

The Faxinal System in the State of Paraná: a Review

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Abstract

The Faxinal System is a traditional silvopastoral system located in fragments of Araucaria Forest in the state of Paraná (PR). In these areas, there is extensive animal husbandry between properties associated with the selective exploitation of forest resources. The Faxinal has been the subject of study by various branches of science, so new gaps and methods have emerged as research has progressed on the subject. To verify the evolution and new challenges of research on faxinals, a bibliometric review was carried out based on 125 articles collected by the Publish or Perish 8 program. The articles were organized according to the decade of publication (1980s; 1990s; 2000s; 2010s and early 2020s), the topic researched (economy, territory, cultural and environmental) and the geographical location of the faxinals. The number of articles on the Faxinal System has increased in recent decades, with a tendency for an even greater increase by 2029. Research has shown that, due to capitalist expansion, the strengthening of agribusiness and environmental problems, the Faxinal is failing to sustain itself in the traditional way and its long-term continuity is under threat. Considering this, we see the need for an integrated approach that promotes cooperation between the community, the private sector and government entities. In addition, initiatives aimed at research, education, training, technical support, and monitoring are fundamental to maintaining the Faxinal System, taking advantage of its sustainable potential.

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INTRODUCTION

Throughout history, traditional systems used in extensive farming have played a fundamental role in the survival of communities and the evolution of world landscapes. Among the various existing traditional agricultural systems, some have been extensively studied, such as the Dehesa in Spain (Rodríguez-Rojo *et al.*, 2022), the Montado in Portugal (Azeda *et al.*, 2021), parmesan cheese production systems in Italy (Mancini *et al.*, 2019), ranches in the USA (Roche *et al.*, 2015), and common pastures in the Swiss Alps (Rudmann-Maurer *et al.*, 2008). In the state of Paraná (PR), an example of a traditional agricultural organization is the Faxinal System, concentrated in the Southeast and Center-South regions.

In Faxinal, which is made up of Araucaria Forest and native pastures, there is extensive and collective herding (community breeding) and selective exploitation of yerba mate and wood. Outside the faxinals enclosures, there is planting land, which is used in mechanized and subsistence agricultural practices (Antoneli; Thomaz, 2012; Chang, 1986; Radomski; Ribaski, 2009). Within these land use patterns, it appears that the Faxinal System faces several environmental problems due to the pressure exerted by animal grazing. Furthermore, with the advancement of mechanized agriculture, there is a reduction in community breeding and the adoption of profitable crops such as tobacco and soybean cultivation, which has generated disagreements among the people of Faxinal themselves about maintaining this traditional system (Antoneli; Oliveira; Bednarz, 2019).

Although little known on the international scientific scene, Faxinal has been the subject of studies in several areas of knowledge in Brazil.

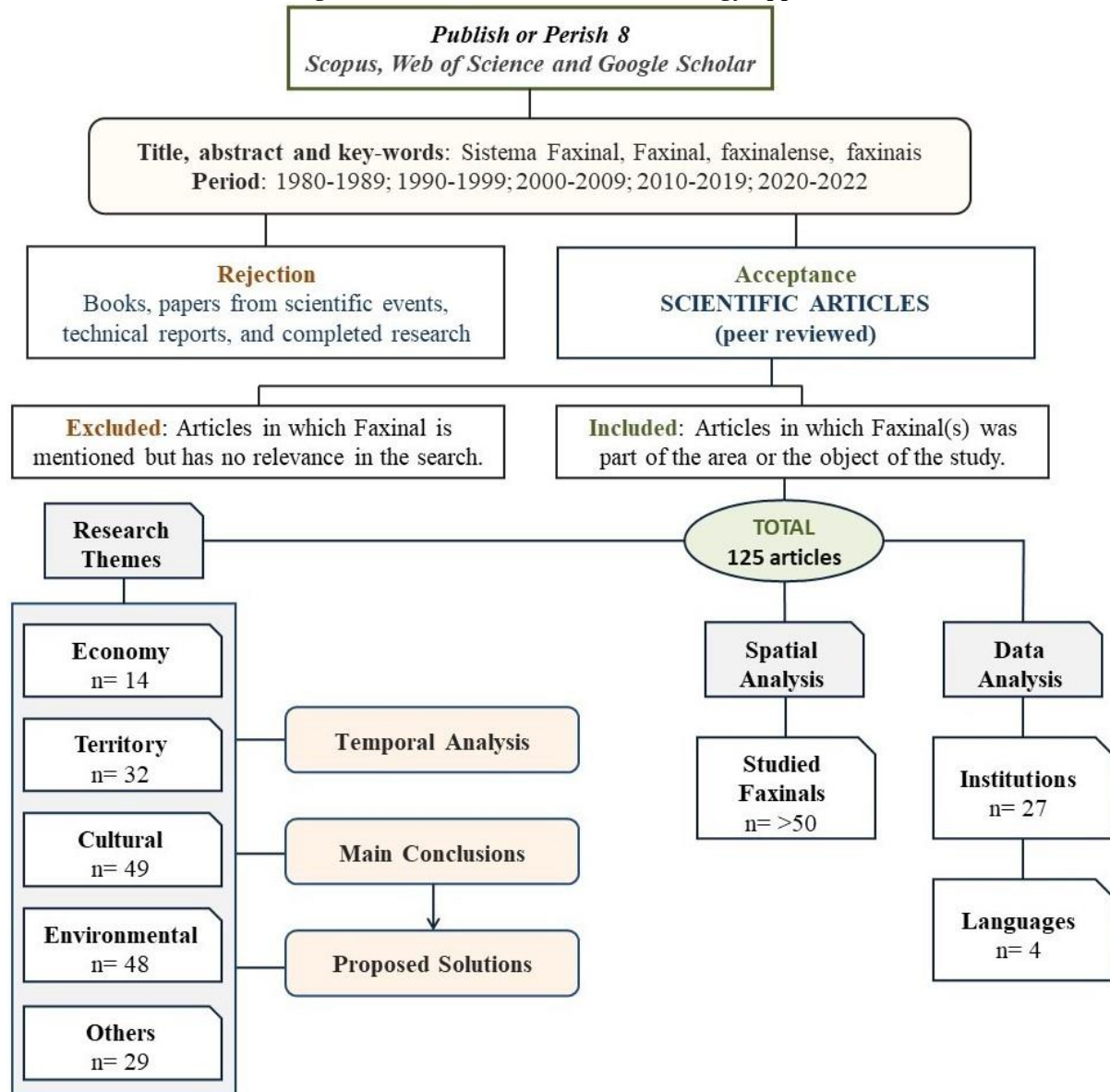
However, little is known about what has been produced over time about the system. Therefore, the objective of this research was to carry out a bibliometric survey on the main topics investigated about the Faxinal System in recent decades. For this purpose, we intend to answer the following questions: a) What are the main research themes in recent decades? b) What are the main problems addressed in faxinals? c) Do the articles present solutions for faxinals based on the problems addressed?

METHODOLOGY

To achieve the proposed objectives, we carried out searches for peer-reviewed scientific articles in any language for the period from 1980 to 2022. The software used in the searches was Harzing's Publish or Perish 8 (Tarma Software Research Ltd®), based on data using the Google Scholar tool (Google®), the Scopus database (Elsevier®), and Web of Science indexers, from Clarivate®. The date of the last search was 12/21/2023. We do not consider publications such as books, articles from scientific events, technical reports, dissertations, and theses.

The selected articles met the criteria of presenting, in their respective titles, keywords, or text, the following words: Faxinal, Sistema Faxinal, faxinalense, and faxinais. We did not consider articles in which the Faxinal System was not the focus of the research (area or object of study), even if the term Faxinal was mentioned in the body of the text. In the end, we selected 125 articles for analysis (Figure 1). This quantity does not mean that all articles produced regarding faxinals were selected, as there may be articles that are not found in the indexers used.

Figure 1 - Flowchart of the methodology applied



Source: The authors (2024).

Using the Mendeley Desktop (Elsevier®) and Excel (Microsoft®) software, we organized and categorized the articles according to: 1. the decade of publication (1980-1989; 1990-1999; 2000-2009; 2010-2019; 2020-2022); 2. the respective research themes: economy (income, agricultural production and marketing); territory (territorial division, territorial conflicts); cultural (ways of life, customs, human perception of the lived space); and environmental (pedology, hydrogeomorphology, botany, phytosociology). To a lesser extent, other themes were identified: education, history, tourism, veterinary medicine, zoology, and anthropology.

Next, we extracted the main conclusions from each topic to identify the progress of research on faxinals. We also checked whether the authors presented possible solutions and/or propositions

to the research problem raised. Finally, we counted the studied faxinals, which were spatialized in a GIS (Geographic Information System) environment, using Google Earth Pro (Google®) and ArcGIS 10.8 (ESRI®) software. We highlight that the extinct faxinals were not spatialized, as were the articles that carried out theoretical studies on the faxinals.

RESULTS

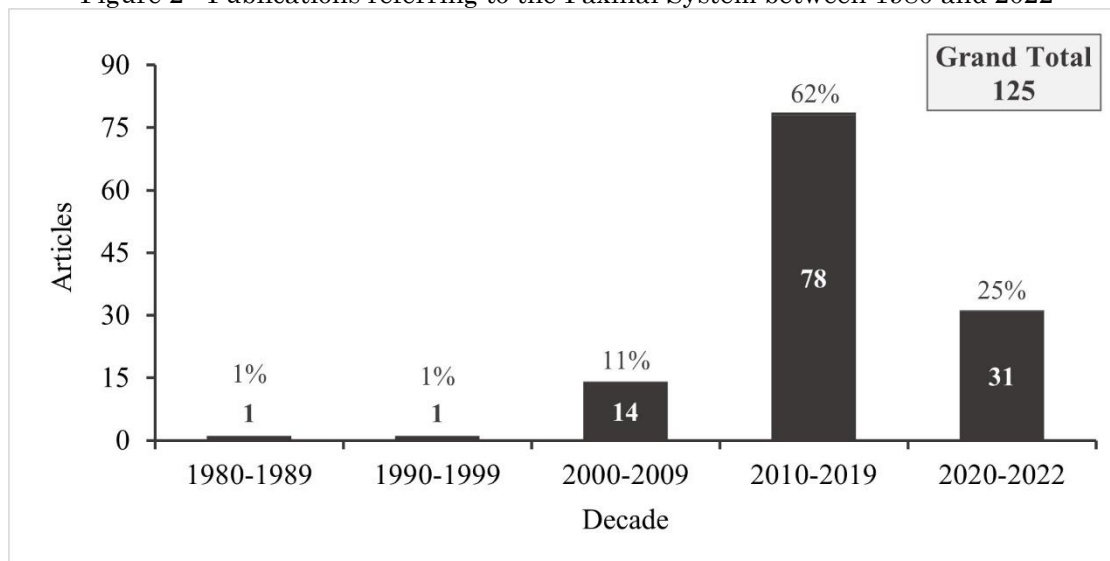
Spatialization and research carried out on the Faxinal System

The first publication in the period analyzed was in 1986. In the 1980s and 1990s, we found only one article. In the 2000s, there was an increase

in publications, and we identified 14 articles (11%). From 2010 onwards, the Faxinal System gained more visibility in the scientific scene, and 78 articles were produced during the period (62% of publications), representing a five-fold

increase compared to the previous decade. Despite only three years in the 2020s, we found 31 articles, which represents approximately 40% of the number of publications from the 2010s (Figure 2).

Figure 2 - Publications referring to the Faxinal System between 1980 and 2022

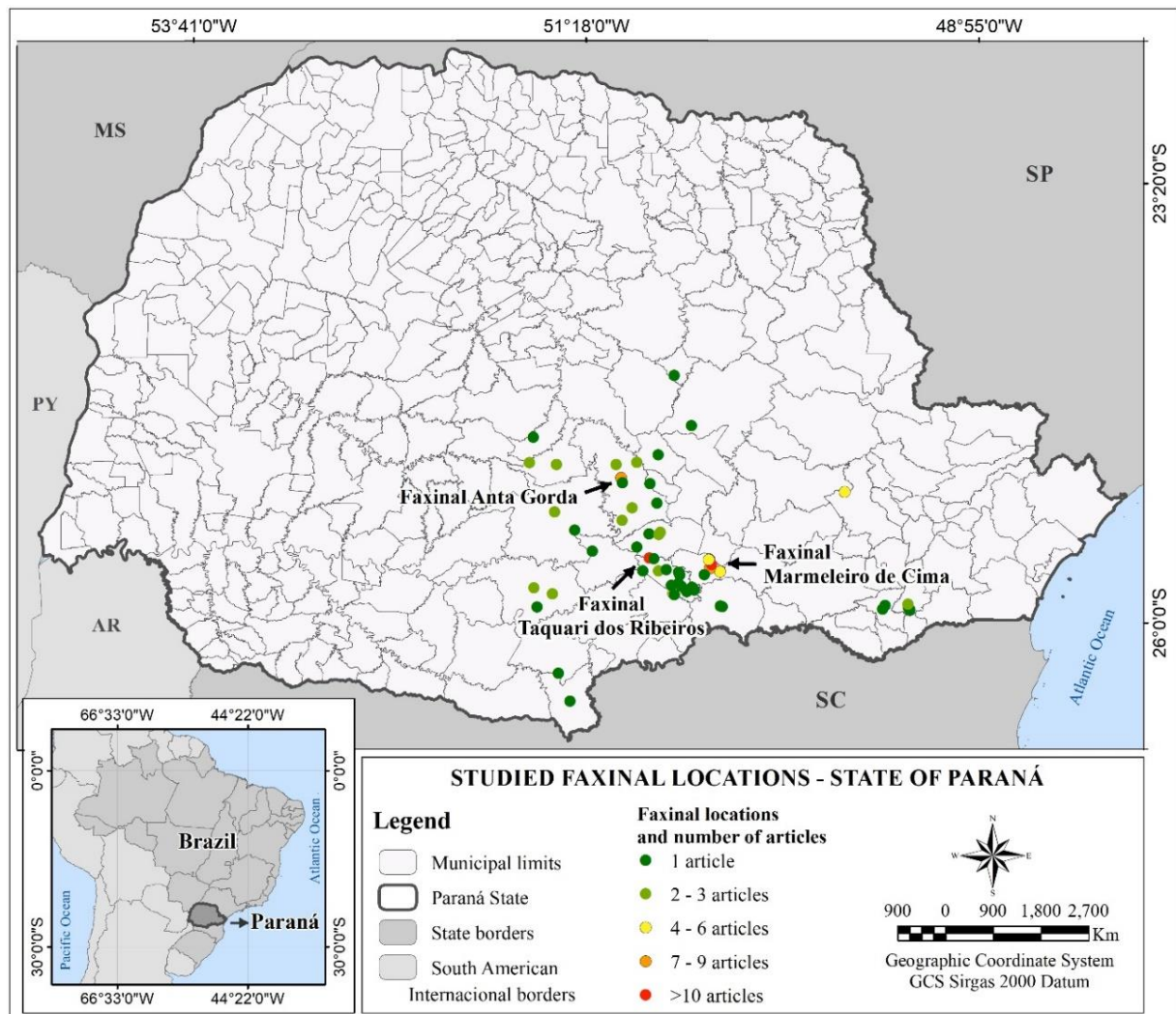


Source: The authors (2024).

The faxinals surveyed are concentrated in the center-south and southeast regions of the state of Paraná (PR), with a predominance in the

municipalities of Rio Azul, Rebouças, Irati, and Prudentópolis (Figure 3).

Figure 3 - Spatialization of faxinals studied in the interstice, between 1980 and 2022, in the state of Paraná



Note: For articles in which the name of the faxinal is not provided, but the municipality of location is identified, a point was marked in the center of the municipality.

Source: IBGE (2021) and the authors (2023). Elaborated by the authors (2024).

The most studied faxinals were: Marmeleiro de Cima – Rebouças, PR (13 articles); Taquari dos Ribeiros - Rio Azul, PR (10 articles); Marmeleiro de Baixo - Rebouças, PR (9 articles) and Anta Gorda – Prudentópolis, PR (8 articles). Faxinal Taquari dos Ribeiros was, above all, studied by Universidade Estadual de Ponta Grossa (UEPG/PR). The faxinals Marmeleiro de Cima, Anta Gorda and Marmeleiro de Baixo were studied mainly by researchers from Universidade Estadual do Centro-Oeste do Paraná (Unicentro/PR), indicating 9, 7 and 6 articles at the institution, respectively (Figure 3).

A smaller number of other faxinals, including Faxinal dos Ribeiros - Pinhão, PR (3 articles), Lageado dos Mello - Rio Azul, PR (4 articles), and Sete Saltos de Baixo - Ponta Grossa, PR (5 articles), were also studied. Of the more than 50 faxinals studied, 29 faxinals appeared in just

one article. 36 publications approached the faxinals of Paraná (without mentioning a specific study region), while 9 articles just stated the municipality of the location, omitting the name of the faxinal under investigation.

Themes of research carried out in the faxinals

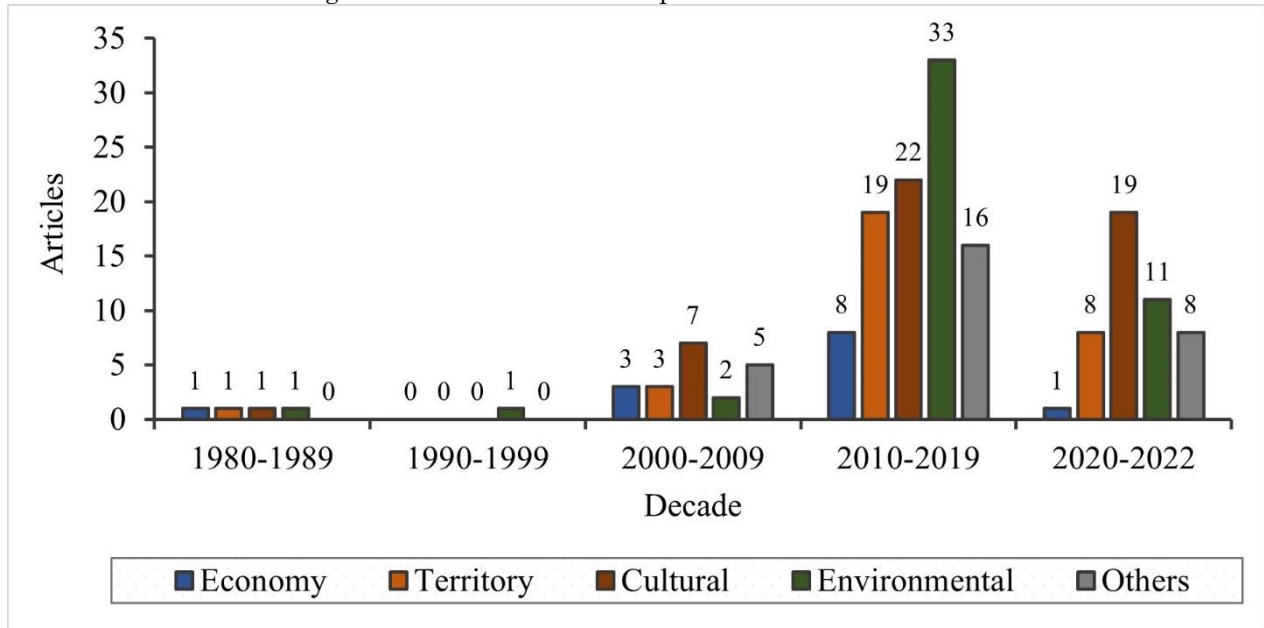
Of the 125 articles analyzed, 48 discuss the culture of Faxinal; 48 refer to environmental issues; 33 cover Faxinal territory; and 13 portray the Faxinal economy (Figure 4). The environmental theme was the only one that appeared in all decades, and the period of greatest production of the theme was between 2010 and 2019, with 33 publications. However, in the first years of the current decade, the cultural theme has stood out, with 19 publications, while environmental studies

occupied 11 publications. The peak of publications on faxinalense culture was in the 2000s (7 articles).

The number of articles on the territory theme was similar to that on the economy in the 1990s

(both with three articles) and cultural theme in the 2010s (19 and 22 articles, respectively). Territorial issues have continued to stand out in the last three years, with nine articles published in the period (Figure 4).

Figure 4 - Themes of articles published about faxinals



Note: an article can fit into one or more themes. Therefore, this figure does not express the total number of articles published, but rather the number of times each topic appeared in the published articles.

Source: The authors (2024).

Articles related to the economic aspects of faxinals were those with the lowest production among the topics, totaling 13 publications throughout the period. Only in the decade 2000–2009 was the number of economic studies greater than the environmental topic, and, since 2020, only one article has been published on the topic. Less frequently, other themes were identified in the articles, such as education, history, tourism, veterinary medicine, zoology, and anthropology (29 articles).

DISCUSSION

Faxinals reached its peak until the mid-1960s, when the Brazilian agrarian sector, aiming to increase productivity, underwent a process of modernization with the use of chemical fertilizers, irrigation, mechanization, pesticides, and genetically improved seeds (Ameen; Raza, 2017). From the 1970s onwards, with the mechanization of agriculture and the insertion of profitable crops on small properties, the Faxinal System began to decline (Antoneli *et al.*, 2013).

From this point onwards, the faxinals became the target of many discussions, both among the locals and in the public sector, regarding the legislation of this system, as the extinction of the faxinals in certain rural areas would only be possible with the consent of all faxinalenses (residents). In this scenario, the people from Faxinal without land to plant were supporters of maintaining the community breeding site. However, those who had a larger area of land were against the continuity of the system, as they saw the possibility of their land becoming arable.

The first research carried out in faxinals aimed to describe the characteristics of this system, considering spatialization and economic and cultural aspects (Carvalho, 1984; Chang, 1985, 1986). Then, research in other areas emerged, opening new perspectives for studies on the national and international scene. With this, we observed an increase in publications over the decades, with cultural, environmental, and territorial themes at the focus of discussions. Of the 125 articles found, 78 were published in the 2010s and 31 from 2020 to 2022 (with a tendency, by 2029, to surpass the

number of publications from the previous decade).

Socioeconomic aspects faxinals

The Faxinal economy was based on subsistence agriculture, the extensive use of animal husbandry, the extraction of wood and yerba mate. However, these activities have become “backward” because: 1. subsistence agriculture requires more small-scale family labor, leading to rural poverty (Barcellos *et al.*, 2019); 2. animal husbandry faces several problems related to sanitation, quality, and fattening time of animals, as well as the difficulty of trading livestock products on a local and regional scale. In addition to these factors, timber exploitation in faxinal areas also declined at the beginning of the 1980s, as in silvopastoral areas there are difficulties in forest regeneration (Hanisch *et al.*, 2021; Kilca *et al.*, 2020).

The modernization of rural and agricultural areas and the expansion of capitalism caused the people of the faxinals to depend on external resources produced by industry and generated changes in the modes of agricultural production. Family farming and herds in common breeding grounds gave way to larger-scale plantations, such as soybeans, corn, and beans, in addition to other external interference (Chang, 1988). Another important factor was the inclusion of tobacco farming, mainly because this activity is suitable for small properties with family labor due to the technical intertwining of tobacco plants with producers and their profitability. Despite this, the activity has generated undesirable effects in economic, social, and environmental terms (Antoneli *et al.*, 2013).

In general, the socioeconomic issues raised in the research address impacts that permeate the economy, also affecting the aforementioned areas in territorial and environmental terms. Keeping that in mind, we observed that, in most articles on the topic of economy, there is an estimate of the profitability of the activities carried out by the people of Faxinal, which are indicated as insufficient for families to remain in the region.

In view of this, in 1997 the Áreas Especiais de Uso Regulamentado (ARESUR - category of Conservation Unit in the state of Paraná) were regulated, in which the faxinals were classified as Conservation Units and began to receive transfers from the Ecological ICMS - Imposto sobre Circulação de Mercadorias e Prestação de Serviços (ICMS - a tax levied when a taxable product or service moves between cities, states, or from legal entities to individuals), where 2.5% of the ICMS quota is passed on to the

municipalities (Paraná, 1997). However, the distribution of these resources is legally determined by each municipality, and they are transferred to the locals in the form of materials for renovating fences, bridges, and building headquarters, among others.

Several authors conclude that the Ecological ICMS could contribute to sustainability and guarantee the continuity of the Faxinal System in its social, cultural, economic, and environmental aspects (Aguilar, 2021; Fernandes *et al.*, 2017; Kuzma *et al.*, 2017; Moro; Lima, 2012). On the other hand, other research indicates that the ecological ICMS does not provide the expected benefits, as in practice, the real actions for forest conservation and community maintenance were not identified. As alternatives, they proposed: 1. the registration of the Faxinal System as a Conservation Unit in the Reserva de Desenvolvimento Sustentável (RDS - category of Brazilian Conservation Unit that corresponds to a natural area home to traditional populations, whose existence is based on sustainable systems of exploitation of natural resources) category (Fernandes *et al.*, 2017; Vilpoux, 2015); 2. the creation of rural credit lines through “Pronaf Faxinal” (Struminski; Strachulski, 2012).

In short, the maintenance of the Faxinal System involves the economic viability of the activities carried out in conjunction with the maintenance of forest areas, with a view to generating a stable minimum income. The difficulty of adding value to the products of the people of Faxinal permeates public bodies, as projects that really contribute to this issue are incipient. Some alternatives in isolation have contributed to income generation, such as the productive and commercial diversification of ecologically based products (Ahrens *et al.*, 2013), the cultivation of medicinal herbs, the planting of orchards and yerba mate, as well as training in various sectors. Ecotourism and rural tourism have also been strengthening due to the elements of nature, the scenic beauty, and the cultural traditions of the faxinals (Farias; Guizi, 2014; Lemes, 2010). On the other hand, the lack of supervision, technical support, and training of public agents makes these initiatives insufficient to maintain the Faxinal System.

Deterritorialization of the Faxinal System

Over time, the Faxinal System has suffered constant disruption. Until the middle of the 20th century, 20% of the territory of Paraná was made up of the faxinals, who were formed, above all, in the Araucaria Forest areas (Löwen Sahr; Cunha, 2005). In the following decades, with the

expansion of capitalism and agribusiness, these areas were reduced to small forest fragments, mainly for extensive animal husbandry.

Correspondingly, territorial studies addressed the issues that influenced the reduction of these spaces, in addition to the migration of faxinalenses to urban areas in search of new opportunities (Grzebieluka; Löwen Sahr, 2009; Novak; Fajardo, 2008; Schörner; Campigoto, 2011). The people from Faxinal who remain in the countryside are changing their form of production, whether by planting commercially interesting products or leasing their plots of land to neighboring owners (Aguilar, 2021; Almeida *et al.*, 2019; Grzebieluka; Löwen Sahr, 2009; Schörner; Campigoto, 2011).

Despite this, several studies state that the communities of Faxinal have resisted, using their local knowledge and practices as factors of local development, and that these transformations and conflicts have not been able to extinguish the system (Correia; Gomes, 2015; Föetsch, 2018). Other research reveals that there is a division among the people of Faxinal; while some fight for the preservation of Faxinal, others fight for its extinction. For them, the system came to symbolize stagnation in time, delay, lack of resources, lack of jobs, heavy work, low productivity, and lack of technical assistance (Langaro, 2018; Lima, 2010; Schörner; Campigoto, 2021).

A survey carried out in 2004 indicated that there were 152 faxinals in Paran . Of this total, 54 ceased to exist between the 1960s and 1980s and 56 between the 1990 and 2004, leaving only 44 faxinals that still retain their original characteristics (Marques, 2004). It is worth highlighting that, until the completion of this work, the website of the Instituto  gua e Terra do Paran  contained only 28 regulations, such as ARESUR.

In the last five decades, there has been an ongoing destructuring of the Faxinal System, which has been little addressed by research. When analyzing the data on the breakdown of faxinals over time, we noticed that approximately 15 faxinals were extinct in each decade (around 10%). If this flow continues, by 2050 this system will cease to exist, a concern raised by Chang in 1988 due to this agricultural expansion.

Therefore, there are two distinct questions that remain unresolved. First, it is necessary to resist the incursions of the landowners who are around the faxinals and continue with cultivation and animal husbandry techniques in an extensive and semi-extensive way, preserving the culture and way of life. To

achieve this, greater attention is needed from public managers to make Faxinal an attractive model of rural life. The question is: how do you do this? As public managers do not always pay due attention to these issues. The second issue is based on the need to modernize and integrate faxinals, with the implementation of public health and environmental policies to add value to products coming from faxinals.

Impacts on the culture and ways of life of the people of Faxinal

The people who reside in the faxinals are characterized by a traditional way of life that is slightly different from other forms of life in the countryside. The difference lies in local culture and customs such as religion, commemorative dates, dances, and traditional festivals, among others (Gapinski; Campigoto, 2010; Toledo; Campigoto, 2010; Vilpoux, 2011). Knowledge, beliefs, and ways of life were passed down through generations. In this sense, some research has highlighted the ability of the people of Faxinal to distinguish between plants for medicinal and subsistence purposes, as well as different types of soil for cultivation (Staniski *et al.*, 2014; Strachulski; Floriani, 2021).

However, agricultural practices, culture, and the feeling of identification are being lost over time, especially among young people from Faxinal, who are increasingly leaving the faxinals towards cities with greater infrastructure and access to paid employment, education, health, and leisure (Grzebieluka, 2012; Grzebieluka; Löwen Sahr, 2009; Lima, 2010; Sim es; G mez, 2016). In this vein, Thomaz and Staffan (2020) conclude that the aging of the portion of the population involved in the practices of this system is an important variable for its disappearance, as young people are prone to migration as they consider agricultural work to be heavy and tiring. However, many people from Faxinal, not just young people, are migrating to the cities, and when they stay, they do not participate in associations and joint efforts, nor do they promote traditional festivals (Strachulski, 2015; Vilpoux, 2011).

Faced with threats to the continuity of faxinalense culture, some research has proposed actions by public authorities to enhance the culture and traditional modes of production of the Faxinal System. Among these initiatives, we can highlight: the revitalization of family farming; the creation of associations; the articulations and joint actions between communities, non-governmental organizations (NGOs), universities, and society in general,

incorporating the faxinals as cultural and agricultural heritage (Novak; Fajardo, 2008; Schuster; Löwen Sahr, 2009).

The academy has provided significant achievements with extension projects, resident training, and data collection (Barreto, 2015). We emphasize that the scientific research carried out at Faxinal generates a range of information on different topics, which makes it easier to propose actions by competent bodies. Reversing this situation demands educational initiatives that rescue and transmit traditional knowledge to new generations, in addition to participation in associations, joint efforts, and cultural events, strengthening social cohesion, and encouraging a sense of belonging to the faxinalense community.

Environmental issues in faxinals

The Faxinal System went through a productive phase until the 1970s. The forest provided various resources, such as wood and yerba mate, and the number of grazing animals did not exceed the stocking capacity, resulting in greater pasture availability. This condition is favorable for minimizing impacts on soil quality and the conservation of native fields.

With the advancement of mechanized agriculture, the areas of faxinals were reduced, and many people from faxinals began to individualize their lands within their own common breeding grounds, beginning a phase of destructuring (Albuquerque *et al.*, 2015). With the reduction in pasture areas, there was overcrowding of animals and a decrease in the volume of pasture (Antoneli; Thomaz; Bednarz, 2019; Hanisch *et al.*, 2021). This context allowed researchers to identify new research gaps regarding the environmental problems of faxinals. Previously, in research, environmental issues were treated transversally and without monitoring or experimentation aimed at evaluating the degradation of natural resources.

Most of the work found on environmental issues in faxinals concludes that the management used in the Faxinal System, especially the extensive breeding of animals in forests and pastures, is fragmenting the landscape into different land uses. Consequently, it also results in negative environmental impacts on soils (compaction, erosion, soil loss, etc.), watercourses (water quality and quantity), and biodiversity (Andrade *et al.*, 2012; Antoneli *et al.*, 2012; Antoneli; Oliveira; Bednarz, 2019; Batista; Lenartovicz, 2022; Bednarz *et al.*, 2012; Dias; Thomaz, 2011).

In the literature discussed, there is no evidence that the system is sustainable for forest maintenance (Albuquerque *et al.*, 2012; Antoneli *et al.*, 2016; Struminski; Strachulski, 2012). However, some authors have proposed alternatives that can alleviate environmental problems, such as the construction of temporary fences to regenerate the forest (Albuquerque; Watzlawick, 2012); the isolation of the riparian forest (Kutzmy *et al.*, 2019); the construction of drinking fountains in pastures to prevent animals from coming into contact with watercourses (Antoneli; Thomaz; Bednarz, 2019); the restriction of grazing in winter due to little pasture availability (Andrade *et al.*, 2012); and the implementation of rotational grazing (Antoneli *et al.*, 2018).

Hence, the need for an integrated approach is evident, involving collaboration between researchers, public authorities, and local communities. Effective implementation of the proposed alternatives requires a joint commitment to reverse the negative impacts of grazing, promoting the long-term environmental quality of the forests and pastures that make up the common breeding grounds.

FINAL CONSIDERATIONS

With capitalist expansion and the strengthening of agribusiness, Faxinal is unable to support rural communities in these traditional ways, and its long-term existence is threatened. Faced with this scenario of progressive destructuring, highlighted by the continuous decline of approximately 10% of farmlands every decade, it is urgent and crucial to address and propose solutions to the problems related to this silvopastoral system.

Purely traditional system maintenance may not be enough to meet current challenges. As a matter of course, there is a need to modernize and integrate the farms into mechanized agriculture, adopting practices that allow the production of profitable products such as vegetables, medicinal herbs, and high-quality animal husbandry, as well as their valorization as cultural and environmental heritage common to all.

There seems to be a gradual loss of sociocultural practices as new generations show a lack of interest in ancestral knowledge. Recognizing these practices as elements of local identity is fundamental, requiring collective efforts that include educational initiatives,

participation in associations, joint efforts, and cultural events. This way, it is possible to strengthen social cohesion and stimulate a feeling of belonging to Faxinal.

The sustainability of the Faxinal System is linked to the economic viability of the activities developed in association with nature conservation. Consequently, an integrated approach that promotes cooperation between the community, the private sector, and government entities is necessary. Investing in training, providing consistent technical support, and strengthening supervision are fundamental steps to enhance the sustainable development of faxinals, guaranteeing economic benefits and environmental quality in the medium and long term.

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