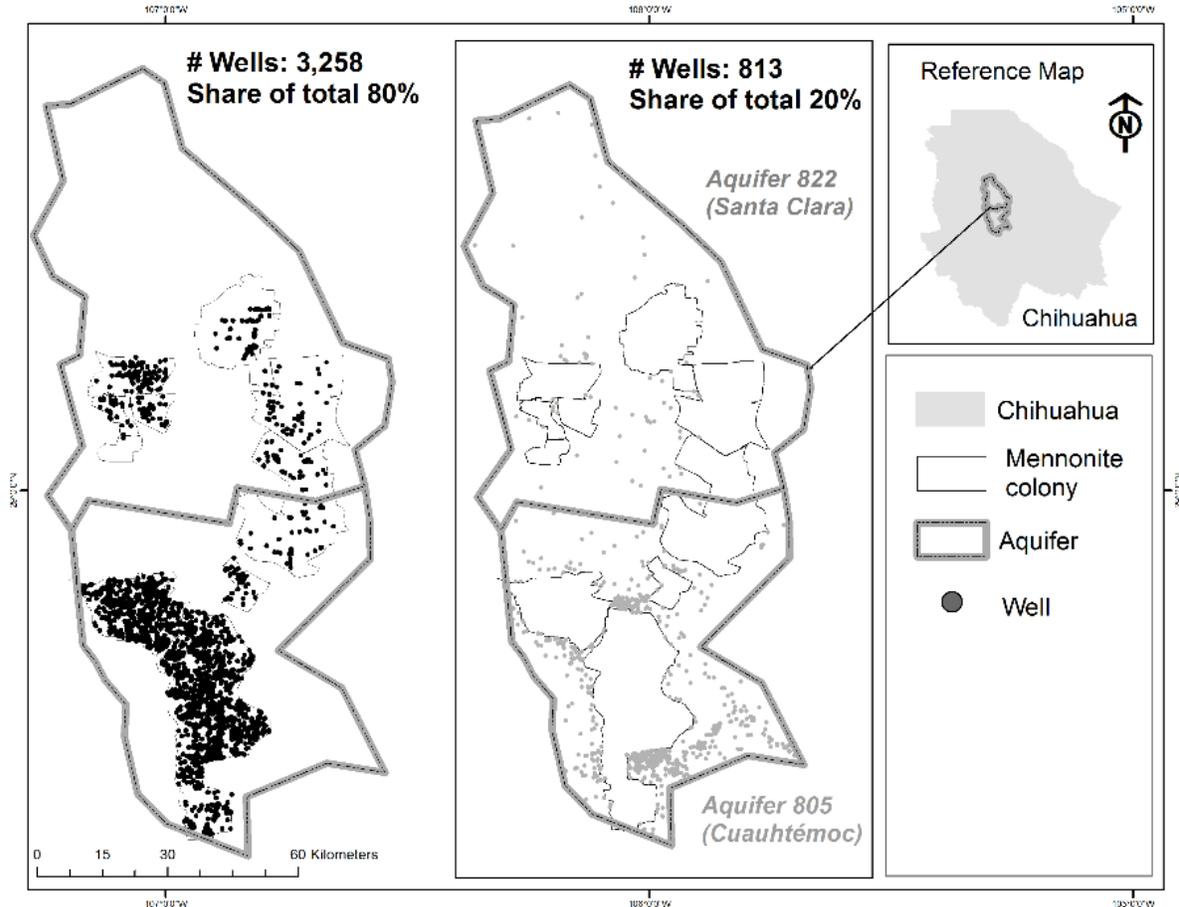
Two additional areas can be identified in relation to important Mennonite agro-industrial centers: Los Juncos aquifer, code 874, and Laguna La Vieja aquifer, code 819. In the latter case and despite being a relatively recent Mennonite settlement area, the estimated EI was 1.77, a clear indication of an ongoing overexploitation process in the area. According to the Agricultural and Fisheries Information Service (*Servicio de Información Agroalimentaria y Pesquera*, SIAP, for its acronym in Spanish), these areas are the main cotton-producing sites in the country. Considering the Laguna La Vieja area alone, a total of 8,658 hectares of cotton were cultivated using underground water during the 2015-2016 agro cycle (SIAP, 2015).

In contrast, Los Juncos aquifer, code 874, the newest among the examined cases, presents the lowest EI, equal to 0.59, a figure within the aquifer's recharge potential, although, is approaching the state's average EI of 0.77 despite being a settlement in operation for only two decades.

To place in perspective the magnitude that wells operated by Mennonite farmers represent in relation to the total number of users within aquifers in the highest extraction area in Chihuahua, which extends across the Cuauhtémoc and Santa Clara aquifers, the proportion of the registered wells that lay inside Mennonite property relative to the total is determined. Map 3 shows the results.

¹⁵The average EI value in the state aquifers is 0.77.

Map 3. Wells Distribution Among Users. High Intensity Used Aquifers:
Santa Clara, and Cuauhtémoc 2015

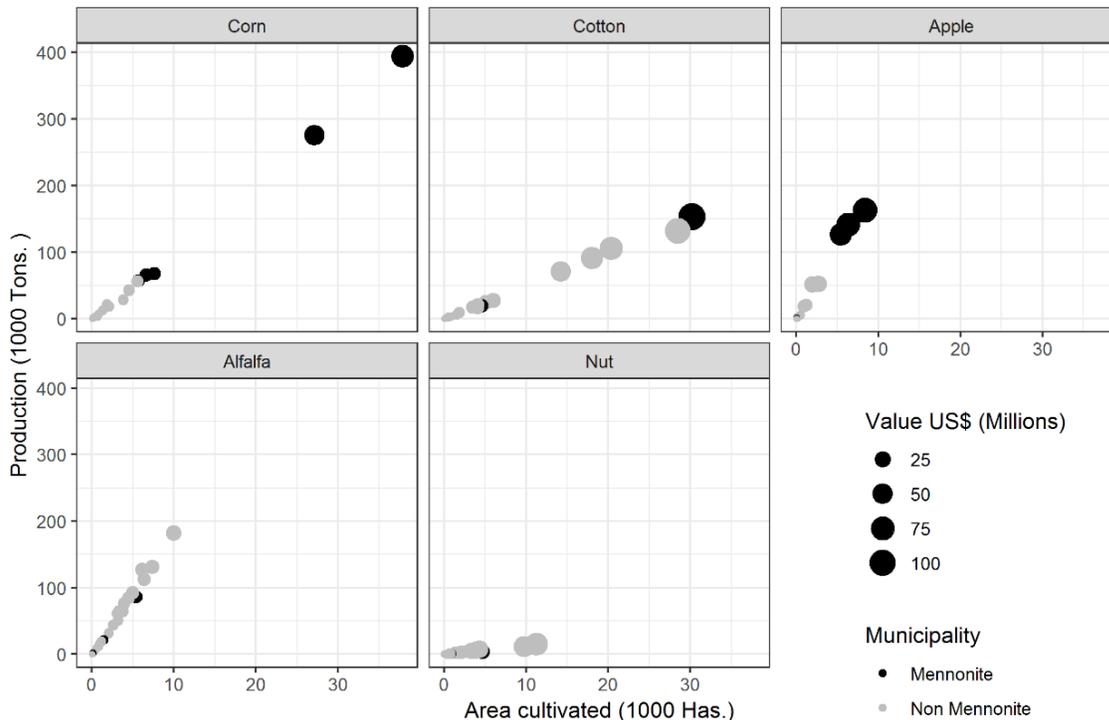


Source: Author's estimation based on INEGI's (2010) Geographic Boundaries and CONAGUA's (2015) Public Registry on Water Rights (REPD, for its acronym in Spanish).

Furthermore, it is worth analyzing the crops grown in the state in relation to the underground water use patterns just shown above. For this purpose, official data from the Agricultural and Fisheries Information Service (SIAP, 2017) is examined. The state specializes in the production of five main crops, allocating 80.5% of its cultivated land, cotton (26.04%), corn (grain) (20.57%), alfalfa (forage) (15.41%), nuts (13.46%), and apples (5.02%).

Within the state, the Cuauhtémoc area is the major producer of corn with 37,825 cultivated hectares using irrigation. As for cotton, the Buenaventura municipality (Laguna La Vieja aquifer) is the leading producer with 30,200 hectares. As discussed previously, these areas are significant Mennonite operation sites. The following figure shows key production parameters for the main crops grown in the whole state distinguishing between municipalities with Mennonite colonies (Cuauhtémoc, Namiquipa, Buenaventura, Nuevo Casas Grandes) and those without Mennonite colonies.

Figure 1. Main Crops Grown in Chihuahua by Municipality 2017.
 Key Indicators Considering Mennonite Production Municipalities



Source: Author’s estimation based on SIAP (2017). Values estimated using official nominal prices per crop (provided by SIAP) and the exchange rate as of September 2017, which was 18 Mexican pesos per U.S. dollar.

The pattern found indicates that Municipalities with Mennonites colonies are the leading agricultural production centers in the state and have the largest cultivated areas, as well as the highest yields among the top value crops. Furthermore, Figure 1 shows that Municipalities where Mennonite farmers reside specialize in high-value crops such as cotton,¹⁶ corn, and apples.

Considering a theoretical perspective, the elements implicit in this intensive groundwater use pattern are consistent with some features depicted by Ribot and Peluso (2003) regarding access theory in which the ability to benefit from assets, in this particular case land and water, are related to webs of power rather than the exercise of rights per se.

According to Hoogesteger and Wester (2015), while initially access to underground water may contribute to develop a scenario of well-being and overexploitation, “in the long run,

¹⁶Production records from SIAP indicate that Buenaventura Municipality (aquifer 819 Laguna La Vieja) alone generated a cotton production worth 110.24 U.S. million dollars during the 2017 agricultural cycle. Similarly, Cuauhtémoc, the leading corn producing municipality in the state, achieved a production worth 70.1 U.S. million dollars during the same period.

it leads to a deteriorated social context in which an increasing number of people —mostly poor farmers— lose their access to groundwater and related livelihoods” (Hoogesteger & Wester, 2015, p. 119). The transition from groundwater well-being to social deterioration has been characterized by recent academic studies, which have identified four stages in this process: 1) The rise of tube well technology fostered by private and public policy efforts, including subsidies in the form of special tariffs for electricity represent a common catalyst effect (Badiani, Jessoe, & Plant, 2012; Khair, Mushtaq, & Reardon-Smith, 2015); 2) Inequality, with groundwater-based single crop intensive agricultural practices (Damonte-Valencia, 2015; Saldi & Petz, 2015); 3) Polarization, with early symptoms of groundwater overdraft (Manzanares, 2016); and 4) decline of the groundwater socio-ecology, with adverse impacts for small farmers and lower-income social groups (Mukherji & Shah, 2005; Shah, 2009).

Currently, Mennonite areas in Chihuahua, Mexico, are transitioning into stages 3 and 4 of this process, therefore deeper wells must be drilled, though so far unsuccessfully. For example, in the Manitoba colony, an area with the largest corn production, wells as deep as 1,200 feet are drilled without success. It is also common to find wells of 2,530 feet deep (CONAGUA, 2015).

Given the rapidly increasing competition for groundwater in this Chihuahua region, strategies to gain a lobby position are taking place with the creation of local associations grouping underground water users who have extraction rights, expressing another sign of aquifer depletion in the transition to a stage of social deterioration.

As predicted by hydro-social theory, outcomes from this transition are not limited to environmental impacts (Damonte-Valencia, 2015) but extend to social processes such as migration. In this case, migration can be seen as a result of a complex social arrangement in which groundwater, a key input for agriculture, has been concentrated, causing environmental concerns and tensions between local farmers.

It is in this context that migration within the country to areas with plentiful water resources such as the state of Campeche in southern Mexico and further south towards Bolivia began to emerge as a new possibility to provide enough isolated land with adequate environmental conditions to establish new colonies, starting the Mennonite migration cycle once again.

Migration to Bolivia

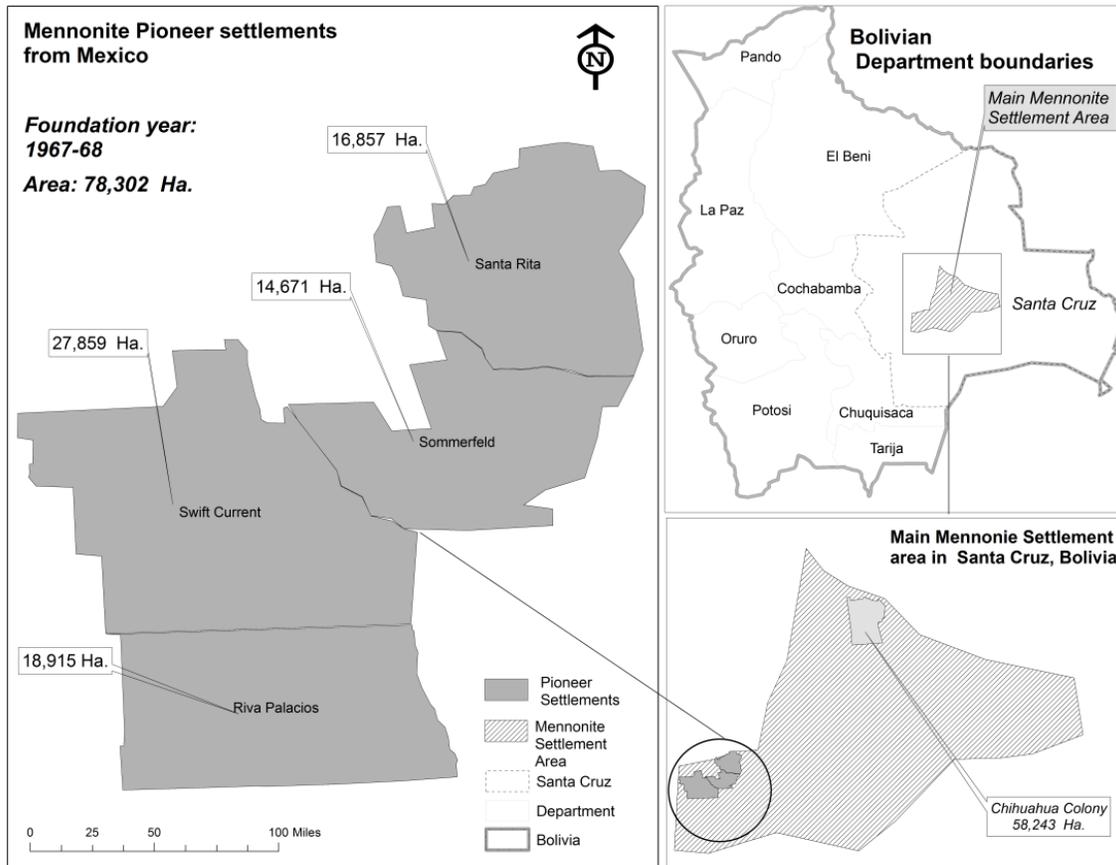
The first massive migration from Mexico to Bolivia¹⁷ took place in the 60s from 1967 to 1968. According to historical records documented by Kopp (2015), this journey was integrated by some 10,000 members of the community who established in a land reserve of 78,302 hectares. In Bolivia, as was the case before in Canada and Mexico, the initial migration stage was preceded by a set of local legal arrangements.¹⁸ In this process, a key legal disposition enabling Chihuahua Mennonite migration was the Supreme Act No. 06030, signed in March of 1962 by the Bolivian government. The document indicates that “The Mennonite colonies that settle in any area of the country to conduct agricultural activities will enjoy full guarantees by the state [...]” (Decreto Supremo No. 06030, 1962, p. 1).

Once the Mennonite farmers obtained these conditions, the establishment of the four pioneer colonies began with settlers from Chihuahua. These mother colonies were Riva Palacios, Santa Rita, Sommerfeld, and Swift Current (Kopp, 2015). As can be observed, the names selected are reminiscent of their origins, tracing a path from a previous migration. The names Riva Palacios and Santa Rita were inherited from Chihuahua, while the colony names Swift Current and Sommerfeld were indicative of a more distant past: their Canadian and European experience. Map 4 below shows the location of these pioneer settlements and the current main Mennonite settlement area in the department of Santa Cruz, including the emblematic Chihuahua colony, founded in 1989 (Kopp, 2015), during the stage of expansion and economic activity consolidation.

¹⁷Although previous isolated settlements were formed in Bolivia as early as 1954, the four mother colonies are considered the start of the massive group Mennonite migration from Mexican colonies.

¹⁸The Supreme Act 4192, signed in 1955 by the Bolivian government, conceded a set of privileges to the Mennonite community and constitutes the first direct legal precedent for the Mennonite migration project.

Map 4. Mennonite Pioneer Settlements from Mexico in Bolivia



Source: Author's estimate based on Instituto Nacional de Reforma Agraria (INRA, 2016) and the Bolivian Plurinominal State Department Boundaries.

Group migration, a distinctive feature of each international Mennonite settlement project, requires vast land reserves. As in the previous two migration stages to Canada and Mexico, the migration project to the Santa Cruz region of Bolivia began with the acquisition of large land reserves in an area that currently covers 78,000 hectares and accommodates four “mother” colonies located 33 kilometers southeast of Santa Cruz city, a regional hub in the heart of the Amazon drainage basin, that also provides strategic market access conditions.

At first, migration to Bolivia,¹⁹ the country with the lowest per capita income in South America (World Bank, 2017), may seem at odds with common perceptions, considering that other countries in the region have dynamic economies along with strong democratic states, as in the cases of Chile, Brazil or Argentina. However, as farmers, Mennonites were more interested in land and recognized the potential of that particular country as a place to conduct

¹⁹According to the World Bank's 2015 GDP figures, Bolivia ranks at the bottom of the per capita income levels among South American countries with 3,276.79 USD.

agricultural activities under a social model that has been transplanted for generations across continents.

In 2017, after 60 years of Mennonite presence in Bolivia, the population grew from four colonies to 52 while land holdings expanded equivalent to eight times its original size (from 78,000 ha to 650,000 ha.). Also, the migration cycle identified in this article as the Four-Stage Mennonite Migration Model (FSMM) has already been through its traditional stages, reaching a mature level and displaying some of its more evident limits in two particular areas: social integration and environmental impact related to resource-intensive agricultural practices. This pattern inevitably resembles common features from the previous Mennonite international migration experiences.

After an initial settlement period characterized by a generally welcoming host society, regional social forces started to question whether the privileged status granted to Mennonites was consistent with the national goals for development. Mainly, the native Guaraní people and the regional farmers' unions which had been active in promoting this approach towards recent Mennonite colonization projects.

In December of 1975, the Bolivian government signed the Supreme Act No. 13261, which abrogated the previous 1962 legal arrangement acquired by the Mennonites. The 1975 Supreme Act included the following judgment:

Considering that Mennonite communities' migration to the country was authorized in conditions contrary to the National Legislation and as a flagrant violation of fundamental norms threatening the sovereignty principles and respect to our institutions [...] The Counsel of Ministries, decree: Article 1. Abrogate Supreme Act 06030 of March 16, 1962 (Decreto Supremo No. 13261, 1975, p. 1).

According to Kopp (2015), the Bolivian Mennonites are accused of being "foreign" landholders, responsible for the massive deforestation and other environmental damage. Although cultural barriers inherent to the Mennonite organization model, which has unique social institutions, preclude Bolivian native people to interact beyond commercial activities, the fact that Mennonites in Bolivia bear the Bolivian nationality indicates that the term "foreign" could be hard to sustain and ultimately is legally inappropriate. Recent studies by Kopp (2015) document in detail the controversy and the socially divergent perception that prevails today surrounding the Mennonite community in Bolivia.

Furthermore, in 2006 the Bolivian government promulgated Act 3545 on "Community Agrarian Reform Extension," aiming among other provisions to conduct a responsible use of land and forest (Honorable Congreso Nacional, 2006).

Despite the current situation and social struggles faced by the Mennonite community in Bolivia, evidence suggests that Mennonite colonies constitute a productive regional engine

that today is an essential player in the agricultural production and supply chain, as well as generates development spillovers reaching across segments of Bolivian rural life.

The contributions of Mennonite farmers to Bolivian agricultural growth is most evident in particular crops such as soybeans, which is the leading export product cultivated in the Santa Cruz Department, the epicenter of the country's agro-industrial production, with an estimated area of 1,307,446 hectares and a production valued at 2005.12 U.S. million dollars (INE, 2015), with Mennonite farmers contributing to 43% of total soy production in the region (Kopp, 2015).

According to INE (2015), the Department of Santa Cruz produced between 66,837,395 quintiles to 6,683,739.5 tons of soybeans. With a market price per metric ton set at 300 USD, soybean producers represent a significant contribution to the regional economy. Also, Santa Cruz is the principal economic engine of the country with the largest GDP share (28.71%) among all 9 Bolivian Departments.

Available population records indicate that the Mennonite community in Bolivia is integrated by 12,000 families, which results in a population of 72,000 members (Joshua Project, 2018) with an average of six family members per household. This structure is important regarding employment generation since Mennonite farmers rely on household labor, employing family members to form self-sufficient agricultural production units.

CONCLUSION

Group migration represents a less common type of movement for people around the world than the traditional and extensively documented individual migration flows. However, these processes have particular importance in the migration literature. It is argued that the formation of the Mennonite settlements in Bolivia by Mennonite immigrants from Mexico offers an opportunity to study the patterns implicit in a unique international migration process.

The evidence presented suggests that migration from the state of Chihuahua to Bolivia should not be understood as an isolated process but as a series of stages in a broad international migration journey. When the historical dots from this process connect, a broad picture of the global Mennonite diaspora emerges. A closer look at their determinants reveals that beyond cultural and socioeconomic causes, environmental determinants have, in fact, been a dominant force that drives such a global migration flow, one in which environmental elements such as land and water availability take center stage.

Furthermore, the data analysis presented in this work concerning groundwater use contributes to understanding how the Mennonite quest to find suitable locations to form new settlements has influenced their expansion pattern across Mexico and beyond. The analysis also highlights the challenges of devising integration policies for the Mennonite

communities in the host societies, policies that promote social and environmental sustainability.

The evidence presented indicates that as migrants, Mennonites have developed a powerful set of strategies that have been evolving, gaining from the experience of a mix of cultures across countries. In Latin American countries, particularly in their transition period from Mexico to Bolivia, the Mennonite migration model has encountered social conditions that allow it to flourish, making the Mennonite communities central players in a global food production chain. Although, as farmers, their activities certainly have clear areas of opportunity to advance towards more sustainable practices, a focus on their socio-organizational model shows that their productive pilgrimage reflects a shared goal founded on solid grounds.

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