Soy *veredas*: smallholder farmer strategies on the margins of the agrarian frontier in Western Bahia, Brazil

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Abstract

The MATOPIBA is a region in Northeastern Brazil, known as one of the most important agrarian frontiers of the country in recent decades. The region is marked by the coexistence of different faring systems, with its plateaus occupied by highly capitalized plantations while traditional smallholder farmers continue to live in the lowlands of the plateaus and the valleys around them. That makes it a privileged context to study the impacts of agricultural modernization, its impacts on the environment and other farming systems and alternative development trajectories that could be available.

While there are numerous studies analysing the economic and territorial expansion of industrial agriculture in the MATOPIBA and its social, environmental and economic effects, there is still need for more studies on the strategies and practices of smallholder farmers situated on the margins of these industrial farms. Therefore, this research focuses on smallholder farming on the margins of the agrarian frontier in Western Bahia, making use of a combination of historical context analysis, interviews, and field observations conducted during two months of fieldwork in 2022, focusing specially on the Corrente river basin. It shows the evolution of traditional peasant faring systems in the region since the start of the 20th century, emphasizing the impacts that the occupation of the plateaus of the region with industrial plantations had on them, showing different strategies and differentiation strategies.

The conclusions point toward the substantial impact of land and particularly water grabbing on smallholder farming systems, which are differently affected in different regions and parts of the landscape. Field observations and analysis of data from the state government support numerous studies that point out the use of environmental registries as tools to illegally claim land, often from public areas used by smallholder farmers. Nevertheless, different strategies contribute to reproduction of smallholder farming systems. Traditional free-range cattle production in natural areas - safeguarded by local associations - increases the resilience of livestock production, investments such as pumps and wells can counter water scarcity, and new practices such as market gardening change the usual amount of land necessary to earn a living in the region. The work contributes to the broader discussion on rural development and the future of small-scale farming in regions dominated by industrial agriculture, suggesting the importance of processes of locally led change for the continuity of smallholder farming under changing conditions, as well as the real consideration of the needs of a diversity of farmers in land and water governance for improved local livelihoods and environmental conservation.

Glossary

Fecho (de pasto), fundo (de pasto): common natural areas mainly used as pasture for cattle production, but also for hunting, fishing, and foraging of different foods and materials. Conceptually, the difference between *fundos* and *fechos* is that *fundos* are contiguous to one's farm, while *fechos* are not. However, *fechos* are more prevalent in Western Bahia, and refer to the fenced areas

Solta: common areas used as grazing grounds. Sometimes used interchangeably with *fechos* or *gerais,* but more commonly referring to common areas around the farms instead of in the *gerais*.

Sertão (pl.: sertões): Hinterlands, sometimes referring to dry areas, but also used in general for rural landscapes in the interior of the country, away from its mainly coastal urban centres.

Gerais: designation of the savannah landscapes occurring atop the plateaus, characterized by their sandy soils and usually uninhabited, save for areas around *veredas*. The term was also often used to designate the *fechos de pasto*, "our/my gerais" being the area used by an individual or community as a common pasture.

Cerrado: Tropical savannah with distinct wet and dry seasons that occupy most of Central Brazil. It borders several other biomes and comprises diverse ecosystems, ranging from woodier to grassier, and wetter to drier.

Vaqueiro: Rural worker who tends the cattle, often requiring notable skills in tracking, herding, caring, etc.

Vereda: Distinctive type of wetland ecosystem of the Cerrado, typically found along watercourses, in areas where groundwater comes to the surface. They host a particular biodiversity, with the most notable species being the buriti palm (*Mauritia flexuosa*).

Rapadura: a sweet made from sugarcane, similar to very unrefined sugar. Usually transported and sold in blocks about the size of a brick.

Cachaça: a distilled alcoholic beverage made from fermented sugarcane juice.

Introduction

Veredas are the marshy areas of the native savannah biome of Brazil, the *Cerrado*. Usually formed by the springing of underground waters, the *veredas* are areas of denser vegetation, concentrating animal and vegetal life and serving as resting areas for travellers who would traverse vast uninhabited *Cerrado* extensions. João Guimarães Rosa, one of the greatest Brazilian writer of the 20th century, immortalized the *veredas* in his novel *Grande Sertão: Veredas*, associating them with abundance amidst hardships, but also the transitional, contradictory spaces in-between worlds that one has to go through in the toils of life. In the Brazilian hinterlands of contemporary Western Bahia, the *veredas* continue to play a similar role. Since the 1970s, the region went through a vertiginous transformation, going from a peasant economy centred on pastoralism to one of the main soy exporting regions of the country. Nevertheless, this modernization is far from homogenous: while the high and flat areas of the plateaus in the region have been almost entirely deforested and converted into mechanized soy fields, the *veredas* atop these plateaus and the valleys immediately to its east continue to support smallholder farmers, whose living places were unsuited for industrial agriculture.

Numerous studies have described the impressive productive and economic dimensions of this agricultural development (Buaianin and Garcia, 2016), while others compellingly show its social and environmental impacts, highlighting the highly concentrating nature of these grain enterprises and their limited capacity to generate local jobs, as well as their numerous environmental impacts, such as deforestation and high use of pesticides (Garrett and Rausch, 2016; Favareto et al., 2019; Lopes et al., 2021; Favareto et al., 2022). However, studies on the dynamics of local farming systems that continue existing on the margins of this agribusiness hub are still limited. Such investigations are interesting from multiple points of view, allowing for a study on the impacts of agribusiness expansion from the unique perspective of local smallholder farmers, and also studying the potentials and limitations of alternative development trajectories in an agrarian frontier.

In this context, the goal of this research is to investigate the farming practices of smallholder farmers in the margins of the soy agribusiness frontier in Western Bahia, Brazil. I have investigated how these farming systems changed through time as social and geographical conditions changed and considered a few cases of different systems observed in the field. This study contributes to a more nuanced understanding of an agrarian frontier region, describing the changes of agricultural modernization from the point of view of these actors and discussing the challenges and potentials of small-scale agriculture in an area dominated (territorially, politically and discursively) by agribusiness.

In this introduction, I start from a contextualization on the recent history of Brazilian farming, followed by a theoretical framework introducing relevant authors who have studied the diversity of farming, particularly in the context of agrarian frontiers. This is followed by a problem statement briefly contextualizing the study region and setting out the research questions and the methodology used to develop this research.

The diversity in Brazilian agriculture through time

Brazilian agriculture is often described as *dual*, emphasizing the divide between large-scale, industrialized systems aimed at exporting commodities and smaller-scale systems, often aimed at subsistence, but also supplying food for internal consumption. However, such broad categories can obscure the dynamic of different farming systems through time, as well as the diversity within each of these fields. In an effort to address this heterogeneity without falling into dualistic simplifications, Niederle (2018) uses the concept of food orders to describe the evolution of Brazilian agriculture since the 1950s. He describes orders as follows:

"An order institutionalizes the relations between and the meanings of people, artifacts, organisms and things. It can be seen as a structure of meaning and materiality that organizes social action." (Niederle, 2018, p. 1472)

Observing the adoption of varying practices, technologies and institutional arrangements allows us to see how different farming arrangements developed in Brazil, describing a few different differentiation trajectories. Niederle (2018) describes 6 such orders: commercial, domestic, industrial, aesthetic, civic and financial. Their main tenets are summarized in the table below (Figure 1):

Table 1. The social orders in the agri-food system in post-1950 Brazil.

	Domestic	Commercial	Industrial	Aesthetic	Financial	Civic
Social practices	Diversification; co-production; craftsmanship; alternativity, conviviality; local foods	Export-oriented plantation; precariousness of work conditions; import-dependent consumption	Massive production; economy of scale; specialization of work; urbanization;	Flexible accumulation; immaterial work; economy of singularities; gastronomization	Flex commodities; accumulation by dispossession; supermarkets revolution; biomaterials	Agroecology; biodiversity conservation; ecologization; food sovereignty
Socio-technical apparatuses	Household working force; endogenous inputs; traditional seeds and breeds	Pre-industrial technologies; relatively specialized work	Engineering; modern technologies; mechanization; Green Revolution	Creative economy; customization; certification schemes	Informational technologies; financial funds; stock markets; private standards	Cooperation; local and fair-trade circuits; participatory certification systems
Institutional apparatuses	Communitarian habits, customs and rules; reciprocity logics	Remnants of colonialism; free market rhetoric; traditional forms of domination	Rationalization; state-oriented markets; sectorial governance	Neocorporativist state; multifuncionality policies; territorial governance; glocalization	International property laws; corporative governance; contractualization	Commons; open-to-diversity communitarism; participatory forums

Figure 1 - Main characteristics of the food orders described by Niederle (2018, p. 1474)

The first 3 orders were present since the 1950s, but in the course of the process of modernization, they go through a series of reconfigurations and branch out into new ones. The commercial order, marked by large estates, cheap labour and focus on exports, slowly becomes subsumed into the industrial one, with the incorporation of new technologies, modern management and support from modernization-inducing policies. On the other hand, the domestic order represents a diversity of systems that usually rely on co-production between farming practices and natural resources (van der Ploeg, 2018), reciprocity arrangements and strategic production either for subsistence or markets. Farming in this order continues to exist mostly as it did in the 1950s, but it also incorporates new technologies to some degree and there is the formation of new variations, whereby domestic farmers engage with different types of organizations to work for agendas like agroecology and environmentalism (civic order); or engage with yet other types of actors to supply refined foods for high-value added chains or restaurants (aesthetic order).

This historical process is illustrated in the graph below, and the historical development of the industrial and domestic orders will be discussed in the next two sections.

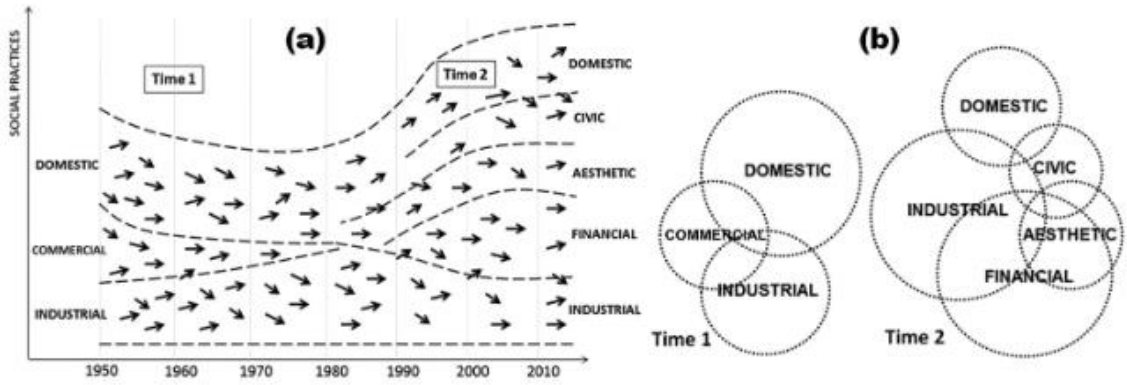


Figure 2 - Evolution and overlap of the orders in Brazilian agriculture. Source: Niederle (2018)

Commercial and industrial orders through time

Colonial occupation of Brazil was chiefly centred in the production of agricultural commodities for the European market. Plantations were therefore a crucial element of Brazilian economy and its rural world, being a core aspect of what Niederle (2018) calls the **commercial order**, centred on the production of commodities based on the control of large estates and cheap labour (whether slavery, during colonial times, or precarious forms of wage labour later on).

As in many parts of the world, the mid-1960s were a landmark in the development of Brazilian agriculture, marking a period when the sector was integrated, technically and economically, into an industrial paradigm. The "green revolution" package of soil correction, fertilizers, pesticides and agricultural extension services reduced numerous aspects of uncertainty in agriculture, bringing it closer to the industrial reasoning of processes, inputs and outputs (Kageyama et al., 1996). Moreover, this technical change led to agriculture being inserted into a broader industrial chain, buying its inputs and tools and selling its products to food industries for processing. In short, following the scheme of Niederle (2018), **it was the beginning of the assimilation of the commercial order by the expanding industrial order,** "anchored in a new set of technical (oil, pesticides, hybrid varieties) and institutional (rural credit, banks, cooperatives, rural extension, agricultural research) apparatuses". (Niederle, 2018, p. 1473).

Buainain et al. (2018) describe the key elements responsible for this modernization. Agricultural research was supported through multiple institutions integrated under the National Agricultural Research System (SNPA, *Sistema Nacional de Pesquisa Agropecuária*), crucially the Brazilian Agricultural Research Corporation (Embrapa), but also other research institutions, universities, and private companies. These organs were crucial because the technical packages of the Green Revolution were mostly tailored to temperate climates, demanding research in order to be used in the then scarcely occupied tropical savannahs of Brazil. Moreover, multiple government programs (PADAP, POLOCENTRO, PRODECER I and II) were instituted through the 1960s and 70s to support the expansion of industrial agriculture through infra-structure development, subsidized credit, technical assistance, among others[1].

[1] For a history and greater detailing of the different agrarian programs supporting agricultural modernization in Brazil, see Pires (2000) and Hosono et al. (2019).

In tune with Kageyama et al. (1996), they also highlight the importance of government policies and subsidies aimed at integrating agriculture into the growing Brazilian industry:

> "Subsidized credit and fiscal incentives stimulated the demand for machines and equipment, while export restrictions on *in natura* products ensured sufficient raw-materials for the local industry. In the following decades, the globalization of Brazilian agriculture became consolidated with networks of service providers, commercialization channels and most importantly, agribusiness entrepreneurs." (Buainain et al., 2018)

Not only did this process greatly increase Brazilian agricultural production and productivity, but also integrate this sector into a then developing broader industrial economy. Kageyama et al. (1996) use the share of intermediate consumption[2] in the value produced by the agricultural sector as an indicator of its complexification and modernization, showing that "from a little over 10% in 1949, it reaches 25% at the end of the 1960s, hiking to almost 40% in 1980" (Kageyama et al., 1996, p. 120, my translation).

Despite the importance of the intensification of agricultural production by its use of new techniques and inputs, the horizontal growth through agricultural frontier expansion did not cease to happen (Kageyama et al., 1996). In this context, the growth of soy production in the *Cerrado* in Central Brazil (chiefly the states of Mato Grosso do Sul, Mato Grosso and Goiás) is the defining example. There was already growing interest in the biome as an agriculture frontier since the 1950s, with the depletion of soils originating from the deforestation of tropical rainforests in the Southeast of Brazil for coffee production (Silva, 2018). Nevertheless, it is only with the adaptation of new agricultural techniques for the tropical context and state support for agricultural expansion and colonization of new areas that there are conditions for its systematic occupation.

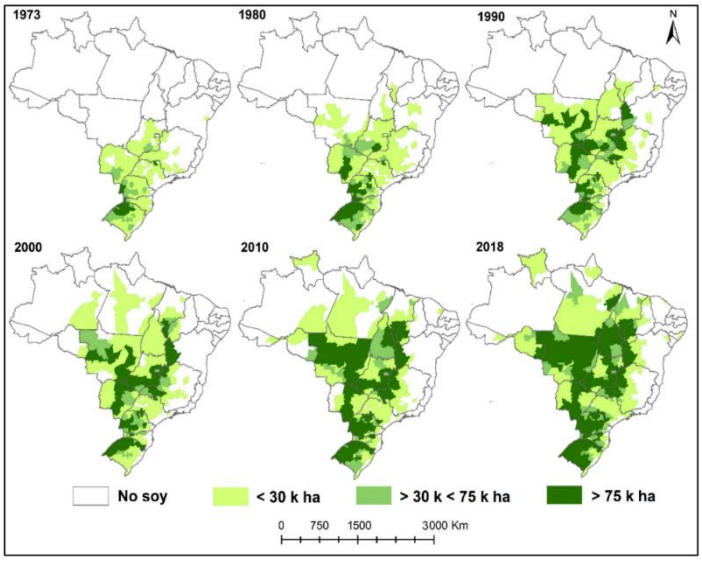
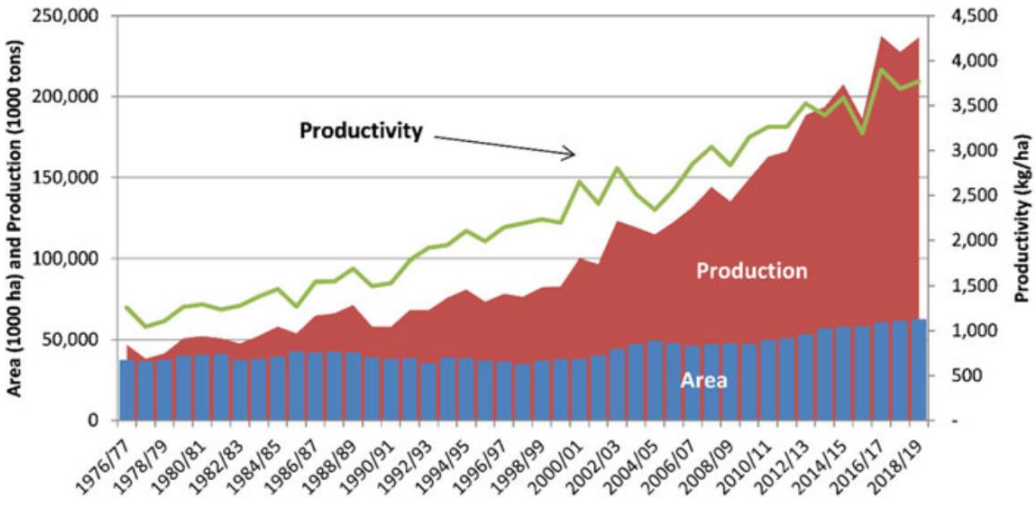


Figure 3 - Area cultivated with soybean in Brazilian microregions (thousands of hectares). Prepared by the

It was in this context of modernizing and expanding agriculture that a soybean price surge in the 1970s, caused by simultaneous reduced supplies of American soya and of other products used as alternatives for it in feed production, left a window open for production expansion in Brazil and the Latin American Southern Cone as a whole. (Langthaler, 2020, p. 258-260). Figures 3 shows the evolution of land use for soy production in Brazil and its growing harvests through the decades, showing the massive occupation of Central (and later Northeastern) Brazil with this crop.

[2] That is, the total monetary value of goods and services consumed or used up as inputs in production by enterprises.

Brazil: Changes in Area (ha), Production and Yield (kg/ha) of all Grains, 1976–2019.



Source: CONAD.

Figure 4 - Evolution of area, production and productivity of grains in Brazil from 1976 to 2019. Reproduced from Klein & Vidal Luna (2021, p. 444).

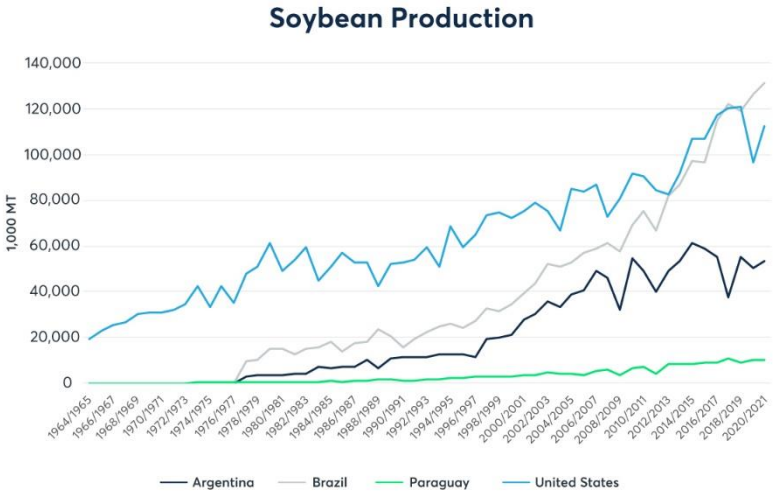


Figure 5 - Soybean production per country (1964 - 2021) - Source: USDA PSD Database

Figures 4 and 5 show the massive rise in Brazilian production of the grain, going from virtually zero into a position as a global player from the 1970s onwards, and eventually surpassing the USA as the largest producer in the world in the 2020s. Figure 4 emphasizes the importance of the productivity for the growth of grain production, responsible for quintuplicating production with less than a doubling of the area dedicated to these crops.

Following the modernizing push and expansion of Brazilian agriculture of the 70s, based on subsidized credit, rural extension services and state-backed research; the 1990s witnessed further consolidation and adaptations to this model. Following the economic crisis of the 1980s, inflation and exchange rates became more stable, allowing for an exchange rate policy supportive of exports. Financing of agricultural enterprises also changed in nature, with greater participation of private actors (Buainain et al., 2013).

While in the 1970s the expansion of the agrarian frontier for soy production mostly took place in Central Brazil, the 1990s marked the beginning of soy expansion into the Northeast, starting in the west of Bahia and later expanding to southwestern Piauí and southern

Maranhão, with the biggest boom happening in the first decades of the 21st century (Eloy et al., 2022).

Niederle (2018) also remarks on the impacts this process had on the continuity and reinforcement of the chasm between farmers in the industrial and domestic orders, which will be further discussed in the next section:

> "Domestic forms of agriculture remained widely excluded, reproducing traditional practices of subsistence production. The most impressive example is the semi-arid northeast region, where, currently, 1.7 million agricultural establishments (one third of the country's total) remain completely detached from these policies. (…) what is more impressive is the fact that, even in the most affected regions [by agricultural modernization], heterogeneity continues to be a remarkable attribute of rural areas" (Niederle, 2018, p. 1465).

Nevertheless, Buainain et al (2013) argue that, especially since the 1990s, agrarian reform and the support to smallholder farmers as a driver of economic development became a nonsensical idea. Considering the quickly growing productivity and mechanization of Brazilian agriculture, support to less productive systems would only make sense from social security point of view rather than the progress of the productive system.

On later texts, this same group of authors acknowledge some space for family farming through targeted policies and practices like short value chains and geographical indications, while still emphasizing that these types of farmers have a big challenge ahead of them to remain active in contemporary rural Brazil (Guanziroli et al., 2019).

Theoretical framework

The domestic order adapts to modern circumstances

Niederle's (2018) characterizes the domestic order as:

> "traditional forms of production and consumption that, as diverse as they may be, embrace a similar set of practices and socio-technical devices. In production practices the 'co-production' between society and nature are prominent, anchored in the linkage between local knowledge and craft objects. These practices are organized in order to ensure the survival of the household, but also (…) [favour] crops that can be consumed or sold in accordance with the needs of the family and market conditions." (Niederle, 2018, p. 1473).

This type of farming and its social actors constitute a diverse and understudied subject in Brazilian history. Studies in the country have traditionally focused on the dynamics of the plantation economies, which not only were the economic driving force of the colonial and national economies, but also have much more abundant records to be analysed. Nevertheless, it is safe to say that such farming systems have been a constant throughout Brazilian history, taking forms as varied as sharecroppers inside larger properties (Wanderley, 1999) to farmers capable of some level of economic accumulation through food production (Linhares, 1981; 1996). Niederle and Wesz Jr. (2021) also summarize multiple studies that highlight the importance of smallholder farmers throughout Brazilian history, whether in terms of the area they occupy or the amount of food they produced.

Furthermore, as the last quote in the previous section emphasizes, peasant practices never faded entirely from Brazil – not even to this day. There continue to be regions or pockets of traditional farming, untouched or incorporating only specific aspects of modern production systems and integration into larger markets. Nevertheless, this order also incorporates new practices and strategies to reproduce farming systems, giving birth to novel arrangements through different institutional arrangements.

Niederle and Wesz Jr (2021) describe some directions of such processes of adaptation of the domestic order. On the one hand, some traditional peasant practices (van der Ploeg, 2018) continue to be useful strategies at guaranteeing livelihoods in contemporary times, such as the production of crops that can both be consumed inside the household or sold depending on market conditions and needs, labour intensifications through optimal use of local natural resources and artisanal tools, and convivial networks of reciprocity. The integration of the domestic order into broader markets also leads to the symbolic and economic value ascribed to locally produced, artisanal products often allowing for traditional systems managing to obtain better prices for their products and incorporating small-scale processing chains that improve their income.

In the context of the studied region, another type of adaptation strategy is also crucial for the continuity of smallholder farming: the capacity to maintain land rights and access in the context of frontier expansion. Rasmussen and Lund (2018) describe how the expansion of commodity frontiers is based on the transformation of social relations and institutions in specific spaces, which precede official legitimacy and allow for the appropriation of strategic resources. Calmon (2022) gives key examples of these processes in the region studied in this thesis, showing how the appropriation of water and land by large-scale farmers hinged on novel forms of articulation with environmental legislation and government institutions. In this context, understanding the strategies through which land control is transferred to private owners (Giorgio, 2024), often through strategic use or shaping of legislation and monitoring instruments (Korting et al., 2023) is key to understand the dynamics that threaten the continuity of smallholder farming and the resistance strategies that are developed on the ground.

Another institutional arrangement through which the domestic order navigates its insertion and reproduction in modernity is through traditional peoples' rights. Almeida (2023) argues that there existed 2 different approaches to agrarian reform in Brazil. On the one hand, there was the National Agrarian Reform Plan approved in 1985, that originated from an idea of issuing land titles to this mass of marginal peasants and supporting the development of a class of small rural proprietors. Conversely, the Constitution approved in 1988 recognized a number of legal forms that remove land from the market, such as indigenous and *quilombola* territories and extractive reserves[3]. These are not dependent on a economic use of the land for their continued existence, being based on the state's recognition of traditional territorial practices that would justify the removal of certain spaces from the land market. Almeida argues that second approach would be more fitting to contemporary Brazil, aligning the expansion of land rights for historically disadvantaged groups with current pressures for sustainable agriculture and nature conservation. It could also be argued that the focus on the later rather than the former is a response to the observation of Buainain et al. (2013) that

[3] Quilombola territories are land rights attributed to communities originating from runaway slaves. Extractive reserves are publicly owned lands that nonetheless give its inhabitants the right to traditional extractive practices, such as hunting, fishing and harvesting wild plants. None of these land rights give individual titles or authorize such land to be commercialized.

there is no longer space for a class of rural smallholders, transferring the dispute for land from the techniques and discourse of the industrial order into the civil one – effectively moving the struggle for land rights from agriculture into the realm of cultural and environmental preservation.

In the course of the thesis, we will discuss how domestic order farmers in the studied region navigate different political, economic and environmental pressures to continue having viable farming systems and guarantee their land rights.

i. Rural sociology and the study of agrarian change

The interest in diverse trajectories of differentiation in rural landscapes is not new, and has been explored by a long lineage of authors. On his recently translated essays on rural sociology, Henri Lefebvre (2022) developed pioneering studies aimed at consolidating an existing but scattered tradition of French studies on regional rural life into a reflection on rural modernization from a Marxist perspective. He argues against what he calls a bourgeois scholarship of the 19th century, who would try to describe the generally accepted values that structured rural communities – while also upholding them as a bastion of traditional values against the increasing dissolution of these same values in the urban world. Contrarily, Lefebvre's goal was to uncover the class dynamics at play in the changing rural landscape, understanding its different elements as fruits of specific productive interests and conflicts and uncovering the diverse, contradictory and never monolithic trajectories seen in changing farming landscapes. To do so, he remarks on how the sociologist is confronted with scarce written documentation, being instead directed to look at "indirect evidences" and crystallizations of the material life of peasants in the shape of the fields, the types of limits between them, arrangements regarding trade and work, crop rotation schemes, etc. Studying historical and current changes of such phenomena would reveal the changes in social classes, and therefore illuminate the current state and future potential of such societies.

This interest in the diverse inner workings of farms and farming communities as not only anecdotical or primitive, but rather as a system in their own right, is taken up in a more contemporary context by van der Ploeg (2018). He is chiefly concerned with the resistance, continuity, and resurgence of peasant farming in the context of the globalization and financialization of food production worldwide. One of his central intellectual efforts is opposing approaches that understand peasant farming as lacking, residual or backward, showing it as a productive system in its own accord, with its own internal logic, and capable of adapting to new circumstances.

Some key features of peasant farming would be labour-based intensification, reproduction of a farm's resource base, and the goal of reproducing the farm rather than necessarily profiting from it at all times. Unlike the other two modes of farming he describes - capitalist and entrepreneurial, which focus primarily on the sale of agricultural products -, peasant farming tends to have a more ambiguous relation towards markets, engaging with them when convenient, but also withdrawing when that is not the case, maintaining the farms using savings or other sources of income, or focusing more intensely on production for self-consumption[4]. Contrarily, entrepreneurial and capitalist farming are mostly or exclusively

[4] These tenets of peasant farming were common throughout my fieldwork. Nevertheless, I choose to refer to the farmers I describe as either "smallholder" or "valley" farmers, two factual adjectives that clearly differentiate

focused on the production of commodities for the market, increasing investments in inputs and mechanization, and land productivity, thus maximizing profits and yields – albeit often at the cost of financial and/or environmental resilience.

Following the interest of these scholars for the unique differentiation trajectories found in rural landscapes, this research aims to study the marginal forms of farming of a region dominated by highly modernized agriculture. We will discuss which strategies are used to reproduce these farms that pose a stark contrast to the booming modernization around them, engaging with the question of whether they suggest a potential alternative pathway of development for the region. The next section will frame these research interests in the context of the study region and describe the research questions.

Problem statement

The Matopiba covers approximately 73 million hectares in Northeastern Brazil, essentially coinciding with the tropical savannah (Cerrado) cover of the 4 states that give its name (Maranhão, Tocantins, Piauí, and Bahia).

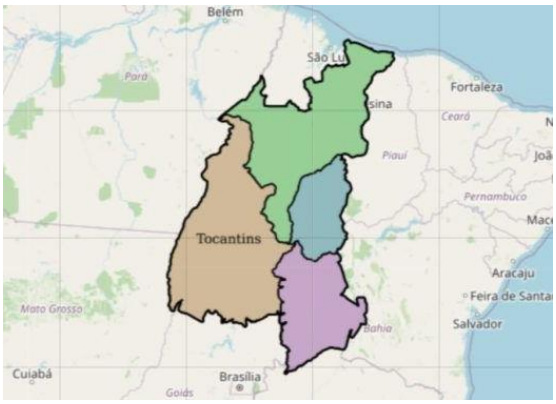


Figure 6 - MATOPIBA in the different states, with Western Bahia marked in purple. Source: Embrapa

It is often described as one of the most important agricultural frontiers in Brazil, a region where "infrastructure is poor, land prices are cheap, and the climate and topographic relief are favourable for rainfed agriculture." (Araújo et al., 2019, p. 58). Soy is currently the main crop produced in the region, having expanded notoriously in just a few decades. Between 1995 and 2015, soy production grew by 4028%, going from 260,624 to 10,758,927 tons. (Araújo et al., 2019). According to data from the Conab ("National Food Supply Company"), the region was predicted to produce approximately 15 tons of soy in 2019/20, amounting to almost 12% of the national total (Paes, 2021). The harvest of grains (chiefly soy, but also including relevant contributions from corn and rice) from 2022/23 was 92% higher than the one from 2013/14 (MAPA, 2023).

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them from the large farms atop the plateau. I chose this more objective naming considering the dynamic nature of the concept of peasant farming, which by definition tends to approach or distance itself from entrepreneurial farming, out of a wish to describe farmers' approaches without the assumption that they predominantly followed "peasant strategies". Moreover, I wished to avoid the unnecessary discussions brought by the link with revolutionary theory that the "peasantry" has in several bodies of work.

After the consolidation of soy production in central Brazil, in the states of Mato Grosso, Mato Grosso do Sul, and Goiás, this became the key agrarian frontier in the country. Within the Matopiba, Western Bahia was the first region to be occupied, as is currently the most developed in terms of infra-structure and productivity. As the map in the previous section (Figure 3) shows, the region was barely occupied with soy in the beginning of the 1980, but already boasted expressive areas dedicated to the crop in the 1990s (more than 75.000 hectares in each of the micro regions in Western Bahia).

The key productive areas of the region are marked by two distinctive landscapes: large plateau areas, suitable for industrial, large-scale agriculture, and the hillsides where these plateaus descend into the many rivers of the region. While the plateaus were traditionally used as common land for cattle grazing, the hillsides have been occupied by subsistence agriculture. With the expansion of soya, the plateaus ceased to be available as natural pastures, but smallholders could largely remain in their homes in the hillsides, since they are not suitable for plantations.

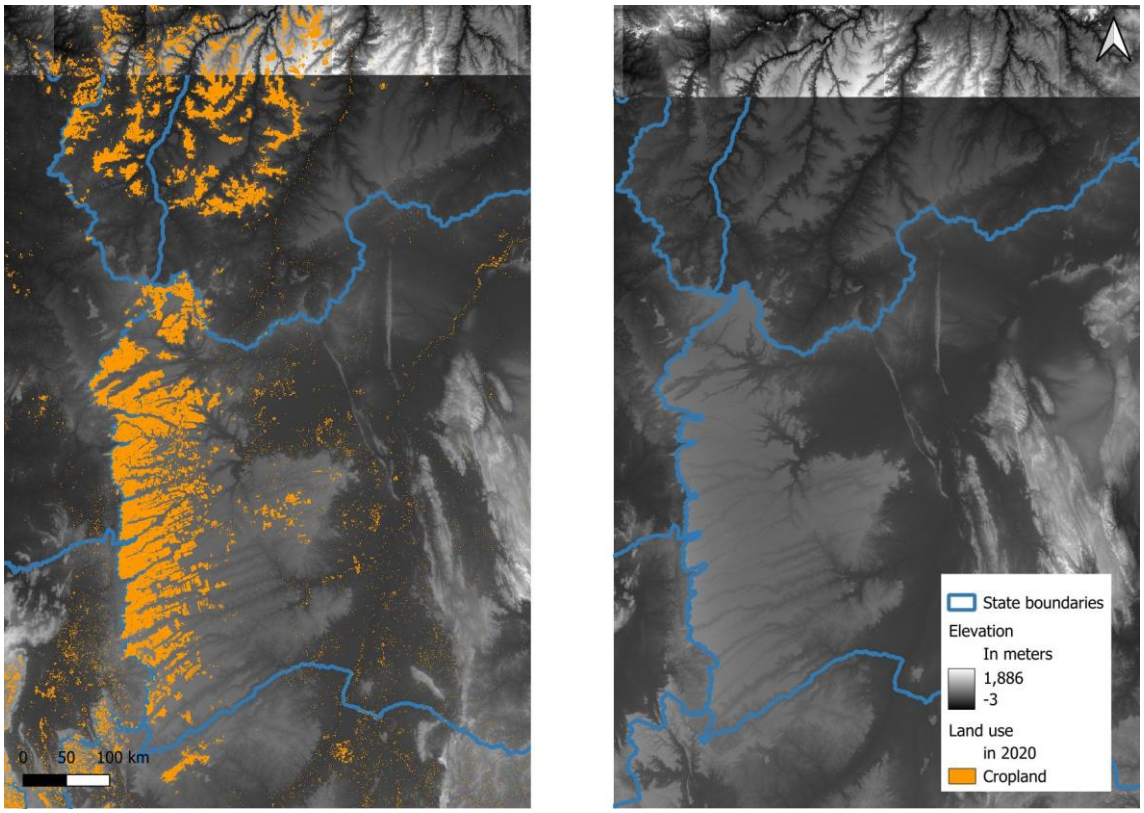

Figure 7 - Maps showing the topography and the cropland in Western Bahia, Southern Piauí and Southern Maranhão, highlighting the concentration of large agricultural extensions on the plateaus. Source: GLAD-UMD and SRTM – elaborated by the author.

This originated a strongly differentiated landscape, where highly mechanized plantations aimed for the foreign market, representing the most developed actors of the industrial order, coexist with traditional farmers who have little access to markets or capital.

Social and economic studies about the region often concentrate exclusively on the huge economic impact of the expansion of modern agriculture (Garcia & Buainain, 2016). Even studies that seek to critically evaluate it, considering its environmental and social impacts or the distribution of the generated income, focus on the social or environmental implication modern agriculture the centre stage (Lopes et al., 2021; Favareto et al., 2022). A third approach,

with which this research aligns, focuses on the livelihoods of the smallholder farmers who live on the margins of soy production, evidencing the impacts of the modern sector on these communities and the farming conducted there, while also describing alternative ways of occupying the territory (Eloy et al., 2022).

In light of the context of the heterogeneity of agriculture in Brazil described in the previous section, this research aimed to add to the knowledge on the history, practices and strategies of farmers on the margins of this agrarian frontier, focusing on the following research questions:

- What have been the main impacts of the expansion of the soy frontier on smallholder farmers?
- What are some strategies used by farmers in the margins of soy frontiers to continue farming?
- In what ways do these farmers engage with the different "orders" described by Niederle to secure their land rights and/or obtain incomes?

Methods

This research is based on the data obtained during a 2-month fieldwork in Western Bahia, between November and December 2022. It is based on participant observation and semi-structured and unstructured interviews conducted with local farmers, civil servants, NGO workers and researchers. The map below shows all the communities visited in the course of the fieldwork, highlighting those where I managed to record audio interviews. The city of Barreiras, where I arrived and to which I returned on my way back is also shown in red.

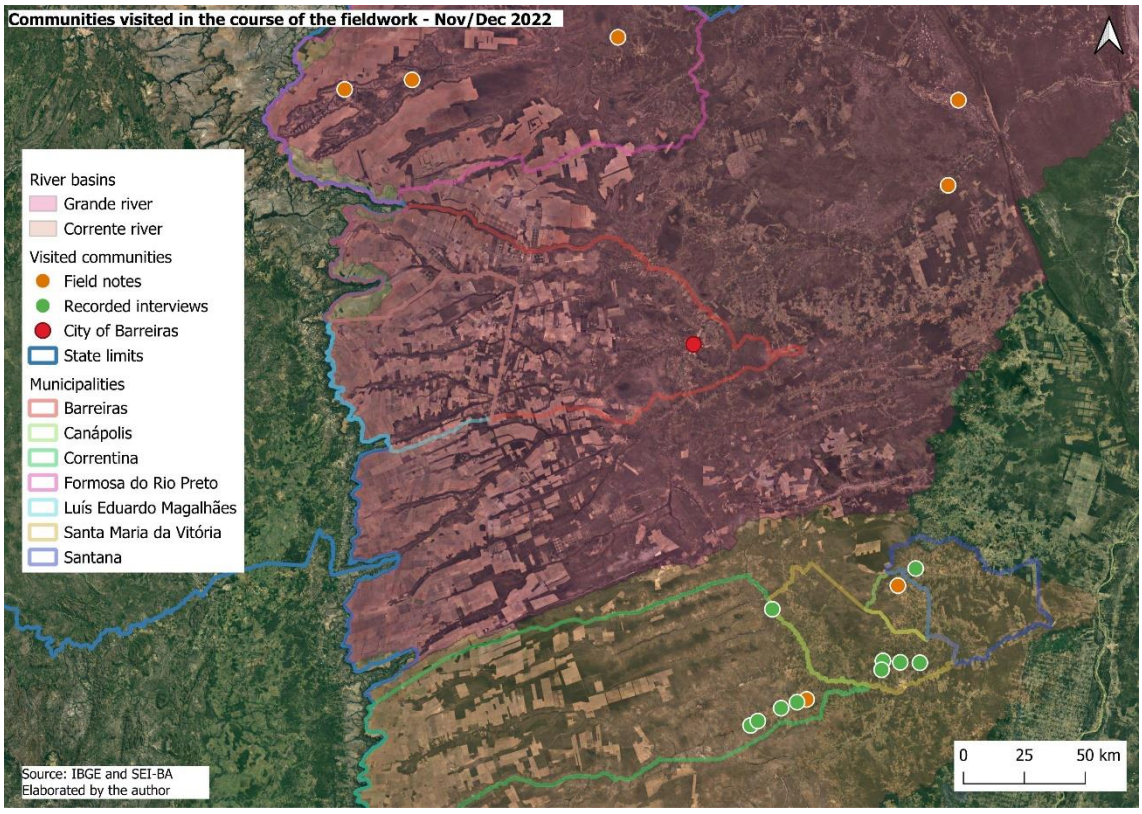

Figure 8 – Map of all communities visited in the course of the fieldwork (November and December, 2022)

Given my initial lack of knowledge of the actors present in the region, I started the search for informants and people who could support me by emailing multiple researchers who had published research on similar topics in the region. This led me to contact people at two local NGOs, 10envolvimento and CPT (Comissão Pastoral da Terra, Bom Jesus da Lapa branch), who offered to support me in my research with lodging, contacts and logistical support.

In my first 2 weeks, I stayed in the city of Barreiras, accompanying the fieldwork conducted by 10envolvimento in local communities in the Rio Preto basin, as well as in a *quilombola* community in the municipality of Wanderley.

Afterwards, I travelled south to Santa Maria da Vitória, where I attended a meeting organized by CPT with representatives of different *fecho de pasto* associations and civil society movements. There, the CPT coordinator introduced me to a farmer from Correntina, who was also the president of a *fecho de pasto* association. He volunteered to house me for some days and drive and introduce me to other farmers around his community (Buriti and the neighbouring communities of Jatobá, Praia, and Brejo Verde).

Subsequently, I stayed for some days in Correntina, housed with a local teacher and activist, where I conducted some interviews with a few civil servants, visited the local farmers' market and met with the people responsible for the EFA Padre Amaro, a rural technical high school influenced by agroecological practices and ideas.

Then, I travelled to EFA Padre Amaro[5], where I stayed for a week, talking with students, interviewing local farmers and finally spending a day in a community close by where one of the teachers at the school - a farmer himself - lived. I interviewed him at length and was introduced to some other farmers in the community of Baixa Grande. After my time at the EFA, I went back to Correntina and met with another local farmer, who took me to stay for a few days at his farm, conducting interviews with him and some of his neighbours in the community of Pedrinhas.

I then returned to Santa Maria da Vitória, where I was lodged at the CPT office and made the acquaintance of Hermes Novais. He is a former museum curator and independent scholar with extensive knowledge of rural traditions in the region, and we agreed to drive together to different communities in the region, interviewing both acquaintances of his and farmers we approached. After 2 weeks travelling around Santa Maria da Vitória, visiting communities in that municipality and neighbouring Santana and Canápolis, I returned to Barreiras and ended the fieldwork.

After the fieldwork, interviews were coded inductively using Atlas.ti to gain a sense of the main points emphasized in each interview. Afterwards, the resulting codes were observed and analysed to determine how they connected and expressed the issues and transformations in farming systems in the region. The narratives were also compared with existing literature, to see whether findings were regional or individual outliers, or were supported by previous literature.

[5] EFA stands for "Escola Família Agrícola", a type of high school mixing traditional disciplines and technical agricultural education based on alternance, whereby students spend 2 weeks lodged at the school and 2 weeks back at their families' farms working. This and several schools of this type in Brazil emphasized agroecological ideology and practices.

Considering my limited knowledge and complete lack of network in the region at the start of the study, there was an exploratory nature to my research. My choice of informants was substantially dependent on my capacity to contact and reach different people, which was linked to the relations I established with some key actors and institutions. Therefore, there are biases towards farmers and institutions linked to the network of the activist organizations I engaged with (CPT, 10envolvimento, EFA Padre André). Later on in my fieldwork, my exchanges with Hermes Novais allowed me to visit some farmers and communities outside this network, which I cherished for adding more diversity to my observations. In addition to the need for logistical support to navigate the region, my experience showed that approaching farmers without any sort of introduction was quite ineffective, since farmers we approached that had no previous relationship with the people guiding me were quite cold and unwilling to discuss any details about their farms or communities.

Despite the biases that inevitably come from depending on certain people for logistical support and networking, I tried to visit a diversity of farmers, seeking varying geographical conditions, communities, access to water, access to *fechos*, and cultures cultivated.

•

In addition to this introduction, the thesis will be divided in 5 other chapters. The first consists of a historical description of the landscape of Western Bahia, describing its occupation in relation to the mainly *coastal* colonial structures of the Brazilian Northeast; followed by the account of the expansion of soy through Central Brazil from the second half of the 20th century and how Western Bahia became one of its main regions from the 1990s.

The second consists of a literature review on the existing descriptions of past and current farming systems in one of the sub-regions of Western Bahia studied in this thesis, the Arrojado Valley.

The third consists of a number of stories from the field, coming from different sub-regions in Western Bahia. They support the descriptions of the literature review in a number of ways, giving them more depth and specificity, but also offer meaningful differences and trajectories present in different sub-regions of Western Bahia.

A fourth chapter is dedicated to a spatial analysis of the distribution of legal conservation reserves from large scale farms on the plateaus, followed by a discussion on how agribusiness actors and smallholder farmers make use of environmental issues and discourses to politically support their claims for land.

Finally, the last chapter contains the discussion and conclusions.

Chapter 1 - Contextualization

> From Cariri through the cerrados of Bahia, all the way to Minas Gerais, there are no green leaves to be seen. The lands of the Corrente river and Correntina are different, though. Irrigated by canals and lazy water wheels, pouring water day and night, they provide reliable and profitable harvests. I know it, at these times a bane is let loose everywhere! *Rapadura* and flour cost small fortunes; and happy are those in Januária, Barreiras and this Corrente, who have some resources. (…) it is when lots of money goes from hand to hand; and the riverside people of Cuscuzeiro and Cafundó pay their debts, buy more fabric, hire more people to work for them, drink wine, and are happy!
>
> -Osório Alves de Castro, *Porto Calendário* (my translation)

On this chapter, I will briefly describe the history and geography of Western Bahia, describing its development and integration into regional and national economy at different moments in time. The chapter is divided in 2 large sections. The first is dedicated to the geography and history of Western Bahia, describing its differences from the São Francisco valley immediately to the east. The second will describe the recent but overwhelming dynamic of occupation that took over the plateaus from the 1970s, showing the conditions that made it possible and its overall effects.

a. Beyond the *São Francisco* river

Western Bahia is also known as *Além São Francisco (*"Beyond the São Francisco"). This large navigable river connected the rich sugar plantations in the coast with the hinterlands, serving as a crucial driver of interiorization of the colonial occupation. It was also known as "river of corrals", owing to the development of cattle production along its margins that both consolidated the occupation of the territory west of the coastal centres and supplied food for the main plantation areas without sacrificing the prime sugar producing land.

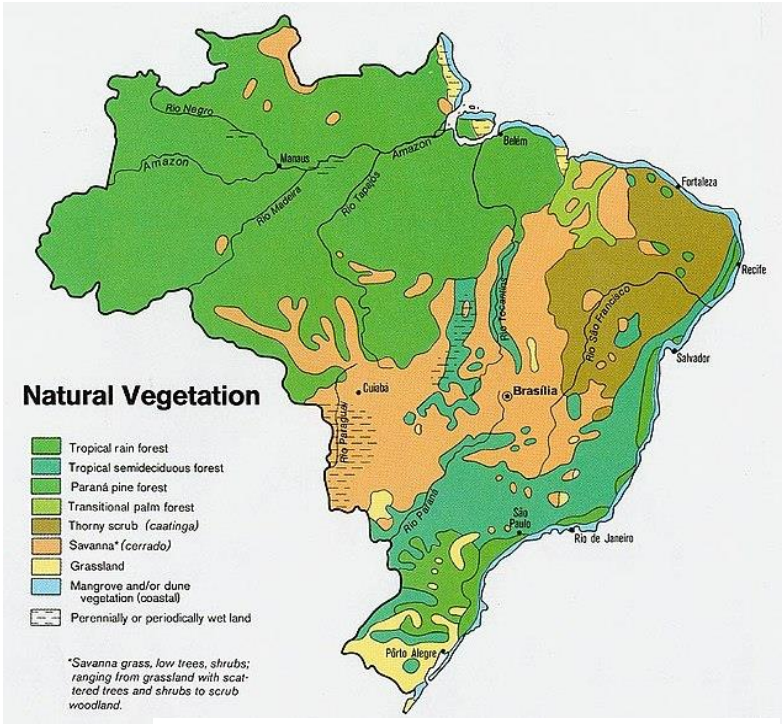

Figure 9 - Map of Brazilian biomes (Source: NASA)

Western Bahia, however, is this region beyond the main channel of transports that drove colonization, constituting a remarkably remote hinterland among the hinterlands. This is exemplified by its administrative history: the first village (São Francisco das Chagas da Barra do Rio Grande) was founded only in 1752, based on a settlement of pacified indigenous groups established at the end of the previous century, in an effort to protect cattle farms in the region from indigenous raids. It encompassed the better part of the area west of the São Francisco river, and it is not until 1820 that the first fractioning of the village into a smaller one occurs (Andrade, 2013). Moreover, the whole area west of the São

Francisco river, initially under the jurisdiction of Bahia, was given over to Pernambuco in 1715, only returning to Bahian administration in 1827. All these facts attest to the overall lack of connection of this region with the economy and administration of the state and the country as a whole (Brandão, 2009).

Another differentiating factor of Western Bahia from the *sertões* to its east are their natural aspects. While Central Bahia is generally occupied by the semi-arid Caatinga vegetation, the west is marked by the Cerrado and its transition zone (ecotone) into the Caatinga[6] (Figure 7).

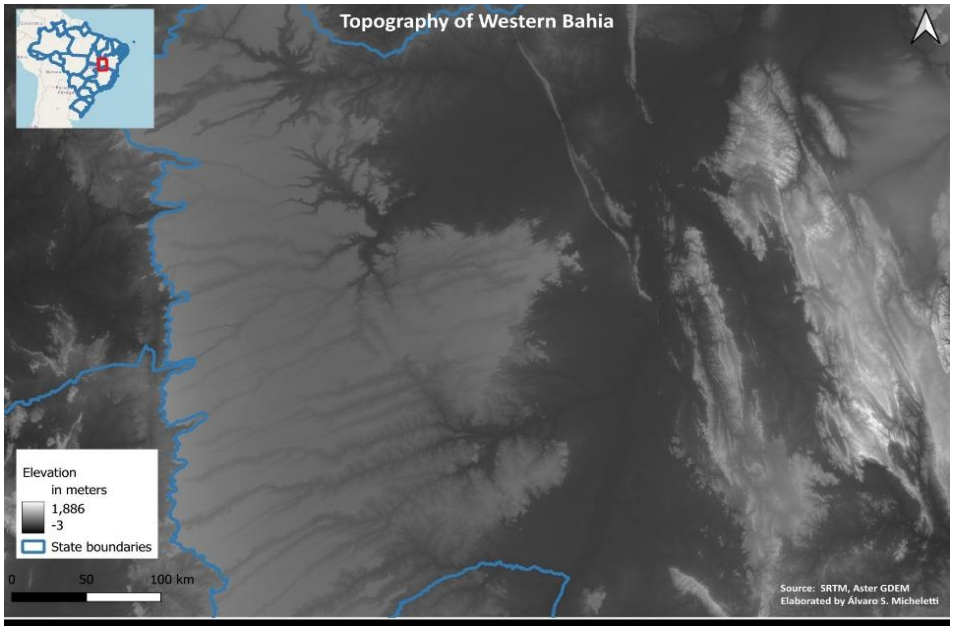

Figure 10 - Topography of Western Bahia. Source: SRTM and Aster GDEM

As we can see in the topographic map (Figure 8), as one moves to the west of the São Francisco river valley (represented by the low area in between two elevations), the plains gradually become hilly terrain, until reaching a high plateau that covers all the westernmost portion of the state (serving as the natural limit between Bahia and the neighbouring states of Goiás and Tocantins).

Moreover, as one can see on the geological map below (Figure 9), there is a change in the types of soil observed when moving from the São Francisco valley towards the western border of the state. While the immediate margins of the São Francisco have sedimentary soils, its broader valley is marked by acidic and ferrous soils for most of its extension (shown in brown in the map). The large yellowish mass that dominates the western half of the map represents arenitic formations, which constitute a large plateau that grows in altitude until abruptly descending along the line that marks the frontier of the state. These arenitic formations are highly permeable and capable of storing water, constituting the Urucuia aquifer. Paired with the increasing rainfall levels as one moves towards the west, this region stands in contrast with its drier eastern neighbour, being the origin of numerous rivers that will feed into the São Francisco.

Finally, we have this intermediate zone, filled with a range of geological qualities represented by a diversity of blueish tones. They are formed by a basis of gneiss or limestone, often mixed with sediments coming from the neighbouring arenitic formation, originating clay rich soils of high natural fertility.

[6] In my fieldwork experience, farmers, researchers and NGO employees repeatedly showed me signs of this transitional nature. We would frequently run into slightly wetter or drier pockets, in which endemic species of one biome would appear in an area that was dominated by the other. The tree called *barriguda (Ceiba glaziovii)* was one such marker species, being endemic to the Caatinga and evidencing drier pockets within the Cerrado region.

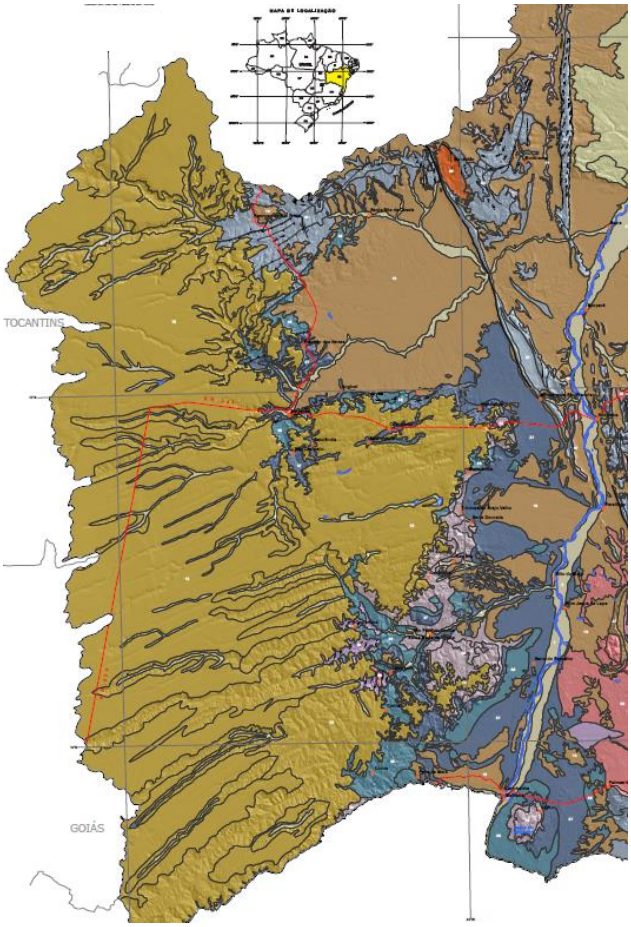

Figure 11 – Geological map of Western Bahia – Source: Carvalho and Ramos (2010)

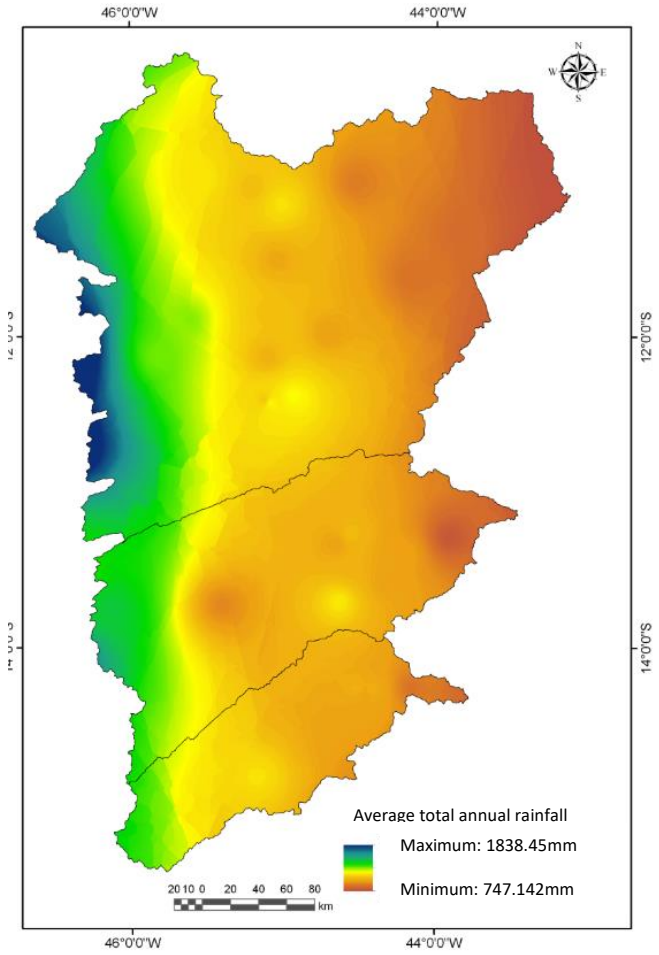

Figure 12 - Average total annual rainfall in the three sub-basins of Western Bahia - Source: Mantovani et al. (2019)

Beyond the main channel of integration into the broader colonial economy and blessed with abundant water and fertile soils, Western Bahia was traditionally inhabited by indigenous groups, and was gradually occupied by different migration waves since the 17th century[7]. The region allowed for the subsistence through agriculture and the development of some degree of successful commercial integration into the colonial structure through the production of cattle, cassava flour, and sugarcane derivates (chiefly *rapadura* and *cachaça*); all necessary, easily transportable foodstuffs that supplied the specialized sugar-producing plantations of the coast (Linhares, 1996). Santa Maria da Vitória served as an important regional port, linking the territory of Western Bahia to the east through river navigation. The quote at the beginning of the chapter, from a novelist born in the region, emphasizes this description, depicting the area around the Corrente river – one of the rivers flowing from the plateaus into the São Francisco – as a fertile region with abundant water where farming dissociated from the large estates common to the colony flourished.

The vast areas atop the plateaus are known as *gerais*, and are marked by sandy and acidic soils, generally being unfit for agriculture – except for exceptionally fertile veins or the *veredas* that occur there. Nevertheless, they were traditionally used as natural pastures, allowing for the creation of free-range cattle, often by men who would earn some animals

[7] Hermes Novais highlighted the importance of the occupation of Pernambuco by the Dutch in the 17th century for the colonization of Western Bahia, as it was a period of political turmoil that allowed for numerous people to escape slavery and settle in the hinterlands.

working on farms along the São Francisco and start their own farms westward (Barreto, 2012).

b. From west to east: industrial farming on the plateaus

In the previous section, I described the general geographical tenets of Western Bahia and its history of gradual occupation by smallholder agriculture along the river valleys. The details of the farming systems developed there and their evolution through the 20th century will be explored in depth in the following chapter. For now, it is important to described the main characteristics of the expansion of plantations that took place on the plateaus from the 1980s. In contrast with the dynamics described in the previous chapter, this period was marked by:

> "an inversion of the main economic areas of Western Bahia: while in the 1950s and 60s the São Francisco valley and its affluent rivers were the most important axis and network, through which cattle and some agricultural products were exported; in the 1980s and 90s it was the *gerais,* previously scarcely populated, that became the most valuable space. While they were occupied by the large agro-industrial complexes, most of areas around the valleys remained separate from the modernization taking place on the savannahs above." (Haesbaert, 1997, p. 138-139, my translation)

While the boom in conversion of savannahs into farmland took place in the 1980s, the preceding decades were marked by important processes that prepared the occupation of this territory. Virtually all lands atop the plateaus had no titles to them, being organized according to "a territoriality based on the daily practices of the relatively isolated social groups occupying the *gerais*, whose ties with the land were more intuitive and 'a-legal' than formal and 'legal' " (Haesbaert, 1997, p. 143, my translation), legally configurating the overwhelming majority of these areas as public lands. Private agribusiness expansion, therefore, depended on the transference of property to private actors. Similarly to how this process took place in the cerrados of Minas Gerais (Nogueira, 2019), an initial process of privatization happened through land concessions for "reforestation" projects in the 1970s, often ironically consisting in the replacement of native vegetation with eucalyptus (Sobrinho, 2012). As growing interests focused on the region as a potential future agrarian frontier, the practice known as *grilagem*, the forging of old land titles to appropriate and sell public land was generalized in the region, with numerous reports of collusion between local notary offices and companies (Aguiar et al., 2021).

Farmers report that there were already cases of foreigners arriving and claiming to own traditionally occupied areas in the 1960s, but it was especially in the 1970s and 1980s that these claims became actual threats and expulsion of farmers from their common lands – setting the conditions for the start of actual agricultural conversion atop the plateaus.

From the mid-1980s, this process starts being visible in land use change datasets: while change through the 1970s is still slow, from 1985 to 2015 there is an increase in 352% in agricultural area in Western Bahia, accounting for the situation currently observed (such as in Figure 7 in the previous chapter) where essentially all the western half of the plateau is covered with plantations. In the coming chapters, the dynamics of frontier expansion and their impacts on local livelihoods will be discussed in greater detail.

Chapter 2 - History of traditional agriculture in the Arrojado valley

> "Josefina sai cá fora e vem vê / Olha os forro ramiado vai chovê / Vai trimina, riduzi toda criação / Das bandas de lá, do ri Gavião / Chiquera pra cá, já roncô o truvão/ Futuca a tuia, pega o catadô / Vamo plantá o feijão no pó"[8]
>
> - Elomar Figueira de Melo, *Arrumação*

In this chapter, I aim to review the main studies focused on traditional farming practices in the Arrojado River Valley, in the municipality of Correntina in Western Bahia. These studies will be supported by my interview findings and field notes to describe the main elements of the farming systems through time.

When studying agrarian systems, small details can entail in important differences, leading to different strategies for social reproduction and economic success. Specially with peasant systems, that frequently have less access to abundant energy inputs, the use of resources and the integration of farms into the natural landscape are usually important aspects of farming (van der Ploeg, 2023). For this reason, while some farming practices and their evolution through time are common throughout Western Bahia, it is important to describe the details of specific regions to get a clear understanding of their development. The Middle Arrojado valley stands out as a good focal point because it was one of the places where I obtained the most interviews in my fieldwork, and also one that has been the object of other more extensive studies, allowing my observations to be put into a broader context.

When justifying his choice for a community that represented this region, Sobrinho (2012) described the main characteristic features that would have to be present as the following:

a. irrigation through excavated channels;
b. The following spatial distribution of agriculture along the landscape:
   i. main food production plots concentrated by the rivers and the channels,
   ii. rain-fed agriculture and/or pastures occupy the drier and less fertile land further away from water streams and;
   iii. areas even further away from the valleys are used as common natural pastures.
c. Cattle production happens in three different types of pastures: cultivated pastures (*mangas)*), common free-range natural areas around the communities (*soltas)*, and larger natural vegetation areas (*fechos*)[9].

[8] "Josefina, come out and see / Look at the thick clouds, rain is coming / Go and take the animals over the Gavião river / The thunder's rumbling all over / Go through the barn, fetch the beans / Let's plant beans on the dry soil" (my translation). Elomar Figueira de Melo is a unique singer, mixing Medieval troubadour traditions with folk music from Northeastern Brazil. His songs depict with authenticity multiple aspects of rural farming, language and culture in the hinterlands of Bahia. Here we see the anxious wait for the rainy season to come, the signals of which prompt farmers to take animals to common rangelands and plant "catador" beans (*Vigna unguiculata)* on the dry soil, trusting that the rain will soon come to water them.

[9] I follow Sobrinho (2012) in his differentiation between *soltas* and *fechos* to differentiate between these two existing types of common natural pastures. However, these words are often ambiguous in the field, with the word *solta* being used to refer to any type of plot where the cattle are set loose.

This description shows different types of valley areas forming a sort of gradient until reaching the wild land of the *gerais*. These different areas of the landscape can be seen in the following scheme of the agricultural landscape in the region:

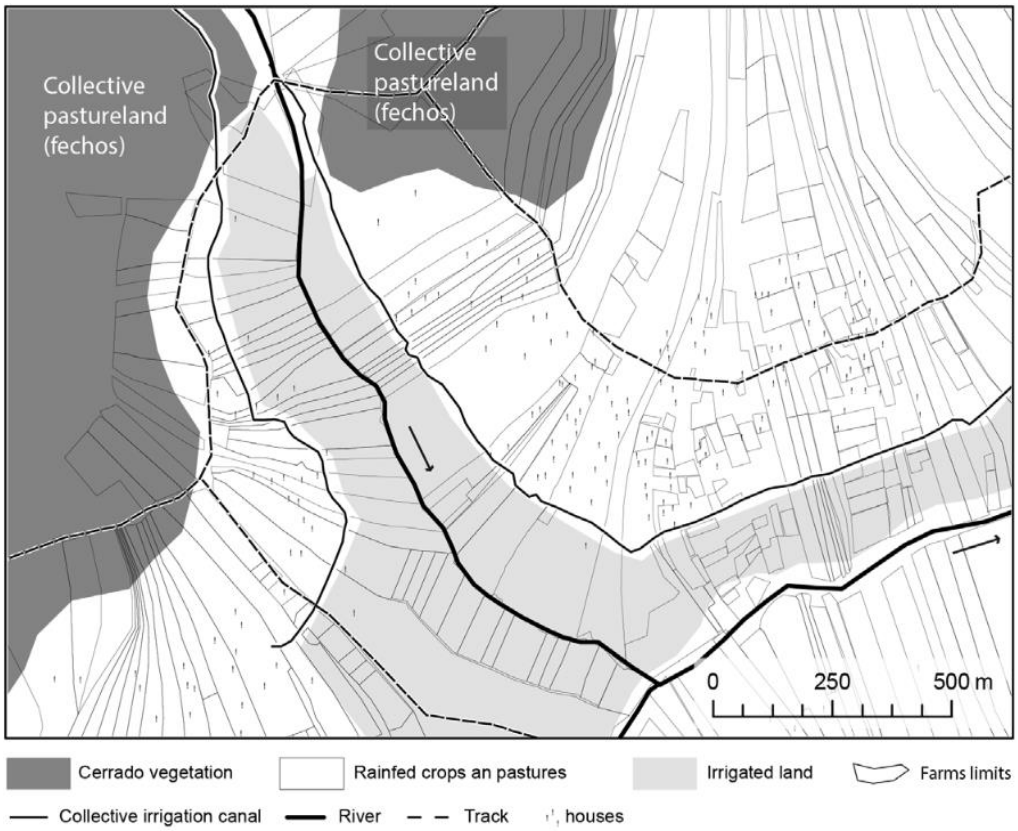

Figure 13 - Scheme of agricultural lands in the Arrojado valley – Reproduced from Vigroux et al. (2023)

On a broader geographical scale, this represents a zoom into the very transition between the fertile lands on the eastern border of the plateau and the sandy soils atop of it. We will now describe the main changes in land use and agriculture in this region through the 20th and 21st century, focusing on how these different areas (irrigated, rainfed and *gerais*) were occupied through time.

a. First half of the 20th century

The initial occupation of the land followed the rivers and fertile soils, having progressed from east to west along the river valleys. Before any artificial irrigation structures were built, agriculture was concentrated on the riverside plots. Areas moving further up and away from the rivers were usually forested, being used as common grazing ground for the cattle or for rainfed swidden agriculture.

Among the main cultures of the region, rice, sugarcane and vegetables are highly dependent on irrigation, while cassava, beans and corn can be grown without it; although they become less productive and more weather-dependent (Sobrinho, 2012). Sugarcane is frequently produced for sale as sugar, *rapadura* or *cachaça*, while the other crops make up the core of people's diets. Most households also have some pigs and chickens, fed with leftovers and corn and left to roam freely, and small plots around the house for cultures used as seasoning like garlic, coriander, sesame, and parsley. These plots closer to home were mostly referred

to as women and children's responsibilities, while tending the cattle is an almost exclusively male job.

Tradition of sugarcane production

Sugarcane is traditional crop in the region, being commonly produced for sugar, *rapadura* or *cachaça*. Although not entirely non-perishable, *rapadura* can last for quite a while if stored properly, serving as an important reserve of calories for diets, sometimes being mixed with flour and meat in meals. *Rapadura* was also an important commodity, one of the main products sold by farmers in the city markets of the region.

João, a farmer in his 90s from the Jatobá community in Correntina, said he used to produce *rapadura* to sell in the town of Jaborandi, employing two people for it. He would leave his farm in an ox cart on Friday to arrive at the market on the following day, where he would buy cassava flour and meat for himself and to sell back in the community.

Barreto (2012, p. 7) places this individual story in a broader context, arguing that it was a common practice in the municipality of Correntina around the 1950s to sell *rapadura* in Jaborandi, which was then transported in ox carts or mules to Santa Maria da Vitória or Bom Jesus da Lapa. He adds that wooden sugar mills dominated, only being replaced by iron ones from around 1995.

Hermes Novais tells of the elaborate system of trade developed to transport goods (chiefly sugarcane products) from farms around Santa Maria da Vitória to the city. Markets would happen on Saturday, and farmers would come using ox carts from multiple communities around in the previous day. Since the roads were narrow and going backwards with an ox cart is very complicated, there would be oral agreements in the markets for the time of arrival and departure at the different entrances of the city, so that the flux to and from the villages around it was all in the same direction. In the Malvão street, there used to be an ox cart gate to control and tax the entrance of commodities in the city, established by *coronel* Clemente Araújo Castro.

Figure 14 - Plots of irrigated sugarcane in Brejo do Espírito Santo (municipality of Santa Maria da Vitória). Small ditches connecting irrigations channels running on both sides of the plots supply water to the crops. Source: the author, fieldwork in nov/dec 2022

A key change for the development of agricultural systems in the region was the **construction of irrigation channels**. Cruciol (2021) dates the first ones to the 1920s, with new ones being built through the decades. In the next chapter, for instance, there is documentation of one that started being built in the 1960s. The increase in irrigated areas brought by these channels greatly increased the agricultural potential of lands with access to them. Sobrinho (2012) links the construction of these channels to population increase and the need for more intensive use of the soil. The construction of these channels structurally changes the agricultural possibilities of the region, transforming lands limited to use as rain-fed agriculture into prime irrigated agriculture plots, making agriculture possible year-round and reducing weather-vulnerability (Cruciol, 2021, p. 55).

Figure 15 - Irrigation channel in the municipality of Correntina that supplies water to the community of Pedrinhas. Source: the author, fieldwork in nov/dec 2022

Agriculture in the marshes nowadays

Nowadays cultivation in the *veredas* is forbidden by environmental law, but a farmer from the Jatobá community told me of the rice he used to cultivate in these places:

"We cleaned the plot, channelled the water out, put the rice in… In the first year, in my plot and Pedro's only, we got 138 sacks of rice. We stayed there for 5 years. The plot was small. But the rice would grow even in the wood sticking out, the rice grains grew atop that rotten wood that was beneath the water

-After drying the marsh, you mean?

-After the water is removed… Then we'd go there with the ox cart, me and Pedro, bring the rice, all loaded on the oxen, bring it over here"

João, ~90 years old, Jatobá community

Numerous interviewees highlighted that these traditional agriculture practices in the marshes are not detrimental for the environment and the water regime of the rivers, arguing that the *veredas* are water discharge rather than infiltration areas. Nevertheless, several farmers in the Middle Arrojado region tended to talk about these practices as something of the past. Isaurino, a farmer from the Middle Arrojado, pointed out that with the fencing of limited areas of the *gerais* used by the communities (*fechos*), there was not enough area to rotate between marshes and allow them to go fallow after cultivation, thus making these practices not environmentally sound anymore in his view.

In the Aldeia community, located up in the *gerais* of the municipality of Formosa do Rio Preto, I collected reports of agriculture in the marshes, where rice, beans and cassava would be cultivated for 3-5 years, and then left to lay fallow for another 3. There were reports of the plots being abandoned to return to a forest state after 30 years of use. This is in line with what is described by Souza (2017), for communities that had enough available area to do such rotation. Another farmer complained that while smaller agricultural plots are allowed, the larger rice production that used to take place in the marshes is now banned by environmental organs.

Sobrinho (2012) and Vigroux (2019) argue that as the riverside areas and swidden agriculture ceased to be sufficient for a growing population, agriculture in the marshes of the *gerais* (*veredas)* became more important. Vigroux (2019) dates the occupation of these lands from the 1940s. These marshes foster denser vegetation around them, making for the accumulation of organic matter on the soil. The plots are drained and burned before being planted, being used for food production for several years until they are left fallow to regrow. This type of agriculture would happen in the period when the cattle would be taken by the communities down the river to for transhumance in the *gerais,* but there are also communities that developed there in the Upper Arrojado, as farmers with little land in the valleys would go and settle in the plateaus (Vigroux, 2019). While such communities (such as Arrojolândia, formerly known as Couro de Porco) continue to exist to this day, they suffered much harder impacts from the occupation of the plateaus by agribusiness, being effectively surrounded by soy fields. While communities in these areas are not the focus of this research, they will be briefly discussed on the coming chapters.

Sobrinho (2012) argues that this type of agricultural production was one of the main sources of food for the Middle Arrojado communities, stating that their prohibition was a relevant external shock to the farming system, demanding intensification solutions. Conversely, the timeline of agrarian systems of the region developed by Cruciol (2021) does not place agriculture in the *veredas* among the key historical changes of the agrarian systems of the valleys.

Cattle production

Cattle production in the Middle Arrojado has been a constant since at least the 19th century. Sobrinho (2012) paints the following picture of the distribution of cattle in the landscape in the first half of the 20th century:

> "In the past, until around the 1970s, there were no fences in the community areas. Many interviewees state that animals were less numerous and roamed freely, grazing in the forests and natural *cerrado* grasslands, in the so-called *soltas*. Fences were limited to riverside plots, to protect agricultural areas from the animals (…) in the absence of cultivated pastures, [the animals] roamed freely year-round, alternating between the forests and savannas near the communities (*soltas*) and the *gerais*, further up the Arrojado river valley, where the *fechos* are currently located"
>
> (Sobrinho, 2012, p. 243-244, my translation)

In the dry season, after the surrounding common areas were exhausted, the animals would be taken to the *gerais*, or even go on their own, as there were no fences and they knew the way. Sobrinho (2012) states that this would usually happen in June, while Cruciol (2021) reports even longer period in the *gerais*, starting as early as April. With the start of the rainy season and the recovery of the forage in the areas around the villages, the cattle would return, restarting the cycle. Cattle were mostly raised on natural forage in common areas, either in the areas surrounding the households or the natural vegetation further away. Therefore, it was not that necessary to own land in order to have some cows.

The details of the lived experience of tending to cattle in the *gerais* will be discussed in further detail in the next chapter. Nevertheless, it is important to emphasize the cultural significance of this practice, beyond its place in the functionality of farming systems.

This is the context that gives birth to the figure of the *vaqueiro* (cowboy, rancher), a man who has the impressive skills and courage necessary to herd cattle in the *gerais* and live there in the transhumance period; while also being connected with the sense of propriety and prosperity linked with the ownership of cattle or the potential thereof[10]. Throughout my fieldwork, it was common to hear stories of (fear of) encounters with jaguars or anacondas, the toils when one or several animals would get stuck in the marshes, or heroic feats of tracking lost animals in the seeming infinite expanses of the *gerais*. Going to the *gerais* was something learned from one's parents and grandparents, and a crucial space of community, where the men would often spend months living in huts, cooking together and sharing in the tasks involved in keeping the cattle safe.

b. Late 20th century

The 1950s and 1970s bring a number of different processes that, as a whole, lead to an enclosure of common lands and an increase in the number of animals and the importance of cattle production for the communities. We will now go through some of the important changes that took place in the period and their impacts on local agrarian systems.

Ploughs, barbed wire, zebu breeds and forage grasses

Before delving into the multiple forms of land enclosure from "outside actors", it is important to delve into common enclosures made by the same farmers who used these commons. Ribeiro (2012) states that barbed wire, zebu breeds, and African forage grasses were three crucial components of the emergence of the modern Brazilian beef industry in the 20th century. These elements prove important in the studied region as well, and it is worth briefly summarizing their arrival in both the country as a whole and Western Bahia.

Barbed wire is invented in 1873 in the United States, and although already being used by large landowners in Brazil in the early years of the 20th century, there are sources stating that in the mid-1950s it was still a very expensive product (Ribeiro, 2012, p. 334-335). Barreto (2012, p. 9) also states that it is not until the 1950s that barbed wire fences begin to be used in the Arrojado River valley, and one civil servant of the Agência de Defesa Agropecuária da Bahia (ADAB - "State Livestock Health Agency of Bahia") stated in an interview that it was only in the 1970s and 80s that it began being widely used in the region. Before that, several statements from the field and Barreto (2012, p. 6) agree that fencing with mud or wood (or more rarely stone) was made mostly to keep animals *out* of agricultural plots, or to lock them in specific grazing areas or temporary places for occasions like the treatment of sick animals or pregnant females:

> "Actually, cattle roamed loose, what was fenced were the plots we cultivated, and the cattle was loose. In this area, from Alegrete and all the way to Lavandeiro, the cattle was free, everybody raised it free like that, there were no fences. It was only afterwards that people started putting up their fences and cultivating grass for the cows and things started looking like this (…)"
>
> Manoel Francisco, 74 years, Cuscuzeiro community

[10] As discussed above, even *vaqueiros* who did not own cattle and worked for richer farmers had the opportunity of slowly building up a herd of their own, given the common practice of being paid a fraction (usually one in every four) of the calves born in the herd they tended to (Barreto, 2012, p. 6).

Figure 16 - Old wood fence, common before the generalization of barbed wire, located in Mutum, in the* gerais *between the municipalities of Santana and Canápolis. Source: the author, fieldwork in nov/dec 2022

Instead of an assumption that if a plot is not fenced it will "naturally" be taken up by someone, since it being "fence-less" implies in it being idle, fencing was actually an expensive exception, undertaken only in areas that concretely need to be safe from animals getting in or out. The technical and financial *possibility* of fencing plots is one of the vectors of modernization of this territory, not only through the enclosure of the *gerais* by foreign parties, but also through the fencing and individualization of smallholder plots.

The introduction of barbed wire is accompanied by the introduction of the *zebu* cattle breed and specialized grasses. This process is summarized in a national scope by Ribeiro (2012) and Nascimento (2013). *Zebu* breeds were already present in Brazil in the early 19th century but began being more intensely selected and raised in the 1890s in southern Goiás and the *Triângulo Mineiro* region, chiefly in the city of Uberaba, which "became the radiating center of Zebu cattle to the whole of Brazil", exporting 10,000 reproducers to different Brazilian states in the year 1912 (Ribeiro, 2012, p. 327). Although there was strong opposition against it at the time, arguing its meat was hard and bad to the taste, and that it dilapidated Brazilian breeds and traditions, the *zebu* eventually became almost ubiquitous, its genetic spreading throughout the whole of the Brazilian herd. The former museum curator and independent scholar Hermes Novais stated that the first arrival of *zebu* cattle in Western Bahia can be traced back to its introduction in an experimental farm owned by Suvale, *Colônia Agrícola do Formoso,* in the 1950s.

A similar process occurred with forage grasses imported from Africa. Ribeiro (2012) reports that African grasses were already present in multiple areas of the country in the early 19th century, with multiple origins, some anonymous, and some credited to different individual initiatives. Nevertheless, it is in the beginning of the 20th century that these imports became systematic and sponsored by the government and research institutions, in an effort to

increase the productivity of the cattle industry. Multiple strains were experimented with, until "a real 'agrostological revolution' ocurred in the 1960s, with the 'Brachiaria genus, initially represented by B. decumbens from Pará', in the North Region of Brazil, 'a species that, at first, was destined for the poor soils of the savannah areas, then began to be used indistinctly in various types of land', becoming one of the grasses with the longest success in national cattle farming" (Ribeiro, 2012, p. 333). Sobrinho (2012) and Cruciol (2021) report the *Andropogon* genus to be the one ultimately favoured by most farmers in the Middle Arrojado after historical experimentation with different breeds, although a diversity of varieties is observed in the field.

What is important about these processes is that the introduction of selected breeds and cultivated forage grasses is contingent on the isolation of these improved animals from the rest, so that their genetics are not mixed; and the development of cultivated pasture plots, changing the practice of raising free-range cattle. This allows for greater productivity and more cattle to be raised in the region, but increases its concentration and makes it increasingly necessary to own land in order to raise cattle. The presence of cultivated pastures in community areas did not eliminate the use of the *gerais* for transhumance, but changed the times when it was conducted, changing from once to twice a year, following the need of cultivated pastures to develop after the start of the rain (September-October until November - December) and to shed their seeds (March-April until June) (Sobrinho, 2012; Cruciol, 2021).

Figure 17 - Cultivated pasture plot in the community of Pedrinhas in Correntina (BA). Source: the author, fieldwork in nov/dec 2022

Vigroux (2019) and Cruciol (2021) also emphasize the importance of the adoption of the plough in the region, which they date to the 1980s and 60s, respectively. Vigroux connects the increased productivity of labour brought by the ploughs with the possibility of working more land. This prompted an increased agricultural use of the plots further away from the river and channels, mainly in the form of pastures.

Taken together, these innovations point towards an increased cattle herd and use of land for cultivated pastures, usually in a consortium of forage and cultures like corn. Sobrinho (2012) argues that this increased cattle production served as a response for the increasingly smaller proprieties per farmer and depleting fertility levels, allowing for a profitable use of the land in association with the common pastures of the plateaus.

While the "internal" changes in smallholder communities caused some types of enclosures, "external" actors, private or linked to the State, have also ignited processes causing other types of privatization of common land in the region. A more detailed analysis of land conflicts in the region will be developed in the last chapter, but at this moment, we will describe their broad strokes and focus on their impact on smallholder agrarian systems.

The genesis of the "fechos de pasto"

As discussed in the first chapter, starting in the 1970s, there was an intense process of enclosure of the *gerais*, with these areas being (legally or illegally) acquired to be converted into agricultural land. Nevertheless, this process also meant that numerous communities lost the natural pastures that played an important role in their agrarian system, with numerous communities also organizing to resist this process. Resistance against this pressure gave birth to the *fechos* that exist today, when groups of relatives, friends or neighbours got together to fence the area they customarily used for their cattle (*fecho* roughly meaning enclosure). Although there were no physical or formalized divisions in the *gerais*, it was common that specific groups would be based in certain places, building huts to house them and their tools while they took care of the cattle, with hills and creeks being used to divide the territory. With the sudden pressure of land appropriation, these informal arrangements were turned into physical, barbed wire fences, often involving direct conflicts with the new "owners" of these areas.

This fencing had substantial impacts with the way of relating to the *gerais*. A very common story I heard was of the interaction interaction with *vaqueiros* from Goiás when tending to cattle; a story usually told with nostalgic undertones, emphasizing as it did the seemingly infinite dimension of the *gerais*. That is because Goiás lays several hundred kilometres west, on the other side of the plateau, where farmers in the valleys beneath would similarly raise free-range cattle. Finding stray cattle or *vaqueiros* from the other side looking for their animals was a testament to the size of the fenceless area, and which was nevertheless populated by all those doing the skillful labour of navigating it.

Most of the land was appropriated in the following decades, setting the scene for to the impressive boom in soy production and land use change previously discussed. The existence until today of numerous *fecho de pasto* associations that lay claim to thousands of hectares of *gerais* throughout Western Bahia and Piauí is a testimony of the success of the organized, direct action of these communities. Nevertheless, the expansion of large-scale agriculture that took place from the 1970s brought changes of enormous proportions, hugely reducing the areas of *cerrado* and wild pastures. It is safe to say that basically all communities who did not actively defend their areas lost them completely, and even those who fenced a *fecho* were

now reduced to a fraction of the area potentially available in the past.[11] The reduction in the available areas and the constant conflicts, often leading to threats of violence, both work as incentives for the organization of the remaining farmers, while also discouraging several from engaging in this practice and prompting changes in the systems.

Changes in water availability

Just like the increased water availability brought by the irrigation channels had huge impacts on the productivity of the land and the crops that could be planted, changes in recent years in the rain regimes and streamflow of rivers and channels also have been having substantial effects on agrarian systems in this region. Bananas, sugarcane, rice and vegetables can only be cultivated in irrigated areas, and the culture of cassava, beans and corn is less productive and more uncertain if solely dependent on the rain.

After studies interviewing different types of farmers in the region, Vigroux (2019) and Vigroux et al. (2023) describe differentiation in farming systems in the Middle Arrojado through the 2000s with a central focus on changes in water availability. Among farmers with more land, those whose irrigation channels continued to have water, and who had sufficient manure, could plant rice and rotate it with beans and maize; farmers without flowing channels had to focus solely on corn, beans and cassava, sometimes being able to buy water pumps; and those with no access to water usually focused on planting cassava and selling its flour. Among farmers with less than 1 hectare of irrigable land, some could successfully turn into market gardeners, while other tended to abandon agriculture altogether and work odd-jobs in larger farms or cities.

My field experience also showed water regime changes to have great impact on the farmers. The abandon of rice and sugar cane and the focus on corn, beans and cassava, while still suffering from the lack of water and the irregularity of rain where common in all communities visited across Western Bahia. Corn was repeatedly mentioned as being strongly affected by irregular rains, needing a steady water supply particularly after it flowers in order to form the corn cobs. Several regions had large areas converted into pastures; a process motivated by the factors discussed above, but also heavily influenced by dry channels and creeks, and unpredictable weather.

Overall, the reduction of water availability decreases an area's agricultural potential, making previously irrigated areas dependent on rainfall, while rainfed plots suffer with increased weather irregularity. This contributes to starker differentiation patterns among farmers: those who can access water (either because their water sources continue available, or through investments in pumps or wells) have greater productive agricultural alternatives, while the increasing number of those who cannot turn to poorer farming systems, often leaving areas to become unproductive pasture plots.

These dynamics will be illustrated with different cases in the next chapter. Moreover, chapter 4 will contextualize these field observations of changing water availability and weather in light of available literature on streamflow and weather variations, determining the extent to which it is possible to ascribe these changes to the expansion of irrigated agriculture in the plateaus.

[11] Cruciol (2021, p. 60) offers a rough estimate from a farmer who states that they used to use 50.000 hectares of *gerais,* which are now reduced to a *fecho* of 2.900. Vigroux et al. (2023) estimate that farmers in the valley of Correntina in 2020 had half of the area per animal that they used to have in 1985, considering both common rangelands and private pastures.

c. Main changes in the 21st century

The impact of fire bans in the gerais

Fire management has been used for centuries in multiple regions in Latin America, as a technique to maintain pasture fertility (Sluyter and Duvall, 2016). Several recent studies have focused on the traditional fire management conducted by traditional populations in the Cerrado and its positive impact on the biome (Fagundes, 2019; Eloy et al., 2019). Nevertheless, the issue has currently become very politically charged. Threats of environmental fines have been reported to be used by agents of large farms trying to lay claim to *fechos de pasto* (Vigroux, 2019), and environmental regulations and interdictions often focus disproportionately on practices like traditional fire management and marsh agriculture while accommodating for the needs of industrial farming (Eloy et al., 2016).

Without burning *cerrado* areas, their quality as pasture decreases. Since the 2000s, there have been increased restrictions on fire in natural areas, which strongly affect *fecho de pasto* communities, as the quality of the Cerrado as natural pasture decreases without the use of fire.

Figure 18 - ***Two Cerrado areas, the first with no fire management and the second one year after being burned, showing the recovery of the biome – Reproduced from Vigroux (2019, p. 86)***

On this chapter, I went over the historical formation and dynamics of farming systems in the Arrojado valley, drawing from fieldwork interviews and observations and a comparative review of the studies of Sobrinho (2012), Vigroux (2019), Cruciol (2021) and Vigroux et al. (2023). I described how the agricultural occupation of the region was developed through the 20th century through the gradual differentiation of farming systems. I showed how local traditional farming systems are based on different agricultural uses of each part of the landscape, from the fertile riverside plots to the hillsides and the surrounding *gerais;* and I described the gradual intensification of an initial occupation based on riverside agriculture, swidden plots and free-range cattle in the hillsides and the *gerais*. One of the first key changes were irrigation channels, which allowed for greater and securer yields for the plots around them, expanding the agricultural potential of riverside up to the hills. The arrival of modern cattle production practices contributed to the fencing of common areas in the valley hills, while also increasing cattle production in association with the use of the *gerais*. The occupation of the plateaus with soy production brings about several processes. From the 70s, local farmers fence their traditional areas to avoid foreign claims over them; a process that ultimately led to the current *fecho de pasto* associations, but did not stop the conversion

of most of the plateaus into plantations. Currently, growing weather irregularities and reduced streamflow impact the valleys, working in the opposite direction of the expanding agricultural possibilities prompted by the expansion of irrigation channels. Hillsides become less productive, as irrigation dwindles and rainfed agriculture becomes increasingly unreliable. Moreover, restrictions on fire usage reduce the carrying capacity of the *fechos*, putting pressure on cattle producers. While farmers who continue having access to water and area for their cattle can still obtain good yields, these multiple pressures limit the possibilities of less endowed ones to continue farming the same way.

After having outlined the overall dynamics at play in one region of Western Bahia, the next chapter will go over several cases from farmers in my fieldwork, mostly from the Corrente river basin. They will illustrate different trajectories followed by farmers under these conditions, while also highlighting specific regional variations to the scenario described above.

Chapter 3 - Farming stories in the Corrente river basin

"What people here want is not to work for others!"
- Farmer in the municipality of Santa Maria da Vitória

After summarizing some of the main drivers changing farming systems in the valleys of the Middle Arrojado, this chapter focuses on reporting observations made in different areas of the Corrente river basin. They will allow us to see diverse conditions set within this broader context and different trajectories that farmers follow under them. I intend to show how varying landscapes and historical conditions can foster different types of farms, as well as discuss different individual choices in similar conditions.

Each section of the chapter is dedicated to a different community or set of communities, starting with its broader geographical conditions and then going into some farmer stories set there. The main points are then summarized and reengaged with in the following chapter, dedicated to discussion and conclusions.

I. Buriti (and other communities in the Arrojado valley)

Among the existing literature on traditional farming systems in Western Bahia, there is a concentration of studies on Correntina and the communities with *fechos de pasto*, located along the eastern margins of the plateau (Sobrinho, 2012; Cruciol, 2021; Vigroux et al., 2023). The map below (Figure 20) shows a section of the Arrojado river valley, one of the regions where these communities are concentrated. This prevalence can probably be explained by the comparatively high political organization of local farmers, with numerous recognized *fechos de pasto* represented by associations, and their articulation with organizations like CPT and AATR, whose members and networks greatly supported my research. The existence of the *fechos* is also important for local farming systems, as we will discuss below. Upwards along the Arrojado river, we find communities settled atop the plateau, who were impacted much more directly by the expansion of plantations in the region, effectively being surrounded by soy plots. As we move down the river, there is also less prevalence of communities with access to *fechos*. In this section, when I refer to farmers in the Arrojado valley I mean those interviewed in the communities shown in this map.

Figure 19 – Map representing the communities visited in the Middle Arrojado valley and the surrounding *fechos de pasto.*

I stayed for a week at Jamilton's house in the Buriti community in November 2022. The communities are characterized by a series of farms scattered along a hilly dirt road, with each different community being divided from the next by markers that I could not observe at first glance. Jamilton drove me to other farmers' houses in Buriti and neighbouring Jatobá, Brejo Verde and Praia, where I could talk to farmers and conduct interviews about the current state of farming in the region and their farming systems. I recorded a total of 8 interviews in the area.

It is also worth pointing out that I arrived in the Buriti community in the first days of November, right after the first rains of the season had started falling. As the attentive reader of the previous section can infer, this was a particularly crucial moment for cattle farmers, as it is the period when depleted and dry grass plots start to regrow and form the forage that will feed animals for the coming year. In the case of the *fecheiros* (i.e., users of *fechos de pasto*), this is a common moment for the cattle to be in the *gerais*, allowing the cultivated pastures enough time to develop without being eaten right away; while farmers without *fechos* have to do the same by rotating around their cultivated pasture plots.

Agriculture and local products

One of the main themes of my interviews was establishing the main elements of the farms and what were the current and future perspectives of agriculture in the region. A very common statement about agriculture was that it was not very profitable, if at all. While there could be incidental good harvests or market conditions that allowed for the profitable sale of excess produce, agriculture was mostly practiced for self-consumption, with limited possibilities of sales. It was also uncommon for farmers to keep track of costs, making the matter of profitability of cattle or agriculture largely a guessing game.

Drawing from fieldwork experience in the same region over 10 years before mine, Sobrinho (2012) observed the growing connection of these communities with the town and its markets, as well as the greater monetarization brought by the expansion of government handouts since the start of the 2000s and rural pensions, as well as the intensification of cattle production as it modernized since the 1950s. He argued that these developments allowed local farmers to become consumers, both from local products and from local towns. This monetarization of trade in food crops was observable in my fieldwork as well: crops like rice, which depend on a lot of water and require intensive work, were mostly bought from urban markets; and I heard reports of the occasional good harvest of beans or corn being sold around the communities themselves.

Along these lines, I could also observe multiple artisanal industries in the communities, with household workshops dedicated to producing *cachaça* or sugar (Figure 21), sugar cane-derived products that are not dietary staples, and are more predominantly produced for sale. Jamilton also reported that Buriti was known in the past for its production of sweets from fruits and milk, which was nevertheless dwindling. Another farmer said he used to produce them, but with the competition of cheaper alternatives in the town stores he gradually abandoned it.

The main issue and complaint I observed was regarding the difficulty of farming due to the lack of water, be it in the channels and creeks or the rain. Although there were some reports of good bean harvests of some farmers in the previous year, there were numerous complaints of bad harvests due to lack of or irregular rainfall. Corn was particularly affected, being especially dependent on steady rain at the time of formation of the corn cobs to yield a good harvest.

However, while cattle was always mentioned as the activity that actually generated cash incomes, and despite these water issues, none of my interviewees had stopped farming their land, continuing "even if out of stubbornness", and changing towards crops that deal with dryness better in areas that had decreased water availability (such as cassava, that becomes less productive and takes longer to develop, but can still be grown with little rain, or cowpeas, which are more rustic than other bean varieties).

Figure 20 - Corn plot close to a house in the community of Novo Mundo (Santa Maria da Vitória), away from creeks or irrigation. Source: the author, fieldwork in nov/dec 2022

Cattle production

A distinctive characteristic of the agrarian systems of the studied area of the Arrojado valley is their proximity to the *gerais,* and the continued access that some groups have to it. Among the interviews conducted with farmers in, it was nearly unanimous that cattle were the most important source of monetary revenue. Even though the region has a tradition of cattle production and its use as reserve of value is very ingrained, its importance was comparatively greater in the communities closer to the *gerais*. This is in line with the observation made by Sobrinho (2012), who states that the natural pastures of the plateaus were used together with fenced pastures on the valleys to obtain revenues by raising cattle, as agricultural plots in the valleys became increasingly fragmented and lost fertility.

When asked what was the activity that yielded the most money, virtually all my interviewees in the region said it was cattle. The main income from cattle comes from the sales of calves for further rearing until the age of slaughter in larger farms. Darlon, a civil servant at the ADAB (Agriculture and Livestock Defense Agency of the State of Bahia) office in

Correntina declared that there used to be large-scale cattle farms in the region of the plateaus known as *quebra-gaúcho*[12], but that most of them have now transitioned into grain production. He stated that nowadays most of the calves bought from small farmers in Correntina end up being reared in farms in other regions, such as Feira de Santana, a traditional cattle region further east in the state of Bahia.

Jamilton also mentioned that most of the parents and grandparents or current farmers who own cattle migrated south to work in São Paulo, Minas Gerais or Paraná, bringing back money from seasonal farm work in these richer regions and buying cattle and land of their own in Western Bahia. Although this dynamic was not common anymore, it is at the root of the formation of the larger herds in this region earlier in the 20th century, when livestock production modernized and expanded.

In the next section, I will describe my visit to a nearby *fecho*, following with a discussion on cattle production in the region.

Staying in the gerais

I visited the *fecho Lodo ao Gado Bravo*[13], where I interviewed Liobino Pereira and Jamilton Magalhães, two members of the association of *fecho* users of the area. To get there from Buriti, we drove on dirt roads until we arrived in the main highway, and then drove for around 50 kilometers. We saw preserved *cerrado* to our left and right, until we took a turn and drove into a dirt road into the *gerais*. Before we got to the gate to the *fecho*, we passed by two different signs from private farms that had their legal reserves around the community's area. Indeed, when checking the CAR, one sees that there are numerous overlapping legal reserves over that *fecho* and several others in the region (Figure 22 - this will be further discussed in chapter 4).

We eventually pass a gate that is the entrance to the area of the *fecho*. After driving for a few minutes longer, now with barely any road beneath the car, we arrive at a small concrete house with a simple hut beside it (made with wood pillars and covered with *buriti* (*Mauritia flexuosa*) leaves, as is traditional in the region). The building serves as a central building of the association in the *fecho*, where people meet, store tools or sleep when staying in the area. Some of the people who use that *fecho* are there, preparing food, drinking *cachaça* and talking. We chat for a while and eat some of their food, and they say the person we were looking for is in his hut, further on into the *fecho*. We go back into the car and drive into the *gerais*. We then reach a fenced area with a small gate, some planted grass in a plot, and a bigger, similarly built hut. Following a trail through a few hundred meters of denser vegetation, we arrived at a creek. We would bathe there later that night before sleeping, although very swiftly, under a constant fear of anacondas appearing, attracted as they are to the wettest parts of the *gerais*.

These huts are the places where people usually stay when tending to their cattle and store their utensils and food. Farmers must go with some regularity to the *gerais* while their cattle are there, in order to tend to any sick or hurt animals and to make sure they do not get stuck in the swamps. They usually have fenced areas around them where the horses used for daily

[12] The easternmost part of the plateaus is known as "quebra-gaúcho", referring to its unsuitability for grain production, since these areas receive considerably less rain than plots to the west. Nevertheless, the occupation of the better areas and the increasing investments in irrigation have been Leading to the occupation of this sub-optimal zone.

[13] This name refers to the geographical delimitations of the *fecho*: comprises the area between the creeks named *Lodo* and *Gado Bravo*.

work are kept and where any pregnant, hurt, or sick cow can be kept for a while. It is also common to have small plots of crops for consumption in this period of transhumance, especially when it is done for longer. These huts are where interactions between farmers staying at the *gerais* occur. Just as Liobino received me and Jamilton with food he prepared on the campfire under his hut, food preparation is an important part of the time spent in the *gerais*. Multiple farmers told me fondly of the simple food consumed in the *gerais,* made with what can be procured there by hunting or growing crops and what can be transported and stored. As reported by Sobrinho (2012), it is common to have rotating responsibilities for cooking, or to have someone permanently assigned for the task who then has his cattle tended to by the others. This is one of the many aspects of comradery that is often mentioned regarding the work in the *gerais*. On these lines, it was also common to hear how stray animals would often be captured regardless of the owners, relying on iron markings to determine who to return it to. Despite the increased fencing, both of individual plots and of the *fechos*, iron markings were and continue to be a crucial aspect of the organization of cattle production, indispensable in a context where cattle are largely grazing free-range, being generally very respected.

Figure 21 – A hut in the *gerais* of Correntina, covered with the traditional buriti leaves. Reproduced from Sobrinho (2012).

A number of issues were put forth regarding the current situation of the use of the *fechos de pasto*. An important issue was already mentioned in the previous chapter, regarding the reduced carrying capacity of the *fechos* with the greater limitations on burning the *gerais*. There were complaints of a reduced presence of farmers and animals in the areas, leading to the reduction in some "positive externalities" of the common use of these plots. There were also complaints about lack of discussion or respect to collective agreements when using fire. Less users in the *fechos* also leads to the reduction of several 'positive externalities' of the *gerais*. When numerous farmers brought their herds at the same time, there would be more bulls, which facilitated getting cows pregnant, regardless of the owner. Moreover, a reduced transit in the *fechos* also makes it harder to share the job of watching the herds, forcing people to stay more time by themselves or hire someone to do it for them. Furthermore, as previously discussed, living in the *gerais* requires animals to adapt to the heat, the natural vegetation and the irregular terrain. Therefore, if animals are not regularly brought to these plots, they may

lose these skills, not identifying certain plants as edible or getting easily stuck into the mud when they are attracted by the grass of swampy areas.

The issue of safety was always present, with a constant looming threat of conflicts with agents from farms in the plateaus, sometimes only abstract, sometimes very concrete. While there were no active threats to that territory while I was there, there was constant concern about people driving along the roads leading there. Just those weeks there had been the divulgation through Whatsapp groups of pictures of a barbecue with abundant guns and ammunition on top of plastic tables, as hired guns of local farmers and land grabbers boasted their strength, intimidating local farmers in conflict with them. Later on in my fieldwork, I visited a community where *fecheiros* were verbally abused, threatened with guns and had one of their animals killed by such hired guns when trying to access their *fecho*. This case and its relation with the expansion of the agrarian frontier in the region will be further discussed on Chapter 4.

***Cultivated pastures x the* gerais**

At the moment he was there, Liobino had 32 animals with him, 22 his own, the other 10 from neighbouring relatives. He owned 50 hectares, and his relatives owned other 30. He stated the need to bring his herd to the *fecho* because he does not have enough pasture of his own to sustain the animals year-round, and he also has the time to spend at the *gerais*.

The need to take the cattle to the *gerais* depends on the number of animals and the amount of pasture owned, as well as on weather conditions. This was reported by several interviewees, and was also reflected in the different situations of the interviewed farmers. Similar to Liobino, Raimundo de Souza, another farmer from Buriti, had 30 cows and 17ha of land, needing to take his cattle out to graze. Other farmers, such as Jamilton and Tião, had enough land of their own to go through the whole dry season without resorting to the *gerais*. In Jamilton's case, he had worked some urban jobs, for instance as project coordinator for *Articulação Semiárido Brasileiro*[14]. This allowed him to buy more land, with which he can raise around 30 cows without necessarily resorting to his *fecho*. Moreover, Jamilton was the only one of his siblings to have stayed in their parents' land, all of the others having migrated to Goiânia or Brasília to work in the city. This may have contributed to his having more abundant land for his cattle. I visited Jamilton in the first days of November, at the very start of the rainy season. He had one last fully developed plot of grass for his animals to graze on, which needed to sustain them for around 15 days until his other plots could get a head start and develop properly. If he were to let his animals graze in other areas before the grass was formed, they would not develop enough to sustain them through the next year.

Jamilton often expressed his concern with the narrative that farmers with enough cultivated pastures would not need the *gerais*. Even though he was at this position himself at the time, he believed that the *gerais* serve as an important resource for farmers in the valley, since they rarely have enough pasture to maintain their cattle in case of a particularly dry winter season, or sequence of seasons.

Liobino remarked on how there was a change through the years linked to an increase in cultivated pastures, with farmers planting grasses year-round in their plots in the valleys and thus sustaining more cattle. This is very much in line with the study findings described in the previous chapter. He also reported that several people from the community relied on renting pasture from large farms in the plateaus, which puts them in a vulnerable position:

[14] Brazilian Articulation for the Semi-Arid

> "In the past 2, 3 years, there was plenty of cattle in these large farms. At Sinimbu only [a large farm nearby], they rented 1000 hectares and put 1000 cows there. You saw that the cattle of so many folks were all in these farms. And then the year before the last, they decided to plant soy in the farms, and told them they had to take all the animals out of there."[15]

The interviews with two civil servants shed more light in the broader situation of pasture rental. Carlos, a farmer from further down the Arrojado who also works as a teacher at a rural high school, gave interesting information about the need for rented pastures:

> "Some farmers had a *fecho* that enabled them to recover their private pasture plot; and sometimes they want to keep the same herd [after having lost the *fecho*]. Then the losses come: at some point his pasture is not enough, sometimes he has no other reserves, then he has to go around renting pastures here and there, at any price he can find. For instance, last year, in the rainy season, the price to rent pasture was between 50 and 60 Reais per animal. This year I heard of a man who rented it for 100 in Correntina, but also even someone else who charged 200.[16]"

This reality was also reinforced by Darlon, an employee of ADAB (Agriculture and Livestock Defense Agency of the State of Bahia):

> "Some families in this region close to the gerais still do this [transhumance in the gerais]. But in the rest of Correntina and in Santa Maria da Vitória, I would say this practice has decreased by 90%. The people lost the fechos (…) Nowadays some people here are renting pastures in the large farms (…) There are those who raise a certain number of animals, beyond what their property can sustain… I have heard of people who leave cattle for the whole year in rented pastures."

Darlon also argued that several regions that have become entirely dependent on cultivated pastures for cattle production are facing an initial process of desertification, partly caused by the intensive grazing on areas where only grasses are cultivated, with little time for recovery or crop rotation, and poor agricultural management techniques. According to him, the availability of the *gerais* had a positive impact on this issue, since such communities had access to enough resources to have more space for agriculture and rotate crops.

Despite acknowledging this, it was mostly me who brought up the subject of *fechos* with him. He focused more on the potential of horticulture and the intensification of cattle production, either for milk or meat production. He argued that the attachment to cattle in the region came in the way of more modern farming systems, maintaining abundant areas as precariously maintained pasture plots. He cited government initiatives aimed at promoting the production of irrigated protein-rich grass varieties or supporting the development of the milk chain. In the next sections, some stories will engage with these aspirations more directly. Nevertheless, reports such as this show the importance of the *fechos* for cattle production, which offer carrying capacity beyond the cultivated pastures and serve as an important buffer in case of particularly dry seasons. They are also telling of the changes described from the 1970s and 1980s onwards, with the growing importance of private land and cultivated pastures for the larger cattle production observed since then, even when communities did not lose their areas of natural pastures.

[15] Liobino Pereira, fieldwork in November 2022, my translation

[16] At the time of the fieldwork, 1 Euro was equal to approximately 5,5 Brazilian Reais. Jamilton had informed me of similar prices, between 100-120 Reais that year.

II. Bernardo – Pedrinhas, Correntina

Figure 22 - Map showing the location of Bernardo's community and nearby *fechos de pasto.*

Bernardo lives in the community of Pedrinhas, between the *do Meio* and *Santo Antônio* rivers, in the municipality of Correntina, around 40km north of the town. He lives in a house with his mother. She had an area of 51 hectares that was split between Bernardo and his other 8 siblings, who all live in different houses in this area. In many ways, his community and his story are just like that of the majority of farmers in the region: similar farming systems, fragmentation of properties into increasingly smaller areas, a history of use of common land that was enclosed by private actors, free range cattle production, organization of the farmers in an association, river streamflow reduction and rainfall irregularity having substantial impacts on agriculture and changing the use of land, among other aspects. Nevertheless, Bernardo also approaches farming differently than most farmers I met, managing a food forest and an aquaculture tank, working towards intensifying his goat production, and to make his horticulture saleable through government programs, and participating in eventual development programs.

Figure 23 - Bernardo's house in the community of Pedrinhas, municipality of Correntina (BA). Source: the author, fieldwork in nov/dec 2022

Bernardo describes how the main production and commerce of the community currently came from cattle, beans and cassava flour. Corn and sugarcane also used to be important products, but both became less prevalent due to different issues relating to water. Corn is mainly produced in rainfed plots, and Bernardo stated that corn is particularly sensitive to irregular rain, heavily depending on constant watering when the fruits are being formed. The increasingly irregular rain patterns, alternating heavy rain and dry periods within the rainy season, lead to frequent harvest losses when the dry spell happens at the moment the corn is forming. Although sugarcane production and its use for the production of *cachaça* and *rapadura* continues to be present in the areas that can be irrigated, Bernardo reported that numerous plots that were used for that were converted into pasture when the creeks or channels that irrigated them dried in past years. These two statements, about corn production being jeopardized by irregular rain and traditional sugarcane (or other irrigated

cultures) being substituted by less productive agriculture practices or (more often) pasture, were a constant through different areas in the Corrente river basin, showing the effects of climate change and agribusiness water use on smallholder agriculture.

In the 1960s, Bernardo's grandfather and great grandfather started building a large irrigation channel from a pond in the main river above their property. In 1993, the municipality reformed this channel, correcting its inclination and removing the sediments from its bottom. In 2012, the community managed to obtain a tractor to finish excavating it so that it reached more plots, which enabled greater irrigation of different areas (such as the food forest), as well as to mill sugarcane, refrigerate the *cachaça* distiller and for the cattle to drink. In the dry period, however, the river and the channels reduce their flow substantially, which reduces their impact on the system. Close to Bernardo's house there were also two creeks that fed smaller irrigation channels to the surrounding area and enabled the production of sugarcane.

Figure 24 - Goat pen in Bernardo's propriety. Source: the author, fieldwork in nov/dec 2022

Bernardo's share of the family estate is of around 5 hectares. Around the house, he has two chicken coops, a goat pen and a highly diverse food forest of a little under 0,5 hectares. Most of his land is somewhat poor pasture that he uses for his goats. He planned to divide this area in pickets, plant tifton and tanzânia grass (respectively *Cynodon sp.* and *Panicum maximum*) and produce silage[17] in his food forest to improve his system for the goats and start producing milk from them.

[17] The silage comprised different types of grasses, manioc leaves, leucena (*Leucaena leucocephala*), gliricídia (*Gliricidia sepium*), pigeon pea leaves (*Cajanus cajan*), and corn leaves, all fermented for 2 months. He planned on using a new grass cultivar developed by Embrapa in the following year, the *capim açu* (*Cenchrus purpureus*). This rich silage is a good example of Bernardo's resourcefulness, also owing to the diversity of his food forest and his formation in the rural school, as will be discussed below.

Figure 25 - Shadier area in the food forest with some benches, under more developed fruit trees. Source: the author, fieldwork in nov/dec 2022

He started his food forest after graduating from the technical farming school and attending an agroforestry course at Sítio Semente, a reference in syntropic farming[18] in Brazil. He manages to sell several products from his food forest for the local government through the PAA[19]. In the last season, he sold bananas, sweet potatoes, carrots, beetroots, and pumpkins.

In previous seasons he had sold passion fruits, cassava (raw and manufactured into flour and starch), cowpeas (*Vigna unguiculata),* among others. He stated that he stopped cultivating some species due to weather changes, but also due to varying prices paid by the PAA, which sometimes did not pay enough to compensate the time invested in some cultures.

Most of the area of Bernardo's family is occupied by pasture for the cattle. The brothers all work together to maintain the pastures and take the cattle to the common natural pasture used by the community, and also work on a collective family plot where they cultivate sugarcane, beans, corn, vegetables and cassava, which are also sold to the PAA. Despite the success of Bernardo's food forest, he said that his brothers are suspicious of it and do not work on it, despite most areas of the family being at least partly managed with labour input form everyone.

Figure 26 - Newer area in the fringe of the food forest, with banana trees and other developing fruit trees beside strips of cassava, corn, and beans. Source: the author, fieldwork in nov/dec 2022

Bernardo deviates from his siblings and most farmers in the community in saying that most of his earnings come from horticulture rather than cattle production. He argued that while

[18] Syntropic farming is a method of agroforestry developed by Ernst Götsch since the 90s that has since been growing in popularity in Brazil. He calls it successional agroforestry, and is more in line with the newer concept of "food forestry" than the more general idea of agroforestry. An outline of the method is presented in Götsch (1995).

[19] PAA (Food Acquisition Program, in the Portuguese acronym) is a government program with the goal of procuring food for public institutions from smaller scale farmers. "The PAA was the first Brazilian experience in using public food procurement to foster more socially-efficient markets. The program establishes an exclusive institutional market for family farming, ensuring an annual acquisition quota per farmer and paying pre-fixed prices equivalent to those paid in conventional markets. Between 2011 and 2018, PAA benefited almost 450,000 family farmers, acquired 2 million tons of food, encompassing 80% of the Brazilian municipalities" (Borsatto et al., 2021, p. 180).

cattle provide some substantial financial entries once or twice per year, horticulture gives regular income throughout the year, even if it also requires regular, daily dedication; which makes for a more sustainable balance of his income sources.

This statement was reiterated by Carlos, a farmer and teacher at the rural school that Bernardo attended. In his view, one of the main contributions of the school is showing that horticulture can be a profitable endeavor, contradicting the common-sense view in the region that it is good only for family subsistence and that real money is only in cattle. The development of market gardening is probably limited by the historically difficult transportation in the region, which has likely worked against an enterprise that demands at least weekly travel to urban centers to sell fresh products. Carlos also stated that in the initial years of the school, numerous children would not have the habit of eating vegetables in the family, having a diet consisting of rice, beans, cassava flour and eventually meat. He argued that the school had a substantial impact on this matter, introducing the regular consumption of a greater variety of vegetables into many households.

The community of Pedrinhas has faced a history of land conflicts and enclosure similar to most areas in the region, albeit with some different actors involved. Bernardino comments that before the construction of a highway (BR-135), "their land went all the way up to Goiás". Of course, this notion of "their land" does not refer to an exclusive proprietary right to the land, as the area used as common pasture is a whole stretch of largely undifferentiated *gerais* to the west, used by multiple farmers from both sides of the plateau. Nevertheless, he comments that after the highway was built, a more concrete differentiation was drawn between the zone on one side of the highway, "where people lived and there were fences", and the zone beyond it, the *gerais,* where cattle was taken to graze freely and there were no fences.

In the first half of the 1980s, this communal grazing land became the object of a conflict, with Brazilian bank Bradesco claiming ownership of the area and starting the development of a forestry project[20]. There were years of conflict, involving the destruction of fences and huts and even Bernardo's family leaving their home and hiding during a period of violent threats. Eventually, the National Institute for Colonization and Agrarian Reform (Incra) intervened, determining that the land in dispute should be made available for agrarian reform and settled by landless families, thus creating an *agrovila* (agglomeration of small agricultural plots and houses). Nevertheless, families already living in the region and owning a plot of land were outside the eligibility criteria, leading to the settlement of this previous communal grazing area by landless families from other regions.

Although this development quenched the violence of the previous conflict, it also legitimized the separation of Bernardino's community from the grazing area they collectively used.

[20] The same story is reported in the field notes of Santos (2020). It is also described in an edition of the left-wing newspaper *A Foice [The Sickle]* dated from September 1985: "In 1980, Roberto de Souza Leão started forging titles for this area by buying the rights of some people to it. Now, after buying the illegal titles from Roberto de Souza Leão, Bradesco Capitalização S.A. invades properties, raids, destroys and sets fire to fences, huts, sheds and other structures built by the people who work that land and raise almost 20.000 cattle in the area since their grandparents' generation (…)" ('Grilagem em Correntina: Bradesco Capitalização S.A. queima currais, derruba cercas e rouba arames para expulsar posseiros', 1985, my translation). This process whereby forestry projects work served as a vector of land privatization preceding its sale and incorporation into more intensive and lucrative uses is described by numerous authors in this region and neighboring ones (Sobrinho, 2010; Nogueira, 2019; Vigroux, 2019).

According to Incra regulations, letting cattle roam freely to graze in the area is forbidden, and Bernardino reported their position to be that "if people want to have cows, they should have their own private plots to hold them". Most of the area of the agrovila, however, is made of *gerais* soil, being unfit for agriculture without substantial chemical inputs. Bernardo stated that the agrovila has a registered legal reserve[21] of 67% of the area, much larger than the legally mandated 20%, effectively leaving a large portion of it idle, but still barring its use as natural pasture. Even though a few people continue to use the area as they traditionally have, this practice has substantially decreased, with the destination of the area by the Incra having complicated the access to it.

Bernardo argues that this contributed to the increased land use for pastures in the community, given the greater need for private pastures with the loss of the common area. This convergence of greater use of private pastures and plots not having access to water anymore is a common story leading to the increased prevalence of land used for cattle pastures throughout the region.
The use of land for market gardening has a different economy than for cattle, demanding more daily, regular work but using much less land to provide an income. It depends upon the availability of water, which has been fluctuating in the region in the recent past. Nevertheless, the existence of a farmer like Bernardo suggests that there is an individual aspect to this decision, with the focus on cattle of several regions not being just determined by material constraints. Carlos, the rural school teacher, declared that he sees one of the main jobs of the institution as promoting the interest in horticulture, which he sees as being developed beneath the potential of the region. He also declared that it could be an income solution in the changed context of reduced common pasture lands.

[21] Every rural property in Brazil has to maintain a fraction of its area as a permanent natural conservation area. This is stipulated per biome, with the properties in the Amazon requiring 80% of preservation, while those in other biomes only need to keep 20%. This matter and its implications for land use in the region will be discussed at length in the following chapter.

The farmers' market in Correntina

Every week there is a farmer's market in the centre of Correntina organized by the municipality. I could not visit or conduct more extensive interviews with farmers I met there, but I could gain some insights about market gardening in the municipality.

There were stalls selling cassava flour and cakes, but also other products that were not as common in the farms described in the previous section, such as milk and cheeses and different types of vegetables. Most of the farmers I talked with there claimed that market gardening for this or other markets were their main income sources, differently from the observations of the previous section.

A farmer selling cheese told me he conducted his own crossbreeding to improve his dairy cows to be more adapted to the climate of the region, and that he had no interest in taking his cattle to the *gerais*. This observation was in line with what another farmer told me about dairy farming: while the *gerais* offer resources that can help take a herd through the dry season, it is not very nutritious forage, often leading animals to lose weight in their stay there. While this is not such a problem for meat production, the regularity required by systematic milk production is at odds with this system.

The presence of more market gardening in other parts of Correntina could be explained by farmers in areas closer and better connected to the main town, constant water availability by the Arrojado river, influence from the rural school, and also the individual initiative of farmers who seeks different farming systems.

Figure 28 - Farmers' market in Correntina. Source: the author. Fieldwork in nov/dec 2022.

III. *Further away from the gerais: some agrarian systems in Santa Maria da Vitória*

The city of Santa Maria da Vitória is located roughly 50km from Correntina, being located further away from the sandy plateaus where the *gerais* are located. One important consequence of this is that farmers in this region never had close access to this virtually infinite territory of natural pastures, raising their cattle only in *soltas* (common areas surrounding the farms). Although cattle tends to be valued as a reserve of value here as well, the farmers I visited in this municipality tended to have less animals as compared to the areas where the *fechos* are located. Moreover, sugar cane played a more important role in the communities, probably due to the proximity to the regional port of the nearby town. The map below shows the two communities described in this section:

Figure 28 – Map showing the communities of Brejão and Brejo do Espírito Santo in the municipality of Santa Maria da Vitória. Source: Google Earth and the author.

Sugarcane farms in Brejo do Espírito Santo

Brejo do Espírito Santo is a village in the municipality of Santa Maria da Vitória, 15km away from the city and around 60km from the communities in the Middle Arrojado valley. It was the first settlement recognized by the government in the area that is now the municipality. This is reflected in the peculiar order of the village: while most communities in the region are more scattered, this village has a square in the centre with a dozen houses around it, as well as a church, a public school and a sports court. This suggests a history of official state recognition and access to public resources.

Figure 29 - Satellite image of Brejo do Espírito Santo, showing the houses around the main square, the sugarcane plots on the river valley to the west, and the orchard to the south. Source: Google Earth - accessed on September 2024.

I interviewed Judite, who grew up in a nearby community, lived most of her adult life in a city working for the government, and now, at the age of 59, moved to a house in the village. She shared her view that agriculture had decreased substantially in the region, despite the availability of water and fertile soils. She attributed it to a decreased willingness do agricultural work with the availability of government income transfers and the possibility to work in the city. She also complained about the difficulty of finding people to do work like preparing the soil, weeding or fixing fences, even when paying wages comparable to city jobs. She enumerated the land situation of people in the different houses in the main square, stating that the vast majority had no access to land of their own, earning a living from government benefits and odd-jobs in the city.

One particularly interesting system of sugarcane production could be observed there. This is one of a series of communities with historical *sítios*[22] in rivers margins. Hermes Novais described how these areas around rivers where clay soils occur foster the micro-climate of a rainforest, owing to the soil fertility and the water availability. Cultivation in the river margins occurs by digging channels from the main river, irrigating all the flat areas around it. These are planted mostly with sugarcane, while natural vegetation is generally allowed to grow in the slopes above it.[23] The occasional flooding guarantees continued fertility of the soil. This is attested by the fact that the sugarcane plants have been growing there for decades, probably centuries. Judite and Hermes converged in saying that no one knows who planted the sugarcane plants and when, as they are yearly harvested and regrow.

[22] A general word for farm, that in the region refers specifically to sugarcane plots.

[23] Hermes mentioned the tradition of preserving the riparian forest in the slopes to emphasize the sustainability of the agriculture in this system. He did mention how that was not necessarily out of an environmental concern, but also a necessity to preserve the riverside plots. This was reinforced by the statement of a farmer who chopped down the forest there to make pasture for his cattle, but the bare land was quickly eroded with the rain, and he ceased the practice, allowing the hillside forest to regrow.

Figure 30 - Worker cleaning the channel and weeding at a sugarcane plot in Brejo do Espírito Santo. Source: the author, fieldwork in nov/dec 2022

Figure 31 - View from above the valley at Brejo do Espírito Santo, with the sugar cane plots between the forested hillsides. Source: the author, fieldwork in nov/dec 2022

I also met with the farmer responsible for the orchard that appears to the south of the satellite image above. He was the only farmer throughout my fieldwork who claimed to have obtained rural financing, which he used to buy his trees and plant an irrigated orchard, mainly comprising oranges and limes destined for sale.

Figure 32 - A few bananas and citruses in an orchard in Brejo do Espírito Santo.

Source: the author, fieldwork nov/dec 2022

Brejão

The Brejão community, some kilometres south of Brejo do Espírito Santo, showed some similar dynamics. João, a farmer form the community, reported that he used to plant mostly sugarcane and could sell it profitably, and that the community was mostly covered with this crop, destined for sale in Santa Maria da Vitória. Since the beginning of the 2000s, however, the marshes that were used for it dried up, and he now mostly plants beans, which can still sometimes be sold. Another farmer in the community said that after his son had managed to invest in a well he could irrigate his farm and produce a special variety of passion fruit developed by EMBRAPA, as well as other fruit, which were giving him good profits. These cases exemplify yet another trajectory of differentiation based on water availability, which in some cases becomes linked to the capacity to invest as natural sources dwindle.

My interview in this area also yielded a telling story of how government infra-structure projects intertwine with private land appropriation in the region. In the 1960s and 70s, the military government invested in numerous projects of infra-structure around the São Francisco River, mainly through CVSF (later called Suvale and CODEVASF)[24]. Among them are the construction of dams and irrigation projects throughout the Northeast. Hermes Novais told of one Santa Clara farm, a relevant trading post since the days of fluvial commerce in the São Francisco River, just a few kilometres south of this community. In 1948, CVSF started developing a project of dam construction in the region. In this context, in the 1960s, one Mário Clemente received credit from CVSF to buy the Santa Clara farm and develop modern cattle production in it. It is reported that he fenced several areas used by the communities around and would refuse to return the cattle that would wander into his land, while also hiring armed men to protect his new property. Soon, through a mix of strong-arming and government support, free-range cattle production was strongly hit and private ownership of public lands increased.

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On this chapter, we saw examples of varied farming systems and differentiation trajectories among smallholder farmers in the Corrente river basin. We saw the continued presence of traditional products grown and prepared for sale in the region, chiefly sugarcane and cassava derivates. That is paired with the production of other crops, mainly aimed at self-consumption. We saw how increased water scarcity (rainfall changes and streamflow reduction) have wide-ranging effects on farming systems, drying the traditional irrigation channels, reducing the output and the possible crops grown in rainfed plots, and eliminating the production of sugarcane from several areas and regions. We also saw how some products and crops ceased to be produced due to the competition with urban markets, making it more worthwhile to buy cheaper goods than produce their own. Marking a deviation from the more traditional farming practices seen in the region, we could also see that market gardening was a profitable alternative followed by some farmers, as well as some cases of fruit production – all of which only developed in plots with access to water.

We also saw the important presence of cattle production, which for most farmers is the main source of monetary income. The *fechos de pasto* allow farmers to raise more cattle in

[24] Respectively Commission for the São Francisco Valley, Superintendence of the São Francisco Valley, and São Francisco River Valley Development Company, in the Portuguese acronyms. They refer to essentially the same institution, which was founded as CVSF in 1948 and restructured and renamed in 1967 and then in 1974, maintaining the name to this day.

relation to their own area and serve as an important buffer for dry years or periods of bad prices, allowing farmers to maintain their herd through unfavourable periods. While farmers who own sufficient land and/or use *fechos* seemed to have a sounder cattle production, there were reports of farmers raising cattle in too little land and probably running into unsustainable financial situations to maintain their herd, as well as overgrazing and poor pasture maintenance leading to erosion and soil quality deterioration.

In summary, smallholder farming in the region has historically developed systems that occupy the different areas of the landscape with a diversity of crops. This type of farming continues to produce food for self-consumption, some cash crops and products, and cattle continues – despite abundant reports of emigration and the ageing of the countryside. However, the gradual fragmentation of farms, land degradation from overgrazing, and the widespread effects of growing water scarcity in different regions and areas of the landscapes tend to put pressure on the yields, the diversity and the possible income coming from farming, especially for farmers with smaller areas. Only few farmers seemed to engage in substantially different systems geared towards sales, despite some examples to the contrary described above – which relied on some degree of water availability. In this context, it remains to be seen whether the strategies to balance production for self-consumption and sales continue to be effective in changing conditions of water scarcity, and whether they satisfy changing desires of insertion into urban culture and consumption.

Chapter 4

Current land conflicts: crossroads between conservation and agriculture

"Campo branco, minhas pena, que pena, secou / Todo bem que nós tinha era a chuva, era o amor / Não tem nada não, nós dois vai penando assim / Campo limpo, ai que tempo ruim / Tu sem chuva e a tristeza em mim (…) E esse tempo da vinda tá perto de vim / Sete casca aruêra cantaram pra mim / Tatarena vai rodá, vai botá fulô / Marela de u'a vez só / Prá ela, de u'a vez só"[25]

Elomar Figueira de Melo, *Campo Branco*

In the previous chapter, I discussed the diversity of farming systems present in a specific region of Western Bahia, the Corrente river basin. We aimed to discuss how the changes and continuities described in Chapter 2 manifested in specific farms visited in the fieldwork, highlighting the varying strategies adopted by different farmers and the relevance of geographical variations throughout the river basin.

In this chapter, the focus will shift towards the practices of agribusiness in the plateaus, as well as their impacts on smallholder farming systems. We will discuss two issues that cause conflicts between these two groups: the impact that plantations have on the water availability in the region, and the use of areas that have a function in smallholder systems as legal conservation reserves of the plateau farms. In both cases, the control of these resources by agribusiness actors comes about through an assemblage of scientific controversy, governmental support and positioning in the public debate sphere.

The two sections of this chapter will cover such agribusiness strategies to claim these resources (water and preserved areas) and the impact this has on smallholder farmers. At the end of each section, we will also discuss the strategies that local communities, researchers and civil society organizations have been employing to preserve natural areas and guarantee the land rights and integrity of farming systems.

I. Land conflicts

[25] "White fields, my sorrows, what a sorrow, it's all dry / All we had was in rain, was in love / It matters not, we toil on as it is / Clear fields, what a dreadful weather / No rain for you and sadness in me / The time of the coming is near / The sete-casca and aroeira sung it over to me / The tatarenas will flower all-round / In one go, all yellow / All for her, suddenly yellow" (my translation). Elomar paints the picture of the wait for the rain as the fields wither in a long dry season, shining in dried whiteness. He makes several connections between the patient waiting for the second coming of Christ – which no one may know when will happen – and the return of the rains, making a parallel between the resigned but steadfast wait for better times which will come like heaven and the flowering of the tatarena (*Tachigali aurea Tul.*), which is among the first trees to bloom when the rain returns.

In the last section of the first chapter, we discussed the conflicts over land that historically took place in Western Bahia; particularly from the 60s and 70s, when new commercial interests started converging on the plateaus of the region.

Frontier expansion for productive purposes continues to be a reality in the region: the continuous growth of irrigated production systems (chiefly soy, but also other cultures like cotton and occasionally sugar cane) has the potential of promoting conflict over lands eastward of the prime plateau land. Nevertheless, another type of claim over territory has become central to understand territorial disputes in Western Bahia, that of natural or less disturbed areas being declared legal conservation reserves of larger farms. The focus on this type of natural area leads to conflicts with smallholder farmers, since a fair share of the preserved areas in the region are precisely the *veredas* or the *fechos de pasto*, which are important parts of local farming systems. Before delving into the matter further, it is important to discuss what these legal reserves are.

Legal reserves in Brazil and Western Bahia

The New Brazilian Forest Code established in 2012 determines that every rural property in Brazil must preserve a percentage of its area as natural vegetation plots called *legal reserves*. This requirement varies per biome, with a mandatory 80% within the Legal Amazon and 20% in other biomes, with Western Bahia and the *cerrado* in general falling into the second category. The institution of legal reserves is a core aspect of nature conservation law in Brazil, with one third of all protected native vegetation in the country being located within them (Metzger et al., 2019). They were established in the context of increasing use of satellite data and online databases, paired with growing global pressure for environmental regulations and enforcement. These legal reserves are registered in the CAR (Rural Environmental Registry), an online system created for this purpose, where the limits and conservation areas of all properties in Brazil are to be uploaded by farmers through self-declaration.

At the time of their inception, these measures were unwillingly accepted by agribusiness actors in Brazil, who bargained for reduced penalties for environmental crimes as a compensation for the inevitably greater enforcement that would come from a mandatory, integrated system. Nevertheless, as described by Bühler et al. (2022), the CAR eventually became a key element of the political strategy of large-scale farmers in the country. The existence of a registry with substantial volumes of data allowed for upholding a narrative of sustainability in intensive agriculture and dispel doubts about illegal property rights or environmental crimes, making bank loans more accessible, for instance. This led large-scale agriculture areas to be the ones that adhered to the CAR the fastest and most massively (Bühler et al., 2022).

Meanwhile, since the system went online in 2012, analyses of self-declared property limits and conservation areas only occur in a case-by-case fashion, according to criteria of state-level environmental authorities; and a thorough, systematic check is yet to be conducted, more than 10 years after the system's debut. The system also fails to display information in a clear and organized way, making systematic research efforts with its data complicated (Bühler et al., 2022).

In principle, legal reserves must be located inside the limits of each property. Nevertheless, there are often strong incentives for geographical intensification of agricultural production. In Western Bahia, for example, the westernmost portion of the region is largely superior for industrial agriculture, boasting extraordinary rain indices and a flat topology that respectively

tend to decrease and become more irregular as one moves eastward. The plateaus are also marked by creeks and declivities that gradually grow into valleys toward the east, which are also not really used by mechanized agriculture. This gives a strong incentive to avoid preserving natural vegetation in the prime plateau land, preserving plots that offer less potential for industrial agriculture towards the east or in the plateau declivities.

This creates fertile grounds for the proliferation of conflicts, particularly in regions where land titling is often disputed or inexistent. Data from the Brazilian Institute of Geography and Statistics (IBGE) states that in 2016, only 68% of land in the MATOPIBA had clear property rights (Buainain et al., 2018). Moreover, the low parts of the plateaus and the *Cerrado* areas that remain in the west are predominantly inhabited by smallholder farmers or used as *fechos de pasto*. All these factors conspire to produce tensions over land rights, with substantial private interest in preserved areas and unclear property rights, in a context where security and legal institutions are often biased toward the interests of large landowners. In order to discuss these conflicts in the context of the Corrente river basin, we will start by analyzing the map below (Figure 34), which displays all registered legal reserves in the municipality of Correntina as well as the *fechos de pasto* present there.

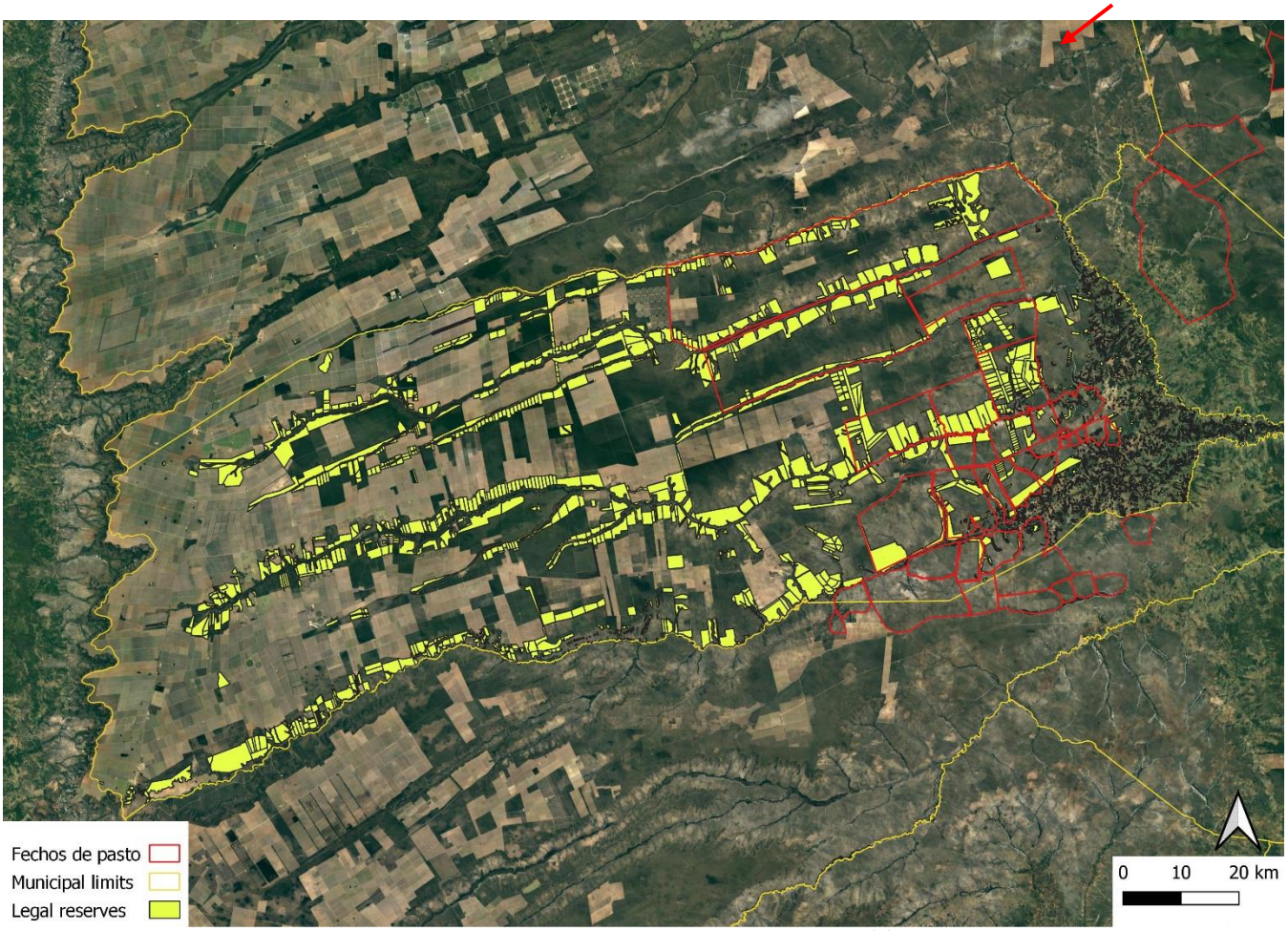

***Figure 33 - Legal reserves registered in Correntina and* fechos de pasto. The red arrow indicates the *fecho* Capão do Modesto, *locus* of violent conflicts in the recent past and almost entirely covered by legal reserves. (source: SICAR; CPT-BA)**

Close observation of the map reveals a number key processes related to the territorial dynamics of legal reserves in Western Bahia and its agricultural occupation. We can divide the map in roughly three areas:

1. The westernmost area, almost entirely dominated by yellowish grey squares of soy plantations
2. The easternmost part of the municipality, where smallholder farmers live and farm. It is marked by a constellation of small legal reserves that can easily be mistaken for black dots on the map.
3. The area in between these two, where the *fechos de pasto* are located and there is considerably lesser presence of soy farms.

We can see that all legal reserves in the plateaus are concentrated along a few lines, which are the lower marshes and river valleys that start in the plateau. These areas are unsuited for mechanized agriculture, remaining unoccupied by the neighbouring soy farms. It is also visible that a number of large legal reserves are located inside the *fechos de pasto,* in the 3rd region described above. This intermediate area is not occupied with agriculture neither by soy farmers nor by local smallholders, due to the declining precipitation rates and the fact that it is still *gerais* land (and thus unfit for agriculture without considerable soil management investments).

Here we have competing needs between local smallholders and industrial farmers for the preserved natural areas. Soy farmers seek to maximize the occupation of the prime plateau land and register their mandatory legal reserves in less profitable areas, while the remaining natural areas that can be used for that are largely also used by smallholder farmers either as their main living place or faming in the marshes (in the case of the valleys atop the plateau) or used for free-range cattle production in the *fechos de pasto*.

These competing claims over natural areas have been one of the main causes of conflict between smallholders and large-scale farmers in the region for some years; and while Correntina and its greater concentration and mobilization of *fecho de pasto* associations makes a particularly emblematic case, these conflicts multiply throughout Western Bahia and the MATOPIBA as a whole.

A particularly notorious case was in Capão do Modesto (highlighted with a red arrow in Figure 33 above). The area claimed by the *fecho de pasto* associations of Capão do Modesto and Porcos-Guará-e-Pombas are disputed by Luiz Carlos Bergamaschi, owner of large areas in the plateaus of Correntina and president of the Abapa (Association of Cotton Producers from Bahia). The claims of ownership are not meant for (immediate) productive use of the land, but rather for registration as legal reserves. A report by AATR[26] (Aguiar et al., 2012) describes that these land titles are based on a remarkably incomplete document stating the sale of the inherited possession of the area, which specifies just the value of the transaction but not the specific area transacted. This title was officialised by the notary and decades later acquired by Luiz Carlos Bergamaschi. In 2021, the *fecho de pasto* associations were granted an *ação discriminatória*, a legal procedure aimed at ascertaining the legality of a questioned land title. This is nevertheless a slow process, which took 10 years to be started and is still ongoing, amidst violent conflict between the hired arms of the supposed owners and the communities that have long used the area as a *fecho de pasto*. During my fieldwork, I visited the community with CPT personnel just a few days after the conflict escalated. Hired arms had begun wandering around the *fecho de pasto*, intimidating the farmers who tried to access it and killed the mule of an elderly farmer who was taking his cattle there. People from the Capão do

[26] Associations of Rural Workers' Lawyers, an organization dedicated to advocacy for peasant rights, mainly in the state of Bahia.

Modesto community reported that the hired arms were constantly patrolling the area around their community, creating an atmosphere of fear and tension.

A few other examples of conflicts of which I had first-hand reports were in the Destocado *fecho*, in the *quilombola* territory of Riacho de Sacutiaba, and in the Arroz community, respectively located in the municipalities of Santana, Wanderley and Formosa do Rio Preto, as well as other examples from Correntina mentioned in the previous chapters.

All of these cases are similar in that natural areas used by the communities for raising cattle, foraging for fruits and roots, fishing, and hunting were claimed as legal reserves for the large-scale farms around them, leading to conflicts and intimidation aimed at barring access to these natural areas, so as to maintain them as "natural areas" and eliminate potential alternative ownership claims over them. Riacho de Sacutiaba is a recognized *quilombola* territory. Therefore, despite not yet having received their land titling, they have a clearly demarcated area approved by the government. For this reason, despite farmers claiming that parts of the *quilombola* territory were his legal reserve, the conflict did not escalate much, given that they have a more solid land tenure situation. That is different in the two other cases, where the *fechos de pasto* have more legal ambiguity surrounding them. In the case of the Destocado *fecho* and the Arroz community, the conflicts escalated quite seriously, with the presence of armed men threatening the communities, and destruction of fences and huts in the *gerais*. In Arroz, there are reports of community members being tortured[27], and in the Destocado, several huts were burned, one of them while a family was present inside. These 3 anecdotes are highlighted because they refer to cases that were reported to me at length, regarding natural areas and communities that I visited. Nevertheless, it was evident that these cases were commonplace for many years, both from the statements of civil society personnel and local farmers. Bernardo went as far as saying that Western Bahia was like a war zone, indicating the concrete dispute over land that is ongoing there.

Figure 34 - Ruins of a hut in the* fecho *Destocado (between the municipalities of Santana and Canápolis, BA) that was burned to the ground by hired arms linked to agribusiness. Source: the author, fieldwork in nov/dec 2022

Having set the scene about the importance of legal reserves, their spatial distribution and the conflicts they engender in Western Bahia, the next section, we will discuss how agribusiness actors and state government institutions have acted to support the interests of modern farming regarding environmental policy and land rights.

[27] This case and others recently gained attention from some important alternative journalism platforms in stories such as the ones from Alessi (2023), Paes (2023) and Couzemenco (2023).

State and non-state actors and environmental policy

In addition to its favourable natural conditions, one of the main aspects of the attractiveness of Western Bahia as an agricultural frontier was the inexpensive land. Both accounts from the field and the literature attest that this "inexpensive" access to land was in fact procured through title forgery through different schemes, forging property titles in collusion with registry offices or manipulating small sales contracts to account for swathes of land multiple times the transacted area (Sobrinho, 2010; Aguiar et al., 2021). However, with the consolidation of Western Bahia as one of the main producing regions in the country, paired with increasing pressure for social and environmental standards nationally and abroad, there was growing need for legal security by clearly ensuring property rights and environmental compliance.

Brannstrom (2005) developed pioneering studies on the strategies of non-state actors to shape environmental law in Western Bahia, showing how the early 2000s were marked by a lack of presence of government environmental bodies in the region, leaving space open for multiple initiatives taken by AIBA (Associação de Agricultores e Irrigantes do Oeste da Bahia – one of the most powerful farmer associations representing the interests of modern farming) to set forth environmental standards and programs that pioneered regulations in this field and shaped policy making, while also steering them in the direction of agribusiness needs. Even before the creation of a centralized system of registration and environmental enforcement in the form of the CAR, the AIBA already created programs aimed at supporting the compliance with the legal reserve preservation rules in force, arguing that failure to do so would be a liability for the sector. Nevertheless, their discourse also exempted farmers from any fault and supported their reforestation measures with spot measures such as a tree nursery, with no overall plan to achieve full compliance. Thus, environmental standards and discourse were framed within the possibilities and needs of agribusiness with no state opposition, while the deforestation of the savannahs in the plateau continued throughout the 2000s and 2010s.

Bühler et al. (2022) argue that, especially from 2015, the CAR has turned into a mechanism capable of simultaneously upholding a "green façade" for agribusiness, while also maintaining environmentally questionable practices unattended. Among the reasons for that is the increase in deforestation following the centralization of land registration into the CAR, given the flexibilization of legal forest suppression in farm areas beyond the legally mandated 20%. Moreover, as mentioned on the previous section, a tool for systematic analysis of the legality of CAR registrations has only been announced in 2021, with initially slow adoption by different states. Despite the still unknown impacts of this change, the standard without its use is the manual analysis of registrations, which follows the criteria of state-level environmental organs. While registrations in the platform are not scrutinized, they are taken to be legitimate, allowing for the regularization of land rights and an image of environmental compliance despite eventual underlying conflicts. Similarly, Korting et al. (2023) argue that in certain contexts the CAR can serve as tool for land appropriation, rendering visible and legitimate in a government platform (until proven otherwise) self-declarations of land ownership that are often contested later.

The generalized nature of conflicts such as the ones described in the previous section and their relation with legal reserve claims supports the claims of these authors. Moreover, it suggests that the development of digital rural cadastres and environmental regulation, when implemented in regions with disputed land rights, legal insecurity, and stark power

imbalances, can exacerbate conflicts, serving as a way to legitimate land grabbing and drive demand for land, in the form of necessary legal reserves.

Another important factor to highlight relates to the place state environmental organs seem to occupy in the political sphere. In my fieldwork, I heard numerous reports from civil society agents of how the INEMA (the environmental authority of the state of Bahia) was associated with the interests of the agribusiness, acting majorly to institutionalize their interests into policy[28]. This is in line with research that points out that much policy dismantling or reformulation on the environmental realm has happened by delegating authority to state organs where desired flexibilizations could be approved more easily (Eloy et al., 2023; Maia et al., 2024).

In the following section, we will discuss an example of this practice, describing a flexibilization in the regulations of legal reserve locations by INEMA, while also analysing new data from the organ's portal to study the spatiality of legal reserves.

Legal reserves relocation

The only possibilities for *compensation of legal reserves* established in the 2012 Forest Code are for cases in which "the owner of the rural property had, as of July 22, 2008, a legal reserve area inferior" to that mandated by the law (Law n. 12.651/2012, article 66, my translation). In this case, it would be possible to compensate this lack in a different property of the same owner or a plot acquired in a third-party's property, so long as this area is in the same biome and state (article 66, §6). Areas in a different state may be used should they configure *priority conservation areas* (article 66, §7). It is explicitly stated, however, that "legal reserve compensation mechanisms cannot be used to authorize the conversion of new areas for alternative soil uses" (article 66, §9, my translation).

Nevertheless, there are evidences that a substantial number of farms registers their legal reserves outside their boundaries in Western Bahia. This is a complicated matter to study, since the CAR supplies the shapefiles of properties and legal reserves but lacks the links between them. A yet unpublished study by Gautreau et al., (2023) developed a methodology to extract these links through geometrical approximation of the shapefiles, revealing a massive presence of this phenomenon in Western Bahia. It also showed large number of properties with more than one legal reserve inside their boundaries, thus receiving compensation from different parcels without preserved area. This process tends to register compensations in a west-east direction, whereby legal reserves from properties further west are registered in regions further east. Although most offsets are over short distances, there was a substantial amount of relocation over 200km away. The authors also showed that there was a gradual process of eliminating legal reserves in the western portion of the plateau. In addition, this study shows that the legal reserves in the westernmost portion of the plateau are located predominantly in the lower areas of valleys and wetlands, and that many of the offsets occur in collective *fecho de pasto* areas.

This phenomenon is of interest because it would potentially suggest misguided practices regarding legal reserves. The possibility of changing the location of these conservation areas with some freedom would maintain a sustainable façade for agribusiness, while allowing for

[28] A detailed account of social movements' perspectives on the mobilization Against unsustainable water use in the plateaus, including accounts pointing to the cumplicity of INEMA with agribusiness interests can be found in Porto-Gonçalves & Chagas (2019).

a continuous progress of the frontier and neglecting the long-term preservation of the natural areas in legal reserves.

On January 2021, INEMA issued a decree regulating *legal reserves outside the property*, creating the possibility of establishing a property's legal reserve outside its boundaries when the original property's natural area "does not guarantee the environmental vegetation quality, or the area offered outside the property offer superior quality". The text is explicit in stating that such a legal reserve *would not configure compensation* in the terms of the 2012 Forest Code (INEMA Decree n. 22.078/2021, article 2, item II). This decree thus regulated a previously inexistent possibility of relocating legal reserves by arguing that another area has "superior environmental quality". In November 2022, the State Prosecutors' Office (*Ministério Público da Bahia)* issued a recommendation questioning the INEMA Decree, stating that they contradicted elements of federal law from the Forest Code. This has caused legal controversy and ultimately led to the cancellation of the decree.
Nevertheless, the open database of INEMA (Portal SEIA) could prove quite interesting for research purposes. It contains all petitions related to environmental law in the state of Bahia, including all demands on varied issues, such as the authorization for water well drillings, natural vegetation suppression and, crucially, legal reserve relocations. Since the database includes details on the farms *and* the shapefiles of their proposed new legal reserves, it could add important data that was not present in the CAR database. I have developed a code capable of selecting all petitions regarding legal reserve relocation and have downloaded and analysed them. The main results of this analysis are summarized in the next section.

Analysis of Portal SEIA data

An analysis of all the demands for legal reserve relocation registered in the SEIA system for the period it has been active (since 2015) revealed that the amount of legal reserves that went through this process is only a small fraction of the total in the region. In the 7 municipalities studied, there were 29.969 legal reserve plots registered in the CAR database. My study retrieved 158 legal reserve relocation demands, which made up 392 legal reserve plots; approximately 1% of legal reserves registered in the region. However, despite the small relative importance of the data obtained, its analysis allows us to make some interesting observations about the nature of the process of legal reserve relocation, supplying some evidence to the hypotheses about frontier expansion described in previous sections.

The first of these observations is regarding the area of the farms that request legal reserve relocation. 98 different farms requested the relocation of the 372 legal reserve plots that could successfully be associated with their original farms. The distribution of the area of these 98 farms is shown below:

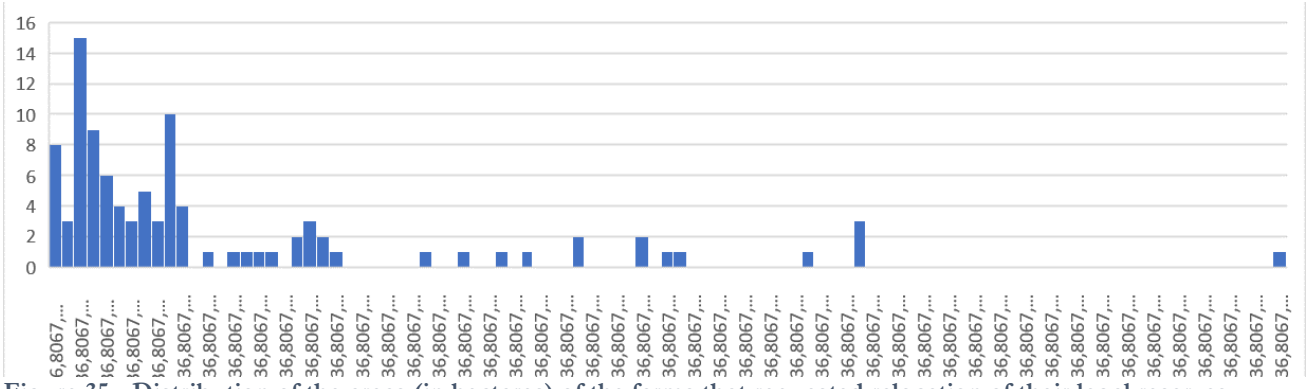

Figure 35 - Distribution of the areas (in hectares) of the farms that requested relocation of their legal reserves.

The average and median are 1412 and 722.2 hectares, respectively, the smallest property has 36.8 hectares, and only 8 properties have less than 236.8 hectares. The data is not difficult to interpret in light of the enormous concentration of land in western Bahia: in the municipality of Correntina, for example, 88% of properties are up to 50 hectares and 96% are up to 200 hectares. However, 53% of the municipal area is occupied by the 1% of properties with more than 10.000 hectares, and 88% by those with more than 1000 hectares (IBGE, 2017). Moreover, it is important to note that most of the large properties in the region are registered under multiple different and contiguous registrations of the same owner, so the properties tend to be larger than this distribution already suggests. Thus, it can be seen that virtually all of the requests to relocate legal reserves were made by the large agribusiness properties located in the far west of the plateau. This data is thus in line with the conclusions of Gautreau et al. (2023), who point out that the registration of RLs outside their original properties takes place in a west-east direction.

In terms of petition year, data (Figure) show that there is a huge spike in applications in all municipalities in 2021 and 2022, showing the importance of the INEMA Decree.

Furthermore, the histogram below (Figure) shows the distribution of the distance between farms and relocated legal reserves:

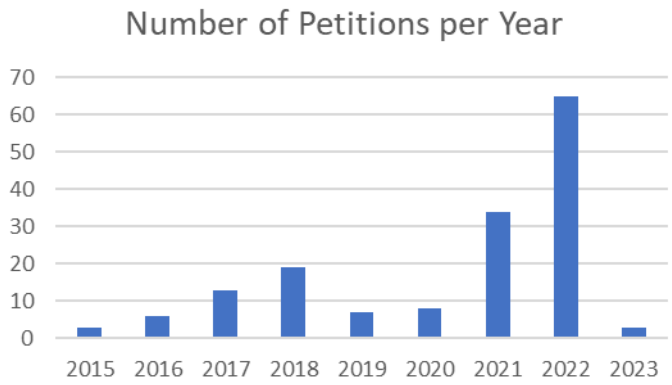

Figure 36 – Graph showing the number of petitions for relocation of legal reserves requested per year

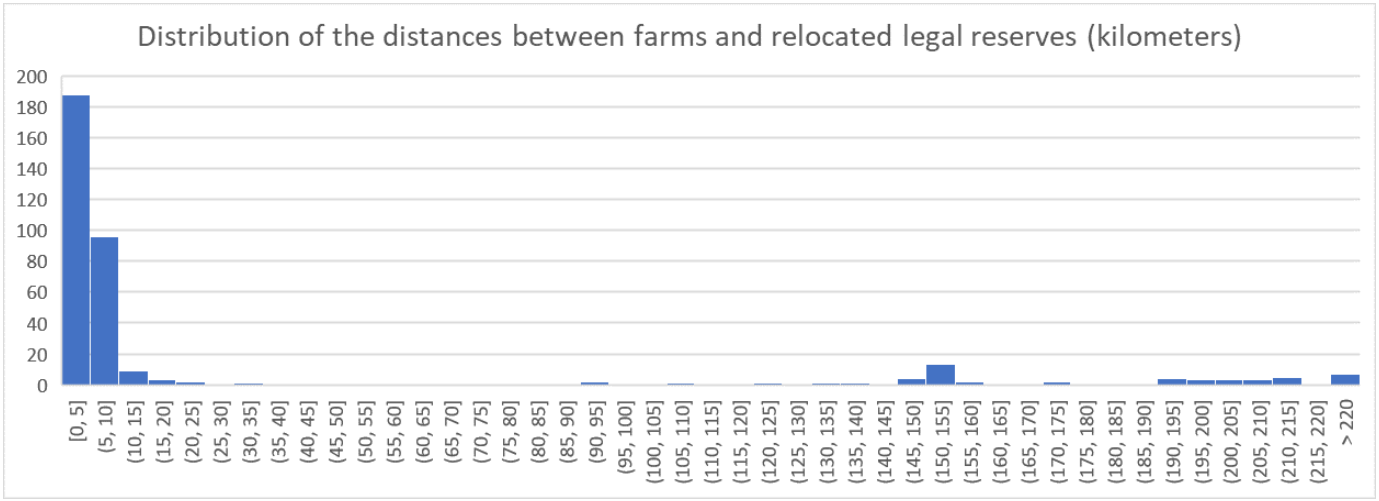

Figure 37 – Graph showing the distances between the farms and the proposed relocated legal reserves in the petitions registered on SEIA throughout the study period.

Out of the 346 plots that could be linked to their original properties, 82% were less than 10km away from their original property. As can be seen in the picture below (Figure 39), these comprise a majority of cases in which the relocations were made in the surroundings of the farm, which could be linked to a concentration of legal reserves in the valleys and marshes in between the plateaus.

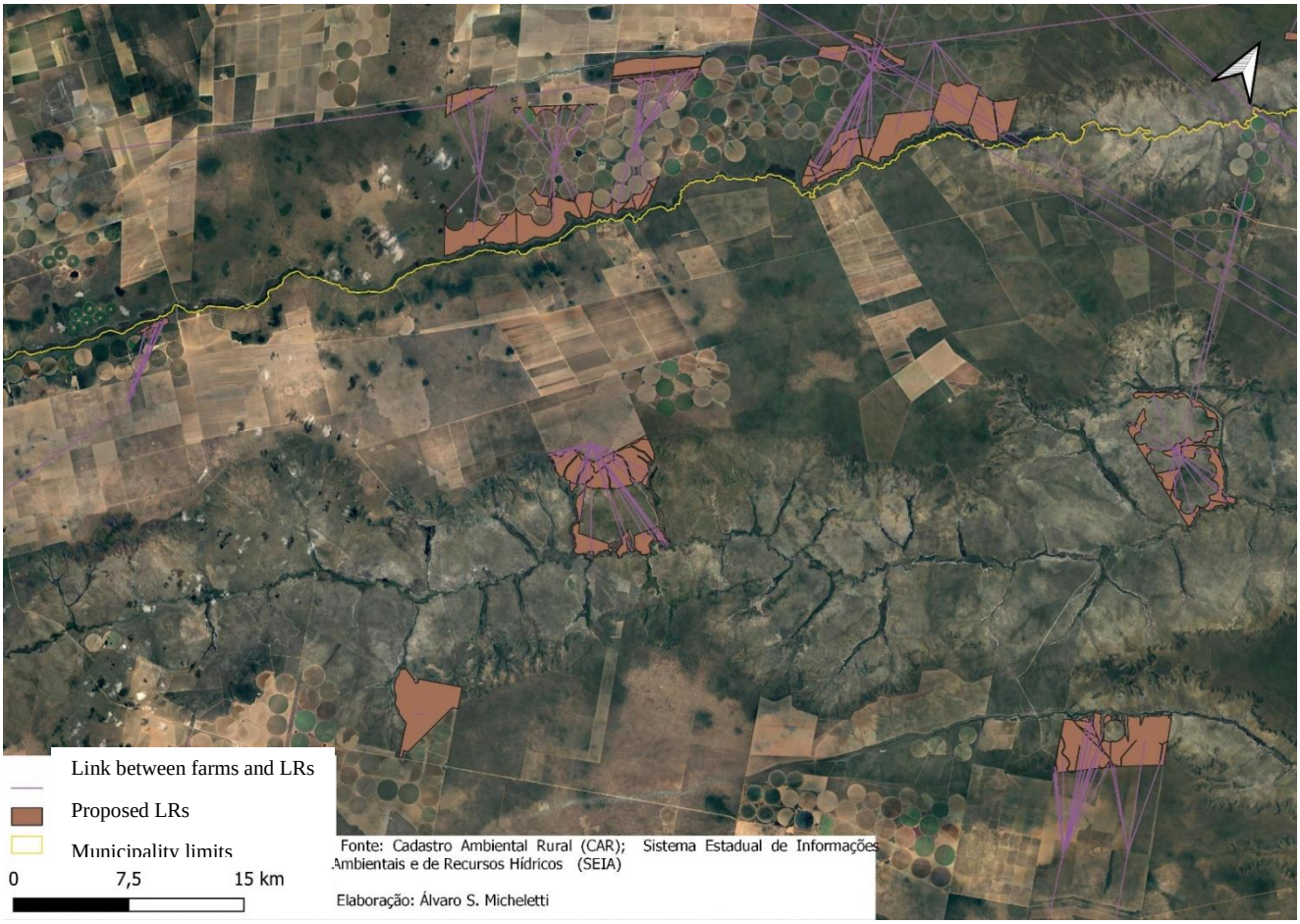

Figure 38 - Map showing links between relocated legal reserves and their original properties in the municipalities of Jaborandi and Cocos

A detailed analysis of the reports and justifications for the relocations would be essential to gain a better understanding of the dynamics represented by this data. However, the dynamic represented in the map below reinforces the scenario presented in the previous sections: a concentration of LRs in the surrounding ravines, *veredas* and valleys, often overlapping the areas occupied by smallholder farmers. Thus, at the same time as the farms on the plateaus are free to deforest and occupy the entire area useful for their purposes, environmental regulations fall on the groups occupying the lower areas, having to deal with restrictions on the use of fire and the occupation of wetlands that impose severe limitations on their livelihoods (Eloy et al., 2016). In this way, the flexibilization of the allocation of legal reserves can promote the intensification of land use by agribusiness not only through transfers of preserved areas to distant areas, but also through "micro-reallocations" of a few kilometres or even hundreds of meters.

Although quantitatively insubstantial, several of the other 18% show cases that illustrate the dynamics discussed so far in the chapter. In Luís Eduardo Magalhães and Barreiras, for instance, there is a number of cases where multiple farms on the plateaus relocate their legal

reserves to a single farm way towards the east, showing the focus on maximizing agricultural land use in the west. A striking case is in Correntina, where most of the relocations registered legal reserves inside the *fecho* Capão do Modesto, leading to the conflicts described in the previous section.

Finally, the tables below show some of the "big names" in RL relocation processes. Of the 158 requests, 40% were made by just 6 landowners, according to the table below:

Claudimir Justi	6
Carrol Farms Brasil Ltda.	7
Fernando Luiz Burin	7
Messala Lemos	8
Luiz Carlos Bergamaschi	14
João Antonio Franciosi	22

Table 1 – Number of legal reserve relocation petitions from the farmers with the most petitions

In summary, the data extracted from the SEIA portal contained less relocation requirements than the large figures suggested by Gautreau et al. (2023) made one expect. This suggests that despite having served for a fair number of cases, the relocation mechanism created by the INEMA is not responsible for the large-scale phenomenon of legal reserves outside their original properties suggested by the previous authors and observed during fieldwork, calling for further investigation of the practical strategies used by farmers in the region to circumvent or shape environmental policy to their favour.

The available data reinforces the main points made in this chapter so far regarding the concentration of legal reserves along *veredas* and *fechos de pasto*, showing several cases where the mechanism of LR relocation supported that trend. Finally, the data also emphasizes the users of this policy, being almost entirely used by large landowners, and also concentrated among only a few names (Table 3).

In this context, we can say that in a context of contentious land rights and several institutions partial to agribusiness interests, the environmental requirement of legal reserves can often be used in a way that turns a mechanism aimed at promoting land sharing and private conservation into a tool for green grabbing and private appropriation of common land and smallholder farmer areas.

Resistance strategies

In the previous sections, we discussed agribusiness strategies to assert claims over preserved areas for legal reserves, showing how the industrial order based on the plateaus upholds an environmental image while it takes advantage of institutional arrangements that allow it to continuously deforest within the law and concentrate its LRs on collective areas of smallholder farmers.

In this section, the focus will be on how certain groups of the domestic order represented by smallholder farmers whose livelihoods are threatened by land encroachment and water scarcity organize politically and make use of traditional identities and a "green" discourse of

their own to resist in their territories, mixing elements of the civic and domestic orders to continue farming.

Fechos de pasto: traditional identities and territorial rights

On chapter 2, we discussed the origins of *fechos de pasto* in Western Bahia. To discuss the political organization surrounding these areas, it is important to return in greater detail to the history of these territories. As discussed in chapter 1, in the 1960s we see the arrival of outside actors with titles to the public lands atop the plateaus, who actually settle and start deforesting plots in the 1970s. At that point, despite there being an informal territoriality in the *gerais* in the form of huts, watering holes, agricultural plots and other implements fixating the areas where each family or extended group would work, there was no demarcation of clear limits. It was between the 1960s and 1970s, in response to the arrival of these new actors, that the fathers of the farmers who were now active in the *fechos* started putting up fences in the *gerais,* demarcating what would become the current areas they use. For several decades, the defence of these territories was largely based on direct action, with fences being put up and torn down by both local farmers and newcomers, with a history of conflicts and intimidation. Most of my interviewees in *fecho de pasto* communities had stories to tell of the from the 1980s and 90s where they were threatened, had to go in hiding and were involved in this concrete struggle for the land – such as Bernardo's story in chapter 3.

The overall outcome of these conflicts is shown in studies reporting the change in land use in the plateaus. From the 1980s, there is a steady and overwhelming conversion of the *gerais* into cropland, effectively eliminating these areas from the farming systems of most smallholder farmers in the valleys (Dionizio & Costa, 2019). Most remaining natural areas that farmers have access to lie in sub-optimal areas for farming, along the *veredas* on the plateaus or towards the east, where the topography and the rainfall are worse for intensive farming. The Corrente river basin is also marked by a remarkable political organization in comparison to other areas visited in Western Bahia, with numerous groups organized in the form of *fecho de pasto* associations that articulated the resistance for maintaining these natural areas accessible for smallholder farmers. In order to discuss the political action of these groups, it is important to contextualize the emergence of *fechos de pasto* as a social movement and an official category.

The new Constitution approved in Brazil in 1988 formally marked a change in the rights of traditional populations to land. The new legislation was drafted in the wake of the military dictatorship that lasted between 1964 and 1985 and had considerable input from multiple representatives of multiple social movements. In this context, the land rights for indigenous and *quilombola* groups gained greater state recognition, as well as other traditional groups.

It was in this context that *fundos e fechos de pasto* were recognized in the State Constitution of Bahia in 1989, establishing the possibility for these areas to be attributed to community associations. Carvalho (2008) describes how this formalization originated from previous mobilizations, generally referred to as the "Luta do Bode Solto" (literally meaning "Struggle for Free-Range Goats"). In the northeast of Bahia, there are farming systems that also rely on common, natural pastures; although more focused on goat production and on a drier areas, with a different history. Just as described in chapter 2 for the case of Western Bahia, this region was confronted with the arrival of barbed wire, the increasing fencing of plots and privatization of land, and a law that determined that fences should have a standard spacing that allowed for smaller animals to pass through and end up on larger farms. This

region saw an earlier political mobilization in defence of collective natural pastures, leading to an accumulated mobilization the presence of *fundos e fechos de pasto*[29].

In 2013, a law was passed by the government of Bahia determining that all *fundo and fecho de pasto* communities should identify as such until 2018 in order to have territorial rights over these common areas. Despite opposition from their representative organizations claiming that such temporal cut-off point would undermine the rights of long-standing communities and underestimate the complex process of communicating with often very isolated communities, this context prompted a large-scale process of mapping and mobilization of these communities, resulting in the voluminous GeografAR (2018) report on the state of *fundo e fecho de pasto* communities in Bahia. All communities identified in this report were recognized by the government as such, but while in Northeastern Bahia this has led to a number of recognized "declarations of real use"[30], no *fecho de pasto* communities in Western Bahia have yet received this title.

Western Bahia is a historically autocratic region politically ruled by a few landowners related to the cattle business (Porto-Gonçalves & Chagas, 2019), posing strong challenges to this territorial recognition, especially in the new context of an internationally important soy producing region. Moreover, several members of *fecho de pasto* associations expressed their critic of the "declaration of real use" as a tool to guarantee their rights. While granting use rights for 90 years and safeguarding the possibility of their future renewal, this legal mechanism establishes the land as a property of the state, maintaining its right to revoke the association's rights if "national interests" require so. In a context where agribusiness interests substantially pervade the state, *fecheiros* expressed their concern that such a title would offer little long-term protection of their interests. Seeing as that private land titles are also insecure, prompting the harassment of individual landowners to sell their individual titles and fragmenting common areas. In my interviews, association members had no clear proposal for how land tenure should be safeguarded, expressing a desire to keep customary arrangements and arguing that the state should protect them from threats and attacks of people who have no legitimate titles to the lands they occupy. This point will be further discussed in the next section regarding the political organization of *fecho de pasto* associations.

In practice, in meetings I took part convening *fecho de pasto* associations and other civil society organizations aligned with them, requesting *ações discriminatórias* (ADs) was frequently mentioned as the main strategy to counter claims over *fechos de pasto* and other natural areas and secure smallholder farmers' access to these territories. These legal mechanisms question the legitimacy of the transaction originating a given title. A lawyer from AATR reported that areas that enter into such a suit tend to decrease in value and interest owing to the increased legal insecurity. However, while between 2009 and 2012 there were five AD in the Corrente river basin, they ceased to be accepted for almost 10 years, until one was pursued in 2021 for the Capão do Modesto case described above (Alves & Filho, 2024).

Dynamic identities

[29] Fundos and fechos de pasto both refer to common natural áreas used as pasture. The difference is that "fundos" refer to áreas immediately contiguous to the main dwelling places of farmers, while fechos are geographically distant. While there are fundos de pasto in Western Bahia, they are much more common in Northeastern Bahia – while fechos are almost inexistente there. Despite the regional and historical differences, both regions banded together under a collective term that contemplates both realities in the state.

[30]

When describing the metamorphosis from the "Bode Solto" to the new vocabulary of the *fundos de pasto*, Carvalho (2008) makes the following observations:

> "Despite the proximity in their meanings, there are important differences between the two terms. The "Luta pelo Bode Solto" meant a struggle for the customary law that valued the existing way of living, refusing the fencing of animals, the fragmentation of the territory in-between communities, and the appropriation of common land. (…) "Fundos de Pasto", on the other hand, represent a necessary adjustment, a legal solution, an alignment with broader struggles, a recognition of one's own limits and strengths. Fundos de Pasto is an external term that is gradually incorporated, until eventually representing the current way of living. (…) Despite having turned into something different from the past, current livelihoods respect pre-existing forms of organization, while also establishing new ones – like the associations. They change constantly to try and remain the same, ensuring dignified living in the region" (Carvalho, 2008, p. 134, my translation).

Despite originating from a different region several hundred kilometres away from Western Bahia, the observations of Carvalho resonate with the reality observed in my fieldwork. Through the centuries of colonial, imperial and republican Brazil, from the 17th century to the 20th, the hinterlands of the *gerais* harboured the development of way of life adapted to the natural conditions of a rather isolated landscape, with a complex fabric of cultural, economic and agricultural manifestations. The incredibly fast-paced changes brought about by the arrival of the industrial order in the landscape from the 1970s prompted new challenges that required new strategies, at the same time that the territorial rights of traditional peoples gained increasing traction in Brazil and around the world.

The International Labour Organization's Convention on Indigenous and Tribal Rights (1989) is an important landmark in this process, recognizing, among others, the right to owning traditionally used land. The Brazilian Constitution of 1988 and the National Policy for Sustainable Development Traditional People and Communities (Brasil, 2007) also reiterate that, clearly stating the right of traditional populations to their land. In this context of increasing recognition of land rights for traditional peoples, it becomes possible to lay claim over land through the affirmation of such identities, asserted by claims of "alternative", historically and culturally ingrained forms of engaging with the land. Here we return to Almeida's (2023) argument described in the theoretical framework, who framed the recognition of traditional land rights as a form of land redistribution process centred not on the democratization of smallholder property, but rather the acknowledgement of traditional forms of inhabiting the land that escape commodification. Thus, the affirmation of local farmers' traditional practice of using natural areas collectively and productively without deforesting them emerges as an argument for the recognition of *fechos de pasto* as legitimate claims over land; and through the protection of these areas, farmers can emerge as subjects entitled to territorial rights as a traditional group.

In this sense, the *fecho de pasto* category is, as described by Carvalho (2008), an assemblage in constant evolution, treading the line between the defence of unformalized customary traditions and the political and discursive needs posed by the necessary relation with governments and civil society organizations. Several aspects illustrate this uneasy and dynamic relation. One of them is the absorption of categories dear to civil society organizations, such as environmental protection and women empowerment. A type of environmentalism sensibility from the part of peasant communities is undeniable: interviews with farmers showed a sense of contemplation and intrinsic value of natural areas, as well as the importance of natural preservation for the sustainability of farming systems. This "environmentalism" may also be at stakes with urban movements, making more concessions to occasional deforestation and hunting, for instance, that would disagree with conservation

concerns. Nevertheless, given the reduced governmental support to farming multifunctionality in Brazil, and chiefly in agrarian frontier regions (Brannstrom, 2005), and the growing political leverage held by environmental issues, the conservation potential of *fechos de pasto*_in a Cerrado region under strong deforestation pressure has made their preservation of the biome (through a productive system) one of their main *raisons d'être* in public debate.

The adoption of women empowerment as a value inside the *fecho de pasto* movement is another interesting issue in the dynamic between *fecho de pasto* associations and civil society organizations. While still a region marked by strong gender norms throughout the social fabric, there is a growing discourse regarding women participation in the movement. The president of one of the associations in Correntina is a woman, and while traditionally *fechos* were only occupied by men, multiple farmers mentioned that they are changing their outlook, seeing *fechos* not only as spaces where (male) work with cattle is conducted, but also explicitly a space for community conviviality, where women can also come to spend time in moments of leisure. It can be argued, thus, that not only *fecheiros* absorb the political demands of the time for strategic positioning, but civil society organizations and their agendas also seem to suggest new forms of seeing and inhabiting these spaces.

Another interesting point of contention is regarding what we could call "positive governance". Freedom of movement and the availability of open spaces seemed to be important values for local farmers, allowing for economic-agricultural resilience in the form of a permanent safety cushion of pasture for cattle, but also a broader conviviality inside and between communities, whereas the *fechos* function as large self-managed spaces where farmers meet, work, and celebrate together. Paradoxically, with the occupation of the *gerais* with plantations, this common aspect could be protected precisely by fencing areas that could remain subject to local traditions of management. Nevertheless, this fencing and the later constitution of associations seemed to be as Carvalho (2008) described, an effort to protect customary arrangements rather than constitute new political entities in the management of the areas. Different interviewees described how each *fecho* has their own rules regarding the transference of rights to the area and the entry of new members (rights being usually hereditary and limited to the extended group that initially constituted the association), as well as the management of the area. Discussions and arrangements rarely go through the formal processes of the association, happening directly between farmers. In a conversation, a member of a civil society organization involved with *fecho de pasto* associations expressed their critic that the farmers were uninterested in increasing the communitarian dimension of their farming systems and further organizing politically through the associations. In their view, farmers were content to use associations as an institutional means of defence when direct threats came but were otherwise mostly concerned with their own farms and engaged in community practices in their own terms. This uneasiness to offer institutionalized solutions is arguably also present in the lack of a land tenure alternative to the ones offered by the government, representing a preservation of customary arrangements and suspicion towards the state. Nevertheless, the farmers I interviewed stated that their concern was maintaining access to the area in the conditions they always did, without expressing plans of institutionalizing the governance of the areas beyond the customary arrangements that ruled over it.

During my fieldwork, there were numerous cases of individual farmers selling their share, either of *fechos de pasto* or in other areas to people connected to agribusiness. This practice greatly concerned the civil society organizations working there, not only because in the case of *fechos de pasto* farmers do not have the right to sell them (as the *fecho de pasto* claim is built

on the assumption that that is public land traditionally settled on by local farmers), but also because of the divisions that causes inside communities, and how in such unclear and politically charged land rights situations one declaration of sales could potentially be transformed into a scripture for much greater areas inside smallholder farmers' territories. In this context, the support of civil society organizations and the existence of the associations supported the defence against the fragmentation of the *fechos de pasto*, affirming them as common areas.

II. Water conflicts

Land conflicts are often the first that come to mind when considering the expansion of agrarian frontiers. Nevertheless, conflicts arising from intense water use are often a great issue in plantation landscapes. As discussed in the previous chapter, the availability of water has been a crucial determinant of the agricultural potential of all plots of land in the region, which depends on both natural and sociotechnical determinations. An example of this is the construction of irrigation channels described in the previous channels, which changed the spatial distribution, yield and crops of farming systems in Western Bahia when built; and change it also when they dry up or start having less water to offer.

Changes in infra-structure and practices are also crucial to understand the industrial agriculture of the plateaus and its impact on the region. The first and westernmost farms in Western Bahia are typically rainfed, exploiting the high natural rainfall of the limits of the plateau. Nevertheless, even these systems have the potential to impact water regimes. One of the key interventions necessary to render *gerais* land productive is the use of limestone, which serves two important functions: it both raises the acidic pH of the soils and creates an impermeable layer that keeps water accessible in the sandy soil to the shallow roots of crops like soya. Moreover, the removal of natural *Cerrado* vegetation and its replacement with temporary cropland has significant impact on the evapotranspiration and infiltration rates.

Water considerations become a lot more important when discussing the growing model of irrigated agriculture in the region. Despite the substantial development of rainfed agriculture, irrigated systems have been growing enormously. The irrigated agriculture area in the MATOPIBA region grew from 66,600 ha in 2000 to 111,654 in 2007 and 168,881 in 2016, 90% of which is located in Western Bahia (Matricardi et al., 2019). Most of this irrigation happens through central pivots, the number of which increased from 9 to 1550 in Western Bahia in the period between 1985 and 2016 (Pousa et al., 2019).

Throughout my fieldwork in Western Bahia, water scarcity – whether due to increasing weather variations or reduced streamflow in river and irrigation channels – emerged as one of the main factor hindering smallholder farmers' systems. It was also the most widespread one, affecting all areas visited in the region, despite of the proximity to the main plantation areas.

This veritable water crisis is outlined by numerous scholars (Pousa et al., 2019; Silva et al., 2021; Eloy et al., 2023; Silva et al., 2023), who show the competing uses of water in the region and the lack of governance mechanisms capable of harmonizing the needs of different actors and the future sustainability of the water regime in the region. Instead, what can be observed is a legalization of the needs and interests of industrial farming, who work through aligned government institutions and strategic scientific controversy to both portray an image of sustainability and steer environmental regulations towards its needs. Eloy et al. (2023) describe the evolution of water regulations in Western Bahia, showing that from 1995 to

2011, water management was largely decentralised towards regional jurisdictions, which left this governance for institutions with little authority and capacity, paving the way for an increased protagonism of private actors in shaping environmental policies and initiatives (Brannstrom, 2005). From 2011, there was a reform in the environmental bureaucracy of Bahia, which merged the forest and water authorities into a single organ (INEMA), leading to a simplification of environmental licensing procedures and increasing legal authorisation of water licensing (Eloy et al., 2023).

Eloy et al. (2023) also outline the existence of scientific controversy supported by agribusiness organizations regarding water phenomena in Western Bahia. While it is a consensus that streamflow has been reducing, different relative importance is given to deforestation and irrigation or climate change to explain it. The Federal University of Viçosa was commissioned by AIBA to conduct studies on the impact of land use change on the water regime of the region, concluding that while soil infiltration rates are substantially decreased by conversion of natural areas into plantations, they remain above the necessary for aquifer recharging. Despite recommending caution regarding the lack of knowledge on the long-term impacts of land use change, they argue that this conversion and the increased water use for irrigation is not responsible for streamflow reductions, focusing on the effects of climate change on rainfall patterns (Dionizio and Costa, 2019). On the other hand, other researchers have emphasized the growing volume of water use for irrigation and their impact on smallholder farmers, showing that the impacts of growing irrigation and their future impacts are not considered when granting water use concessions (Silva et al., 2021; Eloy et al., 2022).

Despite protests[31] and the increasing presence of local activists in local water boards and there is active scientific controversy on these issues, water governance in the region continues to cater to agribusiness interests to a large extent, lacking in monitoring and governance that ensures water availability for the different actors along the river basin in the dry seasons – while also endangering the future water availability for all.

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Throughout my fieldwork, in the different regions of Western Bahia, land appropriation (often due to the registration of legal reserves) and water scarcity emerged as the main impacts brought by the expansion of modern farming atop the plateaus. Following the previous focus on smallholder farming, this chapter aimed at describing the agribusiness strategies that cause these impacts, while also discussing the strategies employed by local populations to adapt and fight against them.

We discussed how the CAR often functions as a tool for green grabbing, enabling complete deforestation on the plateaus by appropriating natural areas that have key functions in smallholders' farming systems. We also showed how this is achieved through a mix of governmental omission, decentralization, and support of agribusiness interests, while also describing the assemblages of civil society and farmer organizations that have been formed to maintain new and traditional forms of occupying the territory that continue to exist in the margins of the soy fields. Moreover, the causes behind water scarcity and the relative importance of different concerns – increased production or long-term sustainability – are

[31] Most notably, on November 2017 there was an uprising of around 1000 local smallholder who stormed the headquarters of a large industrial farm in Correntina (Igarashi) and destroyed its water pumping facility. When police repression and trials followed, extraordinarily large manifestations against unsustainable water use and the farmers happened in the town. This story and its broader context are detailed in Porto-Gonçalves & Chagas, 2019).

the object of scientific controversy supported by agribusiness. These processes resonate with Niederle's (2018) conceptualization of farming orders, showing how both domestic/civic and industrial orders navigate the realm of environmental policy and discourse to protect and further their interests.

Chapter 5 – Discussion and conclusion

"Por fim já farto de tuas manhas / Teus filtros, tua ingratidão / Te deixo entregue a mãos estranhas / Meus filhos não vão te amar não / E assim como a água deixa a fonte / Também te deixo pra não mais / Do exílio talvez ainda te cante / Das flores, a noiva entre os lencóis / Dos brancos cafezais / Adeus, adeus meu pé de serra / Querido berço onde nasci / Se um dia te fizerem guerra / Teu filho vem morrer por ti"[32]

Elomar Figueira de Melo, *Canto do Guerreiro Mongoió*

I. Discussion

In the previous chapters I covered different aspects of smallholder farming systems on the margins of the agrarian frontier in Western Bahia, highlighting the diversity of farming systems and the conflicts for land and water that exist in the region. In this section, I will interpret some key findings in light of discussions in the literature, both about Western Bahia and agricultural frontiers in general.

"Domestic order" farmers in Western Bahia

One of the broader topics this thesis engages with is the discussion on the trajectories of modernization of rural landscapes. In the Brazilian context, as elsewhere, some actors and researchers argue the irreversible trend of modernization, which would leave little space for rural landscapes that do not follow the logic of increasing scale, technification and capital investments (Buainain et al., 2013). On a different note, other researchers emphasize the diversity of modernization trajectories, which originate a diversity of "orders of farming" that constitute the rural landscape (Niederle, 2018; Niederle & Wesz Jr., 2021).

When studying the trajectories of the plateau and valley farming systems in the Arrojado river valley, Vigroux et al. (2023) came to the interesting conclusion that, despite the enormous differences in technology adoption, the average productive yield of farming systems on the valleys and the plateaus of Correntina is approximately the same, despite having enormous differences regarding the income they obtain for it – the former producing for their own consumption or local markets, while the latter specialize in commodities for export. In this context, we see that smallholder agriculture remains productive for a diversity of farmers but focuses less on production for sales, while also being less articulated into profitable markets, usually selling only inside communities or at most local towns, except for the occasional beneficiary of government purchase programs.

This evidences that, despite the growing water scarcity, there continues to be productive farming systems in the valleys. In my interviews, there were numerous instances of explicit pride in being able to produce one's own food and having a degree of self-sufficiency, not depending on external jobs to provide at least the basic food needs of the household.

[32] "Finally, tired of your caprices / Your conditions, your ungratefullnes / I leave you in the hands of strangers / My sons will not come to love you / As water leaves its source / I leave you, not to return / From the exile I will sing of you, perhaps / The flowering bride / Of the white coffee fields / Farewell, my hillsides / Dear cradle where I was born / If ever you are besieged by war / Your son will come die for you" (my translation). Here Elomar bitterly contemplates the broken traditions and successive foreign groups that colonize the hinterlands of Bahia. For an interesting analysis of the symbols in this song and a description of its historical and geographic references, see Portela and Magalhães (2016).

Nevertheless, the insertion of these smallholder farmers into markets was reminiscent of the limitations described by Guanziroli et al. (2019), who emphasize the increasing mechanization and increased productivity of modernized agriculture and the near impossibility of family farming to compete in all but the markets with greater added value, such as artisanal products. Indeed, my observations suggest that even as the monetarization of rural communities and the physical connection with local towns increased in recent years, the products that were produced for sale continued to be chiefly the same from previous decades; while the production of other crops and products seemed to dwindle with greater difficulties for their production (e.g. rice) and with the competition of cheaper industrialized alternatives (e.g. milk and fruit artisanal sweets).

When discussing the strategies for the insertion of the domestic order of farming into modernized food systems, Niederle and Wesz Jr. (2021) gave multiple examples based on increasing the added value of produce through the perceived value of local or sustainable production, artisanal practices or local-specific ingredients and varieties. While I could observe some processes where local artisanal products could be inserted into more profitable value chains, especially through the work of civil society organizations, these were still limited practices who did not involve most of the farmers I interviewed. Subsistence farming, frequently supported by pensions and government handouts, with the occasional development of more intensified production for sales (fruit production or market gardening, as well as some milk production initiatives) were the most common strategies observed – suggesting that the branching of the domestic order into aesthetic or civic orders for income generation were still incipient in a less urbanized region like Western Bahia. However, elements of the civic order were important in the organization of smallholder farmers as traditional populations and environmental stewards, as will be discussed in the next section.

Frontier expansion and environmental regulations

The dynamics in Western Bahia observed in this research are important examples of broader processes in land appropriation and agrarian frontier expansion worldwide. Giorgio (2024) and Rasmussen and Lund (2018) emphasize the contemporary importance of the reconfiguration of land control arrangements for the integration of resources into global economic circuits. They emphasize how the control over territories often starts through the undoing of local property and authority regimes, which is only later legitimized and transformed into formal regimes with recognized authority. This line of research suggests the importance of studying the local, institutional and informal strategies of resource appropriation taking place in regions of commodity frontiers.

The ubiquity of fraudulent land transactions and privatization of public land in the occupation of the interior of Brazil and the expansion of its agricultural frontier are a well-studied matter, which also played an important role in the formation of the MATOPIBA as a modernized agricultural front (Alves 2009; Aguiar et al., 2021).

In the past decade, a "green" discourse and compliance with environmental legislations have become increasingly important for important parts of the Brazilian industrial agriculture sector (Bühler et al., 2022). In parallel, strategies to bypass or shape environmental legislation are developed, particularly at the state level in important agriculture frontier regions (Eloy et al., 2023; Barasal Morales & Laurini, 2024; Maia et al., 2024).

Among these strategies, there is the issue of legal reserves and the system meant to manage them (CAR), which serves to attest environmental compliance but has evolved to function as a strategy to lay claim over land (Korting et al., 2023). On chapter 4, I discussed spatial findings which, despite not accounting for a large proportion of farms in the region, support the results of Gautreau et al. (2023) when they argued that legal reserves are relocated from

the optimal agricultural land of the plateaus towards areas in the east, often being registered over *fechos de pasto* and *veredas*, important areas for smallholder agriculture.

Furthermore, while there were conflicts for direct occupation, cases where large-scale farmers registered their legal reserves over *fechos de pasto* and other natural areas used by smallholder farmers were a very common occurrence in my fieldwork throughout Western Bahia, often being followed by intimidation and violence to ensure that the traditional users of those areas had no access to it and could not claim ownership to them in the future. These findings corroborate the narrative regarding frontier expansion (or the intensification of land use in the plateaus) through the dislocation of legal reserves towards areas used by smallholder farmers.

In the course of the fieldwork, I could also see how the alliance between *fecho de pasto* associations and civil society organizations worked rights to protect the common areas of the *fechos* and smallholders' rights in general, often mobilizing the identity of these groups as "traditional populations" to lay claim over the common rangelands of the *gerais*, defending their historical occupation with sustainable practices that ensure local livelihoods while still maintaining sustainable ecosystems. This alliance illustrates the process of the rights of traditional populations serving as a way of guaranteeing the right of alternative uses of the land and relations with nature that contrast with extractive agribusiness practices, as discussed by Almeida (2023). It could be argued that this is another trajectory through which the domestic order guarantees its continued existence in modern contexts, focusing more on uses land uses that support environmental conservation than the trajectories highlighted by Niederle & Wesz Jr. (2021), who emphasize strategic insertion into food systems in different ways.

The engagement with environmental protection mobilized by the effects of natural degradation on smallholder systems is also an example of the "environmentalism of the poor" described by Martinez-Alier (2003). The unequal effects of environmental issues suffered by marginal populations would prompt novel initiatives for conservation motivated by the safeguarding of local livelihoods. *Fechos de pasto* and the engagement of local population in struggles for more sustainable water management would be new fronts of the defence of environmental protection, organized in forms that also consider local livelihoods, suggesting new forms of collective organization and public recognition. Currently, the position of *fecho de pasto* associations and their civil society allies is rather defensive, e.g. trying to safeguard land rights and denouncing the leniency of water concessions in Bahia. Nevertheless, the integration of the demands of smallholder farmers who suffer the impacts of environmental degradation first-hand would be central for an agricultural and environmental governance where the needs of a diversity of farming systems were taken into account and agriculture did not compromise ecosystem dynamics in the long-term. In a context of growing financial opportunities for sustainability initiatives like cattle production in natural or restored areas (Abramovay et al., 2024), such resistance strategies can offer alternative forms of territorial governance that could conceivably be singular opportunities for local development.

II. Conclusion

This thesis has been dedicated to the study of smallholder farmers and communities in Western Bahia, a region marked by the relatively close proximity of markedly different farming systems and territories.

In this section, I will answer the three research questions that structured the thesis based on the results presented in the previous chapters, followed by a reflection on the implications of these responses for the broader societal issues that motivated this research. Finally, I will offer my reflection on the thesis and fieldwork processes, describing the merits, limitations and lessons learned for future endeavours.

1. **What have been the main impacts of the expansion of the soy frontier on smallholder farmers?**

Western Bahia is a notable agrarian frontier because, except for some communities who lived or continue to live in the plateaus, the majority of farmers who lived in this region before the expansion of modern farming were not directly displaced by the new farmers. Rather, they lost their common rangelands and remained in their farms while dramatic changes took place in the surrounding landscape.

The main impacts observed through the fieldwork, which were widespread in all studied areas, were loss of land (particularly commons pastures) and violent conflicts with large-scale farmers and their agents and the growing water scarcity in the region. The loss or reduction of common rangelands increases local dependency on private cultivated pastures, reducing the carrying capacity available to smallholder farmers and decreasing the resilience of their systems to longer or harsher dry periods. It also reduces other benefits of the commons, such as areas for hunting, fishing and foraging that complement income or food production. Beyond farming systems, the expansion of plantations was marked by threats, violence and insecurity for farmers in the valleys since the 1970s, with numerous stories of resistance and the current articulation of farmers into associations, linked with civil society organizations like CPT and 10envolvimento.

Moreover, the reduction in water availability had varying impacts throughout regions and areas of the landscape. While the main rivers continue abundant - despite streamflow reductions - numerous creeks and irrigation channels have dried in the past 20 years throughout Western Bahia, increasing the dependency of agriculture on rainfall, which has also become increasingly unreliable. In this context, the agricultural yields and the diversity of crops available for farming systems decrease, leading to losses or requiring investments such as wells or pumps.

2. **What are some strategies used by farmers in the margins of soy frontiers to continue farming?**

As discussed through chapters 2 and 3, recent changes in farming systems varied per region and through the different areas of a region's landscape, some of which were not related with the expansion of the agrarian frontier. Water scarcity was an important factor of differentiation. Landscapes with a greater decrease in water availability were marked by conversion into pastures, while also decreasing the output of irrigated/rainfed plots. These changes were often tackled by investments in pumps or wells to irrigate plots and maintain productivity, although that requires means that not all farmers have. With access to water, there were also examples of different systems such as fruit production or market gardening, the latter of which could offer greater incomes with less areas – a potential response to the reduced productivity of the rainfed hillsides.

Fecho de pasto associations were one of the great institutional innovations of the region, organized for local farmers to be able to claim public lands as being traditionally used by

them, a strategy that guaranteed most of the remaining common natural rangelands throughout Western Bahia. The continued access to natural pastures allowed for greater resilience in cattle production and for lower requirements of private owned land per animal. Several farmers also relied on pensions for the monetary income, offsetting the decreased productivity of their farms and continuing to live in their farms despite often having dwindling harvests.

3. **In what ways do these farmers engage with the different "orders" described by Niederle to secure their land rights and/or obtain incomes?**

Overall, the farmers interviewed in this research be said to have mostly domestic order practices, reproducing their livelihoods through low-input, high labour practices and maximization of the natural resource base of farms, as seen in the historically developed adaptation of farming systems, maximizing the potential of each part of the landscape. One of the main reconfigurations observed were the domestic farming taking up the aspects of the civic order, whereby important aspects of smallholder farming systems are protected through alliances with civil society organizations and political activism, defending both the importance of traditional people's land rights and for both cultural and environmental reasons, highlighting the articulation of production and conservation achieved by *fechos de pasto* communities. Conversely, agribusiness farmers also engage in such political and discursive practices, articulating with researchers and government institutions to influence scientific debate and environmental regulations towards their interests, while emphasizing the sustainability and law-abiding nature of their practices.

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As a concluding remark, I will move my focus away from the agricultural and economic considerations that occupied most of this research. When developing the proposal for this thesis, I assumed I would find a very precarious rural landscape, pressed to the limit by the encroachment of agribusiness expansion over its resources and territory. I was surprised to see that, despite all the issues described in the course of this thesis, farming did not seem to be *structurally* threatened. Despite the numerous pressures on smallholder yields discussed at length here, traditional ways of farming continue to be present and allow farmers to reproduce their livelihoods. The reports of rural exodus that I heard were more connected with the desire to emigrate to the city than a crisis in the farming system that *compelled* farmers to migrate. These observations made me reflect on the nature of modernization that took place in the region, marked by exogenous forces that occupy the most remote point in local symbolic geography with new techniques, connected with global value chains, effectively developing as if planted on a foreign ground. Local farmers, especially the least endowed in land, are sometimes employed in the process of uprooting tree roots after deforestation of new plots, but beyond that there is little local employment generated by the expansion of the sector that is responsible for large contributions to the Brazilian foreign trade balance. Neither evolving into modernity, nor being directly displaced by it, smallholder farmers seem to gradually slip into oblivion. I quote here a consideration along these lines made by Hermes Novais in a conversation with a farmer in the community of Cuscuzeiro, in Santa Maria da Vitória:

> "People here know in which direction each type of leather expands. (…) Leather from the cow's belly has a structure that doesn't work for lassos, it loosens. (…) There's also that, rats eat them [leather utensils]. So, you have to hang them somewhere in your house, and it's not easy to have a proper place: rats nibble through wood when they smell the fat you hydrate

> leather with. So, you had to hang these things from a hook, and put a calabash on top, so that the rats trip and fall if they try climbing. And do you think it was easy having a saddle? It was hard buying one, and you also had to protect your saddle. You can't let it dry up, but you also have to protect it [from rats]. Also, the bottom coating of the saddle, which you easily find made from some sort of foam nowadays, wasn't easy to find. (…) What material can you use? You'd have to take it over for someone to make it for you. You'd be off, and someone would ask you: since you're going that way, take the catinga de porco leaves, or that other, how was it called, carobinha, right? Carobinha. And marva branca, yes, the marva[33]. You would put these leaves beneath the saddle or the yoke so it didn't hurt the animal. The yoke also has a shape of its own. You'd think, a yoke is a yoke, but it's not that simple. The mule yoke is bigger, it's shaped differently. It also depends on the mule, if it comes from a jenny it is one thing, if it comes from a mare, it's another[34]. So, the yoke has a particular shape, and you have to find a piece of wood that is almost that shape already, since you don't have screws; it wasn't easy coming around screws, binding things together. So, it had to come in the right shape, you would have to find a branch more or less the shape of your animal already. Then the frontal part has a shape, and the part on the back has another. (…) And when you put the coating, you have to know where to put it, so you don't burden the animal's back. The back has to be free, you can only constrain the sides. It is easy to say "oh, the peasant over there...", but it's not just anyone who can put a saddle on an animal, put weight on it, and not end up having issues later. (…) I think about this and I wonder, who is going to tell people about this. Then I go on and I keep a yoke [in the museum], but… This is the knowledge that one day will be like the cave paintings from the indigenous people: someone lived it all, but it wasn't properly recorded. Then this knowledge will be lost; and important knowledge at that! When we need it in the future, we will re-start at square one." (Hermes Novais, fieldwork in Santa Maria da Vitória, December 2022, my translation)

While the traditional system of production for subsistence can still be pursued by people who live there – with all the issues and limitations discussed above -, its capacity to engage with urban contexts is limited. Traditional cash crops and products still offer income inside communities or in towns, but their insertion seems limited. In this context, the question seems to become more whether farming will be attractive than whether it will be possible. Throughout my fieldwork, I encountered several examples of what we could somewhat romantically call anthropophagic development[35] in Oswald de Andrade's (1991) sense, an engagement with farming life stemming from a confrontation with its modern others.

This was the case of Jamilton, president of a *fecho de pasto* association who went back to his farm after moving to Goiânia for several months and concluding he was not cut out for the city; of Bernardo, who developed a food forest after attending rural high school and going for a course at an important agroforestry research center in Brasília; of Iremar, the teacher and activist who was constantly mentioning in his conversations with me and interventions in *fecho de pasto* association meetings the quality of life that people had there compared to the reality of shanty towns, salaried work and busy public transport and urban violence; and perhaps above all of Hermes, the uncanny independent scholar of Santa Maria da Vitória, who regularly received manuscripts from Brazilian professors who studied different aspects

[33] All these plants are recorded by Dias and Laureano (2021) in a compendium of medicinal Cerrado plants. The scientific names of these species are likely *Cenostigma pyramidale, Jacaranda decurrens* and *Sida cordifolia,* respectively.

[34] In Portuguese you use the same word for both mules, while in English you would call the hybrid between a horse and a jenny a hinny.

[35] Here I reference the Antropophagic Manifesto by Oswald de Andrade, a literary manifesto in which he advocates for a modern Brazilian aesthetic, selectively absorbing tenets from Western culture into a national synthesis, making an authentically Brazilian way into modernity.

of the Cerrado for fact checking and readily interpreted each building or differently colored soil layer in light of global economic and natural history.

Throughout my fieldwork, there were reports of how communities gained access to electricity in the past 10 or 20 years, and I cannot recall one community I visited, however distant, that did not have access to satellite internet. In this context, beyond their capacity to protect rural livelihoods (however real and crucial it is), the development of market gardening or the engagement in *fecho de pasto* associations may be important for their engagement with urban society, not only allowing for some degree of modern consumption patterns, but also allowing for participation in political and cultural life, having the potential to make rural life meaningful in a more interconnected context.

In light of the broader social question that sparked the thesis – whether there are alternative development paths to the expansion of industrial monoculture in rural Brazil –, the uncertain possibility of an affirmative response seem to lie in the vigor and the fate of initiatives such as those of these actors, who live in a countryside still marked by some convivial customs and traditional practices, but articulate with urban, modern institutions and practices to defend them.

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Finally, a few concluding notes on the process of this thesis. I had been generally interested in the dynamics of the MATOPIBA, with its coexistence of traditional farming and highly modernized farming and global chains from the final years of my bachelor's in Brazil. This motivated me to embark on this research despite neither me nor my supervisor having no experience or contacts of my own in the region. In hindsight, this has been a double-edged knife, with positive and negative aspects, which I will discuss below. Despite my best efforts in literature review and narrowing down research interests during the development of the proposal, my research questions at the start of the thesis were still quite broad. Declaredly conducting an exploratory study, I went into the field with an understanding of the subjects that interested me and the large-scale dynamics at play, but open to see the main issues that called my attention and suggested further investigation.

My first weeks of fieldwork had a number of beginner's struggles, with struggles with local language, repeated misunderstandings about terms and farming practices that I later came to see were evident for all those around and struggles to put my "researcher hat" on and clearly ask for the things that interested me instead of listening to whatever my informants had to say. Later on, when a farmer offered to receive me at his house and introduce me to other farmers in his community, I managed to get a closer, more systematic view at a specific region, albeit largely limited to one individual's knowledge and choice of informants. The network of organizations and people engaged with farmers' movements in Correntina greatly supported me, with generous rides and beds to sleep in that allowed me to move around more, visiting the farmer's school and other communities in Correntina. Later on, the interest and generosity of Hermes once again gave me access to a series of farmers and communities that are not that represented in the literature on the region, which focuses more on the farmers around the *fechos de pasto*. This allowed me to get some glimpses of what was indeed common throughout the region, and what was more exclusive of the areas covered by previous studies.

I mention the practical matters of my fieldwork and the support I received to highlight that the fieldwork was conducted as a constant negotiation between my interests and where I

could get through my contacts. When the time of writing came, I faced some difficulties with piecing together my observations. My data came from different regions and was not homogenous (some interviews contained information on income and areas, other focused more on political organization, etc), making it hard to make more generalized statements about my findings. I dedicated a lot of time and conversations to understand historical matters and the general aspects of farming systems in the region, which to some extent had already been covered by research in Brazil (such as Sobrinho, 2012; and Cruciol, 2021)

Looking back from the conclusion of the thesis, I wish I had a clearer baseline of research questions that I could answer by collecting some specific information from farmers. I mention that in light of my stress during fieldwork and through the writing process, which I believe is linked to attempts to cover much more than I could concretely achieve. Nevertheless, I believe my openness during the fieldwork was an invaluable posture, that allowed me to be open to listen and construct the issues and dynamics unfolding in the region with less strong assumptions from the start. Having more open-ended questions also left me free to explore areas that were not usually covered in studies of the region. I have greater appreciation for what fieldwork can unveil and can clearly see how a period of one or even two months serves as an exploratory study that allows for more fitting and objective questions to be posed, and for the necessary networks to be established.

In the future, I hope to be able to mix the openness and curiosity that was probably my biggest motor in the field with an anchor in the concrete results that will be obtained as the research output, having more freedom to explore with the certainty that some outputs will be able to be reliably obtained.

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