



Transformation and differentiation of agroecosystems in Western Santa Catarina / BR

Transformação e diferenciação dos agroecossistemas da região oeste de Santa Catarina / BR

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ABSTRACT: This work aims to describe and analyze the historical process of occupation of Western Santa Catarina, constituted by different social groups, implementing different modes of occupation and use of natural resources. Understanding this process helps in understanding the current development of the territory and the potential and risks for its future development. The study used the theory of agrarian systems to understand the dynamics of differentiation and transition of modes of production in the territory. Thus, we employed a qualitative methodology, using historical and academic documents regarding the region, content analysis of these documents, and participant and non-participant observation. In conclusion, the diagnosis methodology and analysis of agrarian systems are relevant for understanding the differentiation and transition of modes of production in specific territorial contexts. The historical dynamics of Western Santa Catarina allowed us to identify a complexification of agrarian systems with increasing dependence on external factors. At the same time, we identified that some of these factors would be vital for a sustainable transition in the development of the territory.

Keywords: agrarian systems; rural territories; western Santa Catarina; family and peasant agriculture; rural development.

RESUMO: Este trabalho tem o objetivo de descrever e analisar o processo histórico de ocupação da região Oeste de Santa Catarina, constituída por diferentes grupos sociais, implementando diferentes modos de ocupação e uso dos recursos naturais. Entender esse processo auxilia na compreensão do desenvolvimento atual do território, assim como de potenciais e riscos para seu desenvolvimento futuro. O estudo utilizou a teoria dos sistemas agrários para compreender as dinâmicas de diferenciação e transição dos modos de produção no território.

Para tanto, fez uso de uma metodologia qualitativa, com recurso a documentos históricos e acadêmicos sobre a região, e análise de conteúdo destes documentos, além do uso de observação participante e não participante. Se conclui pela pertinência da metodologia de diagnóstico e análise dos sistemas agrários para o entendimento da diferenciação e transição de modos de produção em contextos territoriais específicos. A dinâmica histórica do Oeste de SC permitiu identificar um processo de complexificação dos sistemas agrários, com crescente dependência de fatores externos. Ao mesmo tempo se identificou que alguns desses fatores seriam chaves para uma transição sustentável no desenvolvimento do território.

Palavras-chave: sistemas agrários; territórios rurais; oeste catarinense; agricultura familiar e camponesa; desenvolvimento rural.

1. Introduction

This work aimed to describe and analyze the historical process of occupation of Western Santa Catarina by different social groups from a perspective that highlights the relationships between these groups and the environment, organizing different modes of occupation of the territory and uses of natural resources. The analysis is anchored in the theory of agrarian systems (Dumazert & Levard, 1988; Dufumier, 1996; Miguel, 2009; Mazoyer & Roudart, 2010), which analyzes the transformation and differentiation of the occupation of a given territory from its different modes of use.

To characterize the agrarian systems, a set of variables of different landscape units was considered in the different periods of predominant occupation: human groups and different social elements generated or altered by them; the forms of access and occupation of the land; the forms of environment artificialization; the instruments of production used; the main productive activities developed in the occupation of space; agricultural surpluses; exchange relations; and crisis and transition factors.

The theory of agrarian systems is considered “an intellectual instrument that allows us to grasp the complexity of each form of practicing agricul-

ture and to perceive, in broad lines, the historical transformations and geographical differentiation of human agriculture” (Mazoyer & Roudart, 2010, p. 71, our translation). For Mazoyer (1985 apud Dufumier, 1996), an agrarian system can be defined as a historically constituted mode of exploitation of the environment, representing a system of production forces adapted to the bioclimatic conditions of a given space and which responds to conditions of each historical moment. A set of different production systems with a similar mode of environment exploitation could be defined as an agrarian system. Thus, different agricultural production systems are implementing new modes of production in the historical dynamics of any predominantly rural territory, promoting transitions and possibly generating new agrarian systems.

Authors such as Dumazert & Levard (1988) and Miguel (2009) propose a methodology for the diagnosis and analysis of agrarian systems (DAAS). This methodology is structured by identifying, characterizing, and analyzing the interrelationships between four principal components, of which three are internal to productive systems: the ecosystem, social groups and their organizations, and the technical or production means. These internal components constantly concern external factors (the fourth

component). They are impacted by them, resulting in changes that can lead to the differentiation of production systems and the agrarian system itself.

This methodology was used by the study that gives rise to this article to describe and analyze the processes of differentiation and transition of agrarian systems in western Santa Catarina. Qualitative research was primarily conducted from documents and historical studies of the region, performing a content analysis on them. In addition, several organizational and productive processes in western Santa Catarina between the late 1990s and the present day were monitored using participant and non-participant observation. The time frame between ancestral times and the 1990s was defined for the analysis, considering its impacts in the present day.

This article is organized into three more parts in addition to this introduction: the second outlines a brief characterization of the environment of the western Santa Catarina territory; the third ponders four occupation processes of the territory and differentiates the agrarian systems resulting from the encounter between social groups, the natural environment, and technological dynamics; and, finally, from this scenario, an analytical synthesis is made, and some challenges are indicated to reflect the contemporary development of this territory.

2. Characteristics of the biophysical environment of the Western Region of Santa Catarina

Western Santa Catarina is vast and diverse regarding relief, soils, climatic conditions, and the occupying population.

This region has been called the Intermediate Geographical Region of Chapeco since 2017, in the new regional division of the Brazilian Institute of Geography and Statistics (IBGE), consisting of seven Immediate Geographic Regions (São Miguel do Oeste, Maravilha, São Lourenço do Oeste, Chapecó, Xanxerê, Concórdia, and Joaçaba/Herval do Oeste). These regions encompass 118 municipalities, with an estimated population of 1,115,238 inhabitants in 2018, distributed in a total area of 24,599,429 km² (IBGE, 2017).

There are three most common ecological profiles in the agroecological zones of this territory: the altitude fields, the slopes, and the flat areas formed in two situations: low places near the river meshes or plateaus in the middle of the existing slopes. This general description is presented in the cross-section of Figure 1, highlighting a diversity of ecosystems formed in these different situations.

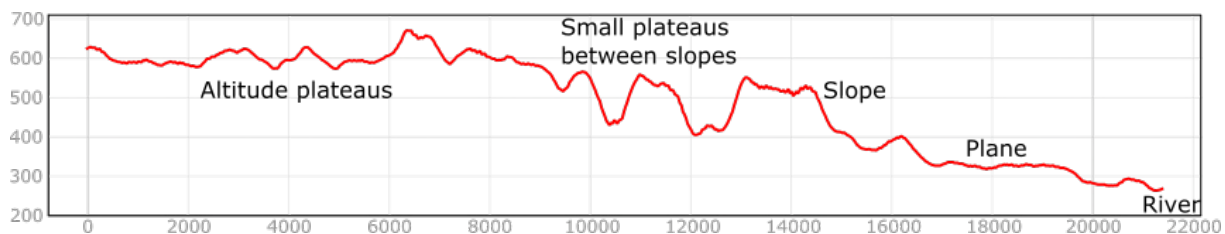


FIGURE 1- Cross-section of the relief of Western Santa Catarina (m).

Note: Digital Elevation model with complement Terrain Profile from QGIS v 3.

SOURCE: the authors, from IBGE, 2002.

Figure 1 shows that the relief and ecosystems of the region are more irregular and diverse than the classification proposed by IBGE (1990, p. 57), such as the “Araucaria Plateau”, which extends from the regions of Caxias do Sul and Santa Maria in Rio Grande do Sul to Campo Mourão and Cascavel in Paraná.

Western Santa Catarina is covered by a Mixed Ombrophilous Forest and, to a lesser extent, Natural Fields in the plateau areas and by a Deciduous Seasonal Forest in the areas of greater slopes, where there are interspersed plateaus and plains on the river banks (Figure 2).

In addition to the diversity of relief and forests, there is a diversity of soil types and fertility in Western Santa Catarina. Eutrophic soils naturally predominate in places of the most rugged relief, in the regions of slopes, small plateaus, and plains by rivers. Soils with low natural fertility and alic soils predominate in the regions of high plateaus (IBGE, 1990). As will be seen, the three ecological profiles identified were used distinctly by human groups throughout the occupation processes, being the basis for the following transformations.

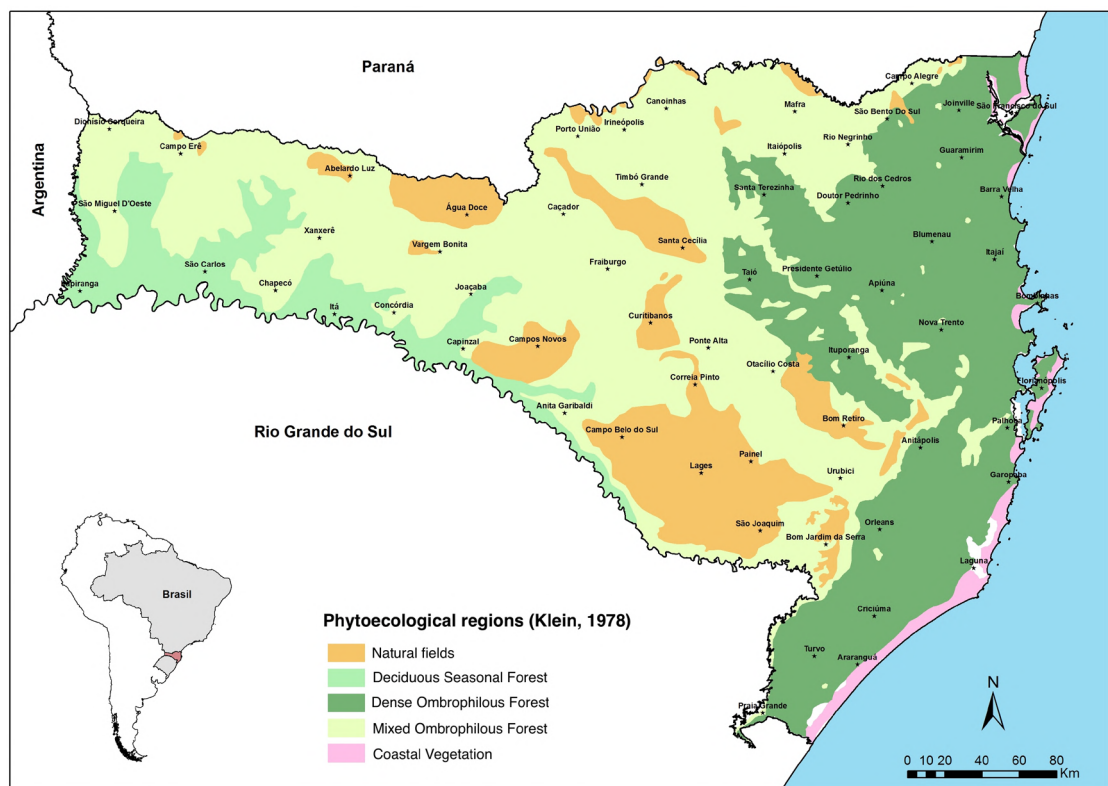


FIGURE 2 - Vegetation of Santa Catarina.
SOURCE: IFFSC, 2021.

3. The occupation processes of the Western Region of Santa Catarina

The following characterizes, with some generalizations, the occupation of the region based on four significant processes throughout its history, roughly distinguished by social groups, their form of occupation and sociocultural organization, the relationship with the natural environment, and the form of exploitation, that is, their forms of life and production.

3.1. The indigenous occupation

This region has records of occupation from ten thousand years ago. Archaeologists have recorded sites of the first culture named Humaitá culture (established near the great rivers); then, in the higher regions, the Umbu culture appeared and, finally, favored by the expansion of the Araucaria forest in the first millennium of the common era, the Taquara/Itararé culture appears. More recently, the Guarani culture, farmers of Amazonian origin, have been found in the archaeological sites of the plains, and Taquara/Itararé culture, predecessors of the Kaingang and Xokleng, the underground houses and ceramics in the Araucaria Forests, indicating the historical links (Schmitz, 2011).

According to D'Angelis (1995, p. 144, our translation),

we must identify the subtropical forest area of Western Santa Catarina as Guarani occupation, especially along the large rivers except for the field edges. On the other hand, we will identify the Araucaria forest and its intermediate fields as the Kaingang occupation.

Marcon (1999, p. 50, our translation), in turn, states that “until the beginning of the second half of the nineteenth century, the lands of Western Santa Catarina and Northern Rio Grande do Sul were occupied extensively by the Crowned Indians” (the Kaingang), that is, having a much more extensive occupation of this territory than the Guarani. This author records that the Kaingang concentrated in the region of the forests, from which they took their subsistence.

Tommasino (2000) demonstrates that the living space of the Kaingang was the areas of pine forests, moving to structure the farms. D'Angelis (1995, p. 150), in turn, states that, unlike the Guarani, the Kaingang were not traditional farmers with sedentary habits but also not nomadic, insofar as their places of residence remained, no matter how much their farms moved.

For Tommasino (2000, p. 193, our translation), the territorial unit of Kaingang society constitutes a physical space that, in summary, is “comprised of mountains, fields, and forests, where groups can exercise their hunting, fishing, gathering, and planting activities”. The primary crops were corn, pumpkin, beans, sweet potatoes, and peanuts.

The social organization of the Kaingang was with a chief, who was the paramount chief of subordinate groups. This chief indicated where each group would occupy in the pine forests. Land use was collective within the same group but with property rights for each group. Pine forests and accommodation spaces in the fields had specific uses per group. Hunting and gathering (except pine nuts) could occur in any area. The farm was owned by those who maintained it while it was cultivated, and, as it was rotating, the land returned to the collective domain after its use (Tommasino, 2000).

The way to agriculture was through slash-and-burn (slaughter and burning of the forest), carried out on high ground, usually on the edges and where the forest was thin. The larger bushes were broken up and heaped up before being burned. Sowing was done after the rains following the burn. There was no other cultural tract until the harvest when they returned to the area. After the harvest, the area was abandoned, serving as a collection of food that still developed.

By the differentiation of agriculture that Mazoyer & Roudart (2010) identify, this production system can be characterized as a felled-and-burned system. According to them, despite having a long cycle of forest fallow, the productivity is average because of the fertility provided by the restored and burned vegetation. It resembles systems that were built later in the history of agriculture. The specificity of the Native American production systems, which the slash-and-burn exemplifies, was the absence of animal domestication due to the fauna diversity in the American continent compared to the others.

Since the Entries and Flags, the indigenous people of the southern region have gradually concentrated the population in increasingly restricted portions of areas previously extensively occupied by them. It should be noted that even with the greater Luso-Brazilian occupation and colonization by European descendants, it was with the implementation of the Federal Decree of President Getúlio Vargas in 1945 that “the Southern states reduced the areas reserved for Indigenous peoples, on average, to one-tenth of what the imperial government had regulated” (Tommasino, 2000, p. 213, our translation).

Some factors can be pointed out as relevant to reduce the predominance of the Indigenous agrarian system in the region, namely the conquest of the seven peoples of the Missions in 1756, which began to encourage transit through the region, until then considered dangerous for the drovers (D’Angelis, 1995, p. 150); the process of hunting Indigenous people to be slaves, taken to São Paulo or Asunción, through the expeditions of the Bandeirantes, facts responsible for the depopulation of the territory (Schmitz, 2011).

3.2. *The Luso-Brazilian occupation¹*

The pastoral fronts are structured based on the crisis factors mentioned earlier, “which boosted the occupation of the fields, leaving, at that moment, the forests (apparently) untouched” (Renk, 1997, p. 31, our translation). Scattered occupation actions were being carried out in these areas through the seizure by Luso-Brazilians, who thus became extractive farmers.

The estates' structure in the region's high-altitude countryside areas has been marked by the large livestock farms since the second half of the 18th century, within which were the farmer and their workers. In this period, the lands were divided into livestock land (the altitude fields) and farmland (hillsides or small plains). According to Mazoyer & Roudart (2010), these styles of agriculture can be associated with the initial forms of agriculture expansion: pastoral and slash-and-burn systems, where possible, associated with river ebb.

¹Luso-Brazilians are the Brazilians from the first waves of colonization to the countryside, who later came to be pejoratively called 'caboclos' in Western Santa Catarina (Renk, 1997).

In 1845, the troop path connecting São Paulo to São Pedro do Rio Grande do Sul was built, passing through the west of Santa Catarina, at the time still partially belonging to Paraná and in dispute with Argentina. From the construction of this path, “several villages were consolidated in the provinces of Santa Catarina and São Pedro, especially Xanxerê, Passo dos Índios, Passo do Carneiro (Passo Bormann - today Chapecó), Goio-En, Nonoai, and Cruz Alta” (Marcon, 1999, p. 52, our translation). From this, the leading commercial organization of the region was droverism. For the same author, this brought especially three impacts: the attraction of residents from the provinces of São Paulo and Paraná, the organization of villages by these new residents, and the circulation of monks through these new paths (Marcon, 1999, p. 53).

At this time, the occupation was carried out through the possession of pieces of land by the Luso-Brazilians. It is important to indicate that the land law of 1850, which defined that, from then on, land ownership would only be possible through purchase, and the Constitution of 1891, which defined that vacant areas were state property, reserving the latter the right to grant or not the right of ownership of the land, would later come to mean the main legal mechanisms of exclusion of Luso-Brazilian farmers from the lands of the region.

"Around 1870, the cycle of troops begins to decline, concomitant with that of livestock farms, resulting in a movement of dispersion of the farming family and fragmentation of large areas by inheritances and shares” (Renk, 1997, p. 34, our translation). With the decline of the troops, part of the surplus population of the farms of the fields of Palmas, Erê, and Irani moved to what is now Chapecó, occupying the forests. With vast

depopulated forests, the region was only occupied sparsely from the end of the nineteenth century. Throughout this region, there was an occupation through the possession of not very extensive areas by each possessing family, which were surpluses of the population of the livestock farms, fugitives from justice, and exiles of the revolts in Rio Grande do Sul. The forest regions were remote and difficult to access, making an extensive occupation of the Luso-Brazilians possible, leaving the areas most occupied by the indigenous without new possessions. Many places showed a conviviality between Luso-Brazilians and Kaingang.

The artificialization of the medium was carried out in this new phase, in many cases, in the cleaning system. This system combined areas in common for extensive, flatter, herbaceous vegetation, predominating cattle, horses, pigs, chickens, and other birds. The cultivation areas, distant from the rearing areas and located on the hillside lands, belonged to individuals or families and were exploited in the slash-and-burn system. If the maintenance of the slash-and-burn system changes from Indigenous people's region to Luso-Brazilian, the cleaning system becomes a novelty through the collective action of common areas with the inclusion of domesticated animals. This system did not include legumes and manure production for system fertilization, characteristics of the first agricultural revolution (Mazoyer & Roudart, 2010). They used the fertility of forests and soil types.

To understand how the region's occupation was already growing in this period, approximately 225 land titles were issued only in the military colony of Chapecó between 1882 and 1910 (Marcon, 1999). Even so, many forest areas remained unoccupied. When the Military Colony of Chapecó was

established, the region's main products were corn, beans, potatoes, and vegetables, produced for family consumption and commercialization with the army (Renk, 1997). Other work tools were available in this period, such as hoes, sickles, axes, and some workforce animals (still without plowing the soils), to implement plantations. Animal traction was primarily responsible for ensuring transportation (through carts and ox carts, where bovine and horse traction were merged). The main activities in the high plateau ecosystems, where the breeding farms were located, were cattle and pig farming. Hunting, gathering, fishing, and minor crops were the main activities in other ecosystems. In both cases, the plantations were made mainly for sustenance, either for the family or farm. Yerba mate emerged in this period as an important commercial activity. Its occurrence is dispersed throughout the region but with greater concentration in the forests of regions with more acidic and alkaline soils.

There was a dispute over the lands of Western Santa Catarina at the beginning of the twentieth century, specifically the region of Palmas fields and the North Plateau of Santa Catarina. The land was disputed between Indigenous people, caboclos, farmers, and colonizing companies. One aspect of this dispute resulted in the Contestado War, the largest Brazilian social conflict between the landholders of the region, the private police of the São Paulo-Rio Grande do Sul railroad, and the Brazilian army, which resulted in eight thousand deaths (Valentini, 2015). For Piazza (1982, p. 251, our translation), there were a series of problems that fermented the disputes in the region:

Economic (at the time, given the connotation of yerba mate, the contested region held the largest native

reserves of this plant and was also a breeding area), social (with problems of land ownership questioned in the face of the construction of the São Paulo-Rio Grande do Sul railroad and its territorial rights; in addition to the formation of marginalized social segments due to the structure of pastoral society and the construction of the railroad), religious cultural (the formation and development of religious culture, provided by the acceptance of messianic leaders), and political interests (the antagonistic placement of regional leaders – colonels – pending to the faction of each of the litigating states [sic]).

Given these facts, it is considered that the main factors that led to the crisis and transition of this agrarian system were the institution of land laws in 1850, which made land a commodity, transforming all landholders into intruders (Werlang, 1994) and the end of disputes that stimulated the Santa Catarina government to promote a colonization policy through private companies. The arrival of new immigrants promoted a broad process of expulsion of landholders whose lands were not regularized, moving these people to steeper areas of little commercial value, reducing their agricultural area, and making it impossible to reproduce the way of life and production of Luso-Brazilians. The cleaning agricultural system, with common areas for livestock, had to be abandoned, and the Luso-Brazilians were forced to adapt to the new dynamics of private property.

3.3. Occupation by settlers of European descent

From the 1920s, Western Santa Catarina experienced a broad process of occupation by European descendants, significantly increasing its population

and demographic density. Farmers from Rio Grande do Sul began to colonize the Santa Catarina region to start a new life in new land (Schuh, 2011).

The modes of production of these immigrants imposed themselves on the different ecosystems. The form of occupation, often through rectangular plots of 24.2 ha (one colony or ten bushels), transversely to the watershed valleys, spatially outlined the division of private properties. The highlands and plains of the farms already regularized in the previous period and occupied in that period by extensive livestock escaped this colonization.

A contract between the government of the state of Santa Catarina and a settler indicated how the land should be distributed to families in the different sub-regions of Western Santa Catarina: 30 to 200 ha in the forest lands, to develop agriculture, 100 to 500 ha in the herb lands (yerba mate); 250 to 900 ha in the pine forest lands, and 2000 to 4000 ha in the livestock lands; the last two cases mainly were high plateaus (Werlang, 1994).

"Especially since 1930, a strong population dynamic emerged, Italo-German-Brazilian originating in Rio Grande do Sul, which reaches the Rio do Peixe and then the entire Western Santa Catarina" (Piazza, 1982, p. 257, our translation). The region had become virtually depopulated by this time due to the conflicts. The municipality of Joaçaba, which together with Chapecó were the two municipalities in the region, had a demographic density of four inhabitants for every 3 km² in 1917 (Radin, 2001). Chapecó, in turn, had 0.94 inhabitants/km² in 1940 and 6.95 inhabitants/km² in 1950 (Piazza, 1982). The growth of the demographic density of the region was intense between 1920 and 1950. Despite the low population density at the beginning of the century, it grew parallel to deforestation, opening areas for

plantations (corn, beans, rice, potatoes, and cassava crops) and rearing small animals (mainly pigs, and later cattle and poultry).

The settlers occupied the forests on the slopes and small, flat areas. The Luso-Brazilian farmers remained in the altitude fields, maintained for a long time as livestock regions. For Renk (1997, p. 65, our translation), "in addition to the regimentation of the settlers, the company was in charge of 'cleaning the area' occupied by squatters, to 'not harm the settlers'". Surplus Luso-Brazilians occupied the hillside areas of the region's major rivers, moved to other regions, or were employed for grass cutting, sawmill work, and other tasks.

The period from 1920 to the beginning of the 1960s was characterized as agriculture emphasizing subsistence, community, or regional product circulation through the sale of a few surpluses, with the inputs coming from the land's natural fertility and animal husbandry.

A new social organization emerged from these immigrants' colonization, consisting of lines, sectors, and communities, later districts and municipalities. The primary building agents of this organization, during and after the work of the colonizing companies, were the Catholic and Lutheran churches, contributing to the design of community facilities such as churches, community halls, schools, and sports clubs. The socioeconomic categories constitutive of this agrarian dynamic were the large farmers (producers) of the highlands and plains, the peasants or settlers (immigrants descended from Europeans, who took over a large part of the slopes and small plains between them and on the banks of small rivers), and the Luso-Brazilians (who moved to marginal areas on the banks of large rivers or became workers).

Thus, the agrarian dynamics of the same territory generate different modes of environmental artificialization by extensive breeding in the flat areas of large farms, integration of breeding (cattle, pigs, and poultry), and intensive cultivation on a small scale, with the use of local fertility in small farms. In other words, different modes of production and different agrarian systems are forming in the same territory. The crops of European immigrants, mainly wheat, corn, beans, cassava, sugarcane, and many subsistence products, were produced by burning vegetation and artificially preparing the soil with simple and rustic animal traction plows after cleaning the areas. Here, we see the combination of practices of environmental artificialization previously used by the Indigenous people, such as the slash-and-burn.

A change in the regional landscape has occurred since the beginning of this colonization process, linked to the cutting of the forest for the commercialization of the best woods and the opening of agricultural areas, aiming to reconcile with small animal husbandry. Photographic records and reports of people who lived at the time demonstrate that, despite all the forest and wood, much of this resource was lost since the settlers' main objective was the installation of their families and farms (Schuh, 2011).

In many cases, groups of families from Rio Grande do Sul acquired land during this colonization, seeking to build a community nucleus. For Poli (2002), this meant “a given cultural pattern and a specific way of life” (p. 137, our translation) of these peasants, for whom “reproducing themselves as autonomous small family producers” (p. 134, our translation) was the focus. Work as a central value, and the division of tasks by family members appear

as structuring in the culture of these new occupants (Renk, 1997; Radin, 2001; Poli, 2002).

It can be stated that the peasant culture, linking the formation of farms for agriculture with small animal husbandry, having family and collective work as transformation of the environment, are central factors in the definition of the new landscape of the region. The role of wood commercialization through rafts in the floods of the Uruguay River, a reason for the enrichment of many people of the time (Breves, 1985), cannot be disregarded.

In terms of agricultural technologies, mechanization with animal traction was disseminated in this period, previously only used in farms occupying high-altitude fields. The first year of the crop was done through slash-and-burn. An increasing number of agricultural establishments used plowing from the second year. If the practice of slash-and-burn was justified in the period of occupation of the Indigenous and Luso-Brazilians, especially given the low demographic density on the available lands, it already became pernicious in this new period. There was no longer enough land to make an adequate rotation that would guarantee the recovery of soil fertility in the fallow period (10 to 15 years), given the low availability of land that soon had to be re-allocated for agricultural use. Even so, according to Radin (2001, p. 103, our translation), “in colonial areas, this was a procedure that changed little until the 1970s”.

Some factors of crisis and transition that are generating a new agrarian dynamic in the region are limits in the artificial environment; an emerging agro-industrial production, mainly linked to pig farming, much practiced by immigrant settlers; the exhaustion of the agricultural frontier, given the limited availability of new land areas for com-

mercialization; and factors external to the existing agrarian systems, mainly linked to the modernization of agriculture implemented from the Brazilian National State. There has been a significant transformation in production modes in the region since the first small agro-industries, from the 1950s until the mid-1980s.

3.4. Agro-industrial transformation

In the late 1960s, Western Santa Catarina was already widely involved in implementing the so-called green revolution. This agricultural revolution is a dynamic of agriculture modernization, highly linked to factors external to the region and production and agricultural systems of the area. Thus, with the transport revolution enabling globalized marketing, farmers increasingly began to acquire seeds, chemical fertilizers, pesticides, mechanizable machines, and subsidized credit (Mazoyer & Roudart, 2010). This tied many farmers to large agri-food corporations.

The territory possessed some companies that would promote the integration of the industrial sector with the region's farmers. They and the agroindustrial integration expanded with the modernization of Brazilian agriculture. The leading corporations were Sadia and Perdigão, which together form today Brasil Foods; Seara; Frigorífico Chapecó; and Coopercentral. These companies took advantage of the region's productive capacity, where the properties increasingly produced surpluses, especially of live pigs and lard, fed with corn from the agricultural units.

This period of structural change in the agrarian systems of the region is the first in which structural

changes occurred without the entry of a new population contingent. The private mode of access to land, with title to property, established in the periods previously described, was central for the productive units to access a set of public and private policies, incentives, and subsidies developed to support the modernization process. Other forms of access to land still in the territory were limiting access to these policies.

The transformation driven by modern production techniques represented a vertical growth of productivity. The production and productivity of beef cattle, wheat, and corn intensified in the high plateau regions, with the grains produced in deeper soils. It should be noted that these soils only became suitable for crops with the spread of the use of limestone. Extensive livestock farming previously developed on them due to their high acidity and aluminum toxicity.

Small farms predominate on the slopes and small plateaus occupied by the settlers, who came to represent the vast majority of establishments in the region, where intensification of grain production in mechanizable areas and of breeding systems in feedlots integrated with agroindustries occurred. In addition, small plots were increasingly earmarked for reforestation with exotic species for energy purposes (smoke processing, poultry breeding, and demand from agro-industries) and construction.

Of the different reliefs in the region until the previous period, slopes were the areas occupied by these farmers for crops, either by tradition or because they presented the most fertile lands. This factor, coupled with the plowing of the soils and subsequent weeding during crop development, led to erosion and loss of fertility. The flat areas of the establishments were, in the previous period, used

primarily for the residence, vegetable gardens, and paddocks, where the dairy cows were raised, usually for family consumption.

A qualified reduction in the turbidity levels of the river waters of the region began to be noticed only in the 1990s, meaning a reduction in their siltation due to soil loss. This is linked to the displacement of the tillage areas to the flatter areas due to liming and the introduction of the no-till system in the region, increasing soil protection. However, such techniques have advanced with the use of transgenic seeds and intensive use of pesticides.

The production instruments underwent significant transformations in the most intense period of modernization. The breeding systems have been modified to ever larger sheds, with more sophisticated and automated control systems of environmental and nutritional factors. Crop seeds, fertilizers, pesticides, and other inputs are increasingly incorporated into production systems due to technological dependence on external factors. However, despite the modern means of production being increasingly adopted, many productive systems still operated using manual tools, animal traction, and light and small mechanical means. Testa *et al.* (1996, p. 62) state that the region presents a “predominance of animal traction” until the 1990s.

In this process, deforestation was highly present in the region until the end of the 1970s, as it was still advantageous to implement agriculture, especially if integrated into the growing pig farming. However, the 1980s marked a general crisis in agriculture and the economy in Brazil, with the exhaustion of subsidized credit as one of its catalysts.

This crisis did not only affect the most vulnerable. Many farmers were in debt, and the agro-industries began a process of integrated selectivity, excluding partners. The prices of agricultural products were low and had a downward tendency, and the number of families who could not live with dignity on their piece of land only grew². There were 67,000 pig farmers in the region in 1980, of which only 3,860 were integrated into agro-industries. In 1985, there were 45,000 pig farmers in total, of which 18,232 were integrated into agro-industries, while 20,000 were estimated in 1995, with a projection of 18,700 integrated into agro-industries (Testa *et al.*, 1996).

The concentration and exclusion of pig farming, which was already the region's main economic activity in this period, led farmers to seek alternative income. Dairy cattle farming was the activity to which most began to dedicate themselves, making it the primary activity of establishments in Western Santa Catarina³ (Mello *et al.*, 2002). In addition to the agricultural alternatives, many could not make a living from it, and there was a rural exodus of some families.

The concentration of pig production also represented the concentration of pig waste. Since most pig production occurred where hillside ecosystems predominated, there was not enough agricultural soil to absorb all the manure produced in the form of fertilizer. Miranda (2001) observed that, of 23 micro basins studied in the Concórdia region, only one had agricultural land capable of absorbing the amount of waste produced. These findings have brought to light an environmental problem in the region: high water contamination (Figure 3).

² Most families of European descendents were large, with no fewer than five children per couple.

³ If milk was the main alternative found, we cannot fail to mention the integration with agroindustries in the production of poultry and tobacco, with which many properties have become involved as an alternative to the exclusion of pig farming.

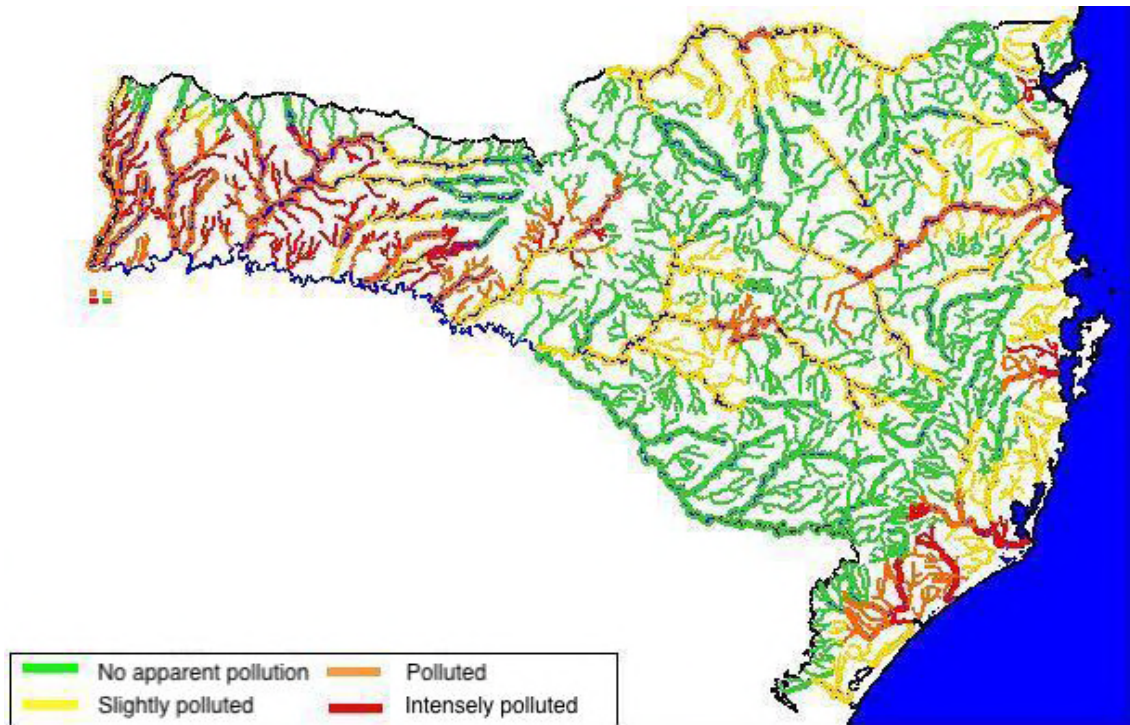


FIGURE 3 - Quality of water resources in the state of Santa Catarina.
SOURCE: INSTITUTO CEPA, 1995.

There are no recent studies or systematic monitoring of the quality of water resources in Western Santa Catarina. However, new technological changes or organization of production systems were adopted due to the visibility of water contamination. Pig farming was concentrated for larger production units; many farmers gradually moved their crops from hillside areas to flatter ones, and pig waste treatment systems were adopted. Environmental licensing was crucial to minimize environmental pollution from the 1990s, inducing companies and producers to more careful practices with the environment.

It can be stated that if the period from 1930 to 1950 represented the intense population occupation of the rural area of the region by population contingents from Rio Grande do Sul; the post-1970 period represented a significant reduction in the population of this rural area through strong migration to larger cities in the region, other rural regions of the mid-north of the country, or urban centers in other regions. This rural and regional exodus process had its specificities for Western Santa Catarina. Still, it can also be framed in the migration process from rural areas to urban centers throughout Brazil.

5. Final remarks, by way of conclusion: reminiscences and challenges for the present day

The dynamics of agrarian change described allow us to verify the relevance of the "diagnosis and analysis of agrarian systems (DAAS)" methodology for the study and analysis of predominantly rural territories. Identifying different combinations and interrelationships between the four components of agrarian systems (ecosystem, social groups, and their organizations, technical or means of production, and external factors) allowed us to demonstrate how different social groups, in different historical times, emphasized some of these components. When Indigenous and Luso-Brazilian people predominated, ecosystems and social groups were the most relevant components in activating productive processes. There were some important shifts in the arrangement of these components with the arrival of European immigrants, incorporating new technical means and important organizational changes in work and social interaction. However, the productive processes derived from the modernization of agriculture promoted the most structuring transformations in the agrarian systems of the region. External factors linked to policies, markets, and new technical means became determinants in the modes of production, implanting a new agrarian system, which became the conventional one for this territorial context.

The DAAS methodology allows us to understand that reality and its analysis are situational, according to the territory. Western Santa Catarina allowed us to highlight the great historical transformations of agrarian dynamics while highlighting the

importance of specific elements to promote these significant transformations. An example of this is the impact of the adoption of only one technical means, limestone, which, when overcoming the acidic and alic condition of the soils of the flat areas, allowed the crops and paddocks to move there and to the sloping areas structurally changing the rural landscape and allowing greater mechanization of crops, relieving the workload of families. However, this is a positive example of a transformation that has incorporated numerous external factors into the productive dynamics of the territory, generating a diversity of negative externalities, especially in environmental and social terms.

The modes of agricultural production have been evolving and changing over time. In a more comprehensive analysis, it is possible to affirm that the periods of Indigenous and Luso-Brazilian predominance and the first phase of occupation of the territory by European descendants represent a traditional agrarian system. Despite the different combinations of the four components of the agrarian system, the three periods we presented a predominance of production for family self-sufficiency, low relationship with markets and external factors, lower environmental impacts, greater incorporation and lower socioeconomic exclusion, and lower productivity and production scale. The first phase of occupation by European descendants could be interpreted as a transition since some elements (such as the widespread production of pigs) created favorable conditions for the installation of agri-food corporations in the territory, a vital element of the following period.

The establishment of modern agriculture, which became the predominant one, did not eliminate the previously described modes of production from

the territory. Thus, agrarian dynamics became more complex, where different production and agrarian systems began to coexist. However, in many cases, an agrarian system has come to predominate, with the relevance of external factors and modern technical means, with technological dependence, policies, and markets as the primary characteristic. In this sense and the current context of the agrarian systems of the territory, it is difficult to imagine the solution to environmental and socioeconomic problems without structural changes in external factors, such as research, credit, technical assistance and rural extension, and markets.

Therefore, it is understood that there is a diversity of elements that impact the future directions of the region, among which we highlight commodities such as corn, soybean, pigs, and chicken; the national and international prices, in addition to the country's policy for milk, a new alternative sought by most family farmers in the region; public policies for family agriculture, which represents the vast majority of farmers in the region; municipal and regional rural development actions that promote the social development of small rural municipalities, today an expression of the lowest human development indices; and the capacity and qualification of civil society to seek new and more diverse alternatives to generate income and preserve the available resource base. In addition to these elements, it is understood that it will be vital for the territory to promote modes of production that are less dependent on external factors without denying the relevance of factors such as public policies and marketing alternatives since they would undoubtedly help in the generation of more self-sustainable productive dynamics.

The analyses presented here may be qualified by additional studies that deepen the understanding

of the complexity posed in the territory in the two recent decades, thus further identifying critical and alternative factors for its development.

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