ACTION PLAN FOR DEFORESTATION AND FIRE PREVENTION AND CONTROL IN THE PAMPA BIOME (PPPAMPA)

(2025 to 2027)

Sant'Ana do Livramento. Photo: Fábio Piccin Torchelsen

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ACTION PLAN FOR DEFORESTATION AND FIRE PREVENTION AND CONTROL IN THE PAMPA BIOME (PPPampa)

Brasilia - DF

2025

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List of Acronyms	
ABC	Brazilian Cooperation Agency
ABIN	Brazilian Intelligence Agency
Anater	Brazilian Rural Extension Agency
Aneel	Brazilian Electricity Regulatory Agency
ANM	National Mining Agency
APA	Environmental Protection Area
APP	Permanent Preservation Area
ARIE	Area of Relevant Ecological Interest
ASV	Vegetation Suppression Authorization
BCB	Central Bank of Brazil
BNDES	Brazilian Development Bank
CABM	Environmental Command of the Military Brigade of the State of Rio Grande do Sul
CDB	Convention on Biological Diversity
CNUC	National Register of Conservation Units
CNUMAD	United Nations Conference on Environment and Development
COP	*Conference of the Parties*
DOE	State Official Gazette
DOU	Federal Official Gazette
Embrapa	Brazilian Agricultural Research Corporation
Embratur	Brazilian Agency for Promoting International Tourism
ESEC	Ecological Station
Fepam	Henrique Luis Roessler State Foundation for Environmental Protection
Flona	National Forest
FNSP	National Public Security Force

Funai	National Indigenous Foundation
GHG	Greenhouse Gases
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit - German Agency for International Cooperation*
ha	hectare
Ibama	Brazilian Institute of Environment and Renewable Natural Resources
IBDF	Brazilian Forestry Development Institute
IBGE	Brazilian Institute of Geography and Statistics
ICMBio	Chico Mendes Institute of Biodiversity Conservation
Incra	National Institute of Colonization and Agrarian Reform
NDC	Nationally Determined Contribution
INPE	National Institute of Space Research
Kunming-Montreal Framework	Kunming-Montreal Global Biodiversity Framework / Kunming-Montreal Goals on Biodiversity
Mapa	Ministry of Agriculture and Livestock
MCTI	Ministry of Science, Technology, and Innovation
MD	Ministry of Defense
MDA	Ministry of Agrarian Development
MDIC	Ministry of Development, Industry, Trade and Services
MIDR	Ministry of Integration and Regional Development
MJSP	Ministry of Justice and Public Security
MMA	Ministry of Environment and Climate Change
MME	Ministry of Mines and Energy
MONA	Natural Monument
MPF	Federal Prosecution Service
MPI	Ministry of Indigenous Peoples

MPO	Ministry of Planning and Budget
MS	Dry Matter
MT	Ministry of Transportation
MTE	Ministry of Labor and Employment
MTur	Ministry of Tourism
Parna	National Park
Patram	Environmental Patrol of the Military Brigade of the State of Rio Grande do Sul
PEC	Proposal for Amendment to the Constitution
PF	Federal Police
PFNM	Non-Timber Forest Products
PMFS	Sustainable Forest Management Plan
PNAPO	National Policy on Agroecology and Organic Production
PNB	National Biodiversity Policy
PNCD	National Policy to Combat Desertification, Land Degradation and Mitigate the Effects of Droughts
PNMC	National Policy on Climate Change
PPCD	Action Plan for Deforestation Prevention and Control
PPCDAm	Action Plan for Deforestation Prevention and Control in the Legal Amazon
PPCaatinga	Action Plan for Deforestation Prevention and Control in the Caatinga Biome
PPCerrado	Action Plan for Deforestation and Fire Prevention and Control in the Cerrado Biome
PPAtlantic Forest	Action Plan for Deforestation and Fire Prevention and Control in the Atlantic Forest Biome
PPPantanal	Action Plan for Deforestation Prevention and Control in the Pantanal Biome
PRF	Federal Highway Police

Ramsar	Ramsar-Wetland Convention - United Nations Convention on Wetlands of International Importance
RDS	Sustainable Development Project
REBIO	Biological Reserve
RFB	Brazilian Revenue Service
RL	Legal Reserve
RPPN	Private Natural Heritage Reserve
RVS	Wildlife Refuge
SDS	Department for Social Defense
Sema - RS	State Department of Environment and Infrastructure of Rio Grande do Sul
Seuc	State System of Conservation Units
Sicar	Rural Environmental Registry
Sinaflor	National System for Controlling the Source of Forest Products
Sisnama	National Environmental System
Ton.	tonne
TI	Indigenous Land
TQ	Quilombola Territory - Land titled to remnants of quilombo communities.
UAS	Alternative Land Use
UC	Conservation Unit
UF	State
UNCCD	*United Nations Convention to Combat Desertification*
UNFCCC	*United Nations Framework Convention on Climate Change*
WHSRN	*Western Hemisphere Shorebird Reserve Network*
ZAS	Environmental Zoning for Forestry
ZEE	Ecological-Economic Zoning

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1. EXECUTIVE SUMMARY

The Pampa, in Brazilian territory, is restricted to the state of Rio Grande do Sul, where it occupies an extensive natural region of more than 190 thousand km², which constitutes the northern portion of the so-called Pastizales del Rio de la Plata. The landscape unit that identifies the biome is the grasslands, characterized by extensive flat to gently undulating terrains, covered by herbaceous and shrub vegetation of high biodiversity. In this vast geographic space formed by open environments, woodlands are limited to riparian areas and more rugged terrain, such as hillsides, mountains, and hillocks, forming a complex grassland-woodland mosaic. Although the general appearance of the vegetation may seem uniform, this is a biome composed of ten distinct ecoregions, with unique floristic and biophysical characteristics. These ecoregions present a series of grassland, savanna-like, and woodland formations with their own structure and floristic composition, which include wetlands (in Portuguese *banhados*), palm groves (or butiazais), pau-ferro and espinilho parks.

In ecotone zones, the Pampa biome presents disjunctions and enclaves of Seasonal Semideciduous Woodland, Seasonal Deciduous Woodland, and Pioneer Formations Areas (restingas and alluvial areas), associated with the Atlantic Forest biome and protected by the special legal regime of that biome. The Mixed Ombrophilous Forest (Araucaria Forest) also presents relevant fragments in higher localities of the Pampa, on slopes and along watercourses of the Rio Grande do Sul Crystalline Shield (Serra do Sudeste), and along the Ibicuí and Jacuí River basins, in the Central Depression of Rio Grande do Sul, remnants of processes of woodland expansion and retraction toward the south of the continent during the Holocene.

The grassland element, dominated by grasses, composites, and legumes, predates the woodland. Thus, grassland plants present numerous adaptations to fire, grazing, and trampling by large grazers now extinct, so that extensive livestock farming can be reconciled with biodiversity conservation in the biome (Nabinger et al., 2009). Although highly biodiverse, the Pampa is the least protected Brazilian biome by Conservation Units (UCs), which correspond to only 3% of its total area (Overbeck et al., 2023; Brasil, 2024). According to the National Register of Conservation Units (CNUC), only 0.54% of the biome corresponds to Integral Protection UCs, 2.32% to Sustainable Use UCs, and 0.09% is in areas of overlap between the two categories (Brasil, 2024).

Among the main drivers of vegetation suppression in the biome, the conversion of land use to agriculture, forestry, and the cultivation of exotic pastures stands out. According to Inpe (2023), the accumulated suppression of grasslands and woodlands in the Pampa was 114,164.78 km² in 2023, representing about 58.9% of the biome, which has a total area of approximately 193,836 km² (IBGE, 2019). Of these, 35,043.31 km² were converted in the last two decades, which is equivalent to 70 times the area of Porto Alegre, the state capital, and six times the area of the Federal District, an annual average of 1,523 km².

In the last 40 years, most of the natural areas converted in the Pampa correspond to grassland formations located in the northern portion of the biome, while woodland formations, between losses due to deforestation and gains through ecological succession, have remained relatively stable numerically. However, since the beginning of the 21st century, there has been an advance of the agricultural frontier toward the south of the biome, over the grasslands of the Campanha, western frontier, and Serra do Sudeste regions. Thus, although a relative decline in the annual suppression of native vegetation has been observed in recent years, if native vegetation suppression remains stable at 2023 levels (about 655 km²/year) and no efforts are made for recovery, restoration, or regeneration of the vegetation, half of the remaining grasslands of the Pampa will be lost by 2070. If it returns to the average annual suppression increase observed in the past decade (about 1,000 km²/year), the natural grasslands will have disappeared before the end of the century.

In addition to the expansion of the agricultural frontier, controlling vegetation suppression remains a significant challenge. By cross-referencing data on suppression increase detected by Prodes/Inpe in the biome between 2018 and 2022 and the ASVs/UASs databases issued by Fepam at the state level and by Ibama at the federal level, it was observed that 94% of vegetation loss in the Pampa may have occurred without authorization from the responsible environmental agency (ICV, 2024). These data indicate that the Pampa is possibly the most threatened Brazilian biome at present.

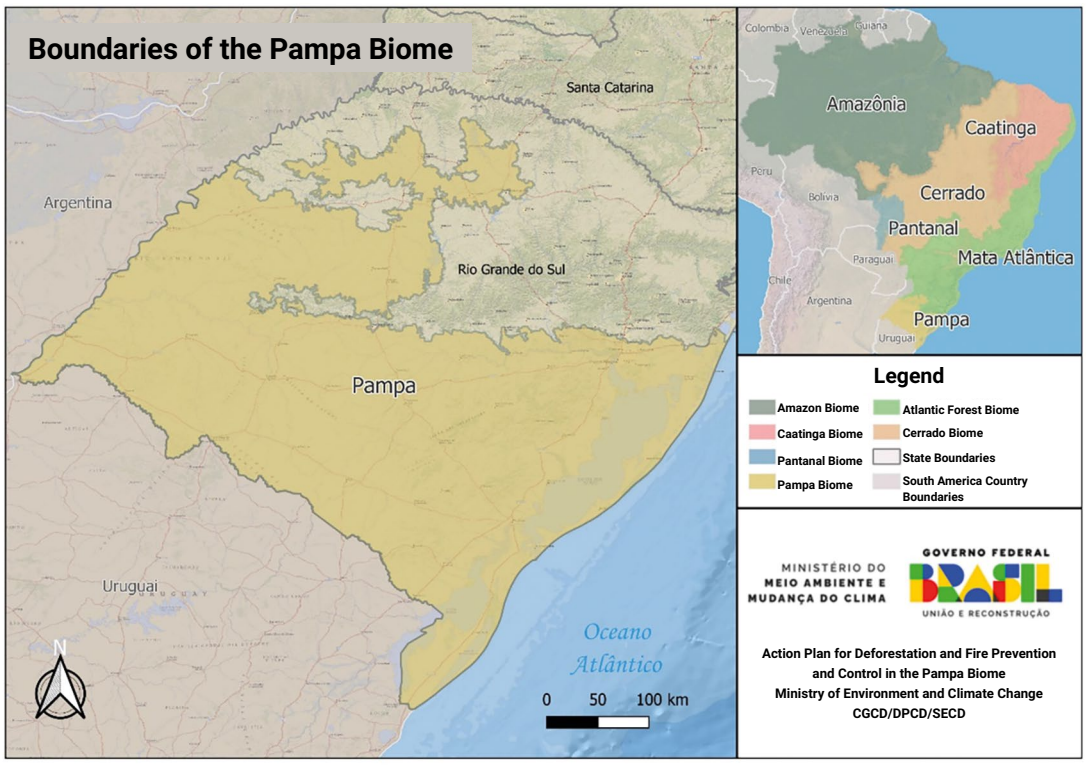
Given the goal of achieving zero deforestation by 2030 and in accordance with the guidelines of Federal Decree No. 11367, 1 January 2023, this Action Plan for Deforestation and Fire Prevention and Control in the Pampa Biome (PPPampa) is presented. The Plan is the result of consolidating the guidelines defined by the Environmental Technical Group of the Government Transition Commission, established in 2022, the contributions of the 19 ministries that make up the Permanent Interministerial Commission for Deforestation Prevention and Control (CIPPCD), as well as the successful experience accumulated by the federal government with the preparation of the Action Plan for Deforestation Prevention and Control in the Legal Amazon (PPCDAm), now in its 5th phase, and the Action Plan for Deforestation and Fire Prevention and Control in the Cerrado Biome (PPCerrado), now in its 4th phase (both planned for the 2023-2027 period). It was developed from bilateral meetings between the Special Department for Deforestation Control and Environmental Land-Use Planning (SECD) of the Ministry of the Environment and Climate Change and a series of ministries, agencies, and affiliated entities. Furthermore, it was developed based on the social, economic, and environmental realities of the biome and the contributions and discussions held during the I Technical-Scientific Seminar on the Causes and Consequences of Native Vegetation Suppression in the Pampa, held on 24 April 2024 in Porto Alegre, RS. Its actions are organized according to the axes defined in the aforementioned Decree: I) sustainable productive activities; II) environmental monitoring and control; III) land and territorial planning; and IV) regulatory and economic instruments.

2. POLITICAL AND INSTITUTIONAL CONTEXT OF THE 1ST PHASE OF THE PPPAMPA

2.1. Biome characterization

In Brazil, the Pampa biome is exclusive to the state of Rio Grande do Sul, where it occupies an area of 193,836 km², corresponding to 68.8% of the state's territory and 2.3% of the national territory (IBGE, 2019), including the border strip, considered essential to national security, under Law No. 6634, 2 May 1979 (Figure 1). In South America, the biome extends for about 760 thousand km², occurring to the south from Bahia Blanca in Argentina, where it encompasses the provinces of Buenos Aires, Córdoba, Corrientes, Entre Ríos, La Pampa, and Santa Fé, covering the entire Uruguay and bordering to the north with ecotone areas with the Atlantic Forest biome, around the parallel 30° South latitude, in the mentioned Brazilian state (Overbeck et al., 2015). Throughout the region, it forms an extensive area of natural grasslands called the South American Pampa, Trinational Pampa, or still Pastizales del Rio de la Plata.

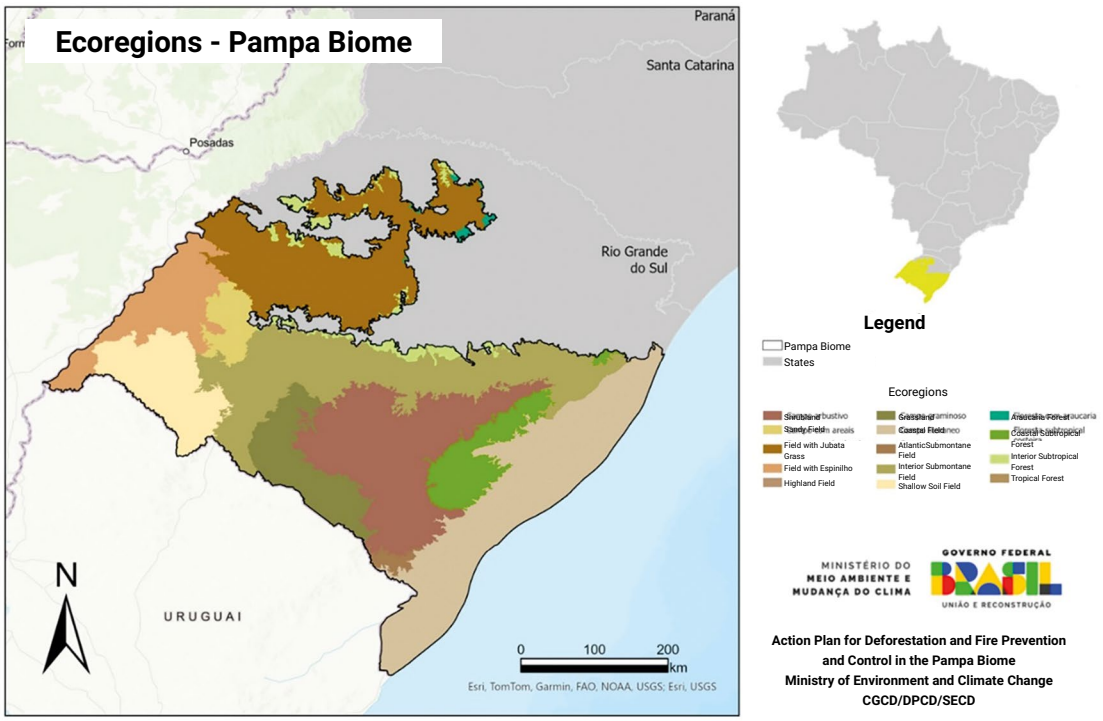
Figure 1. Distribution of the Pampa biome in the state of Rio Grande do Sul.



Source: MMA. Based on data from IBGE (2019).

Natural pastures (native grasslands) constitute the dominant type of natural vegetation in the landscapes of the biome. Seasonal-type forests predominate only on the eastern slope of the Rio Grande do Sul Plateau (also called the Rio Grande do Sul Shield or Serra do Sudeste), due to its proximity to the Lagoa dos Patos and the sea, while in the other regions, forests are found only along hillsides, valleys, and watercourses (IBGE, 2019). Although the general appearance (physiognomy) of the grassland vegetation may seem uniform, this is a biome composed of several phytophysiognomic units, with their own structure and composition (Boldrini et al., 2010). Ten ecological systems (ecoregions) are recognized for the Brazilian portion of the biome, a classification based on the dominant vegetation, altitude, relief, and the main soil types that make up the environment (Hasenack et al., 2023). Only one typology presents a predominantly forest character, though marked by grassland-woodland mosaics: the Seasonal Woodland, also called Coastal Subtropical Forest. Furthermore, nine predominantly grassland typologies are recognized: 1) Field with Jubata Grass; 2) Field with Espinilho; 3) Sandy Field; 4) Mixed Field with Andropogoneae and Compositae, also called Interior Submontane Field; 5) Coastal Field; 6) Shrubland; 7) Grassland; 8) Shallow Soil Field; and 9) Mixed Field of the Eastern Crystalline, also called Atlantic Submontane Field, the latter restricted to a small area in Brazilian territory, especially in the municipality of Jaguarão (Figure 2) (Hasenack et al., 2010; Hasenack et al., 2023).

Figure 2. Ecoregions of the Pampa biome.



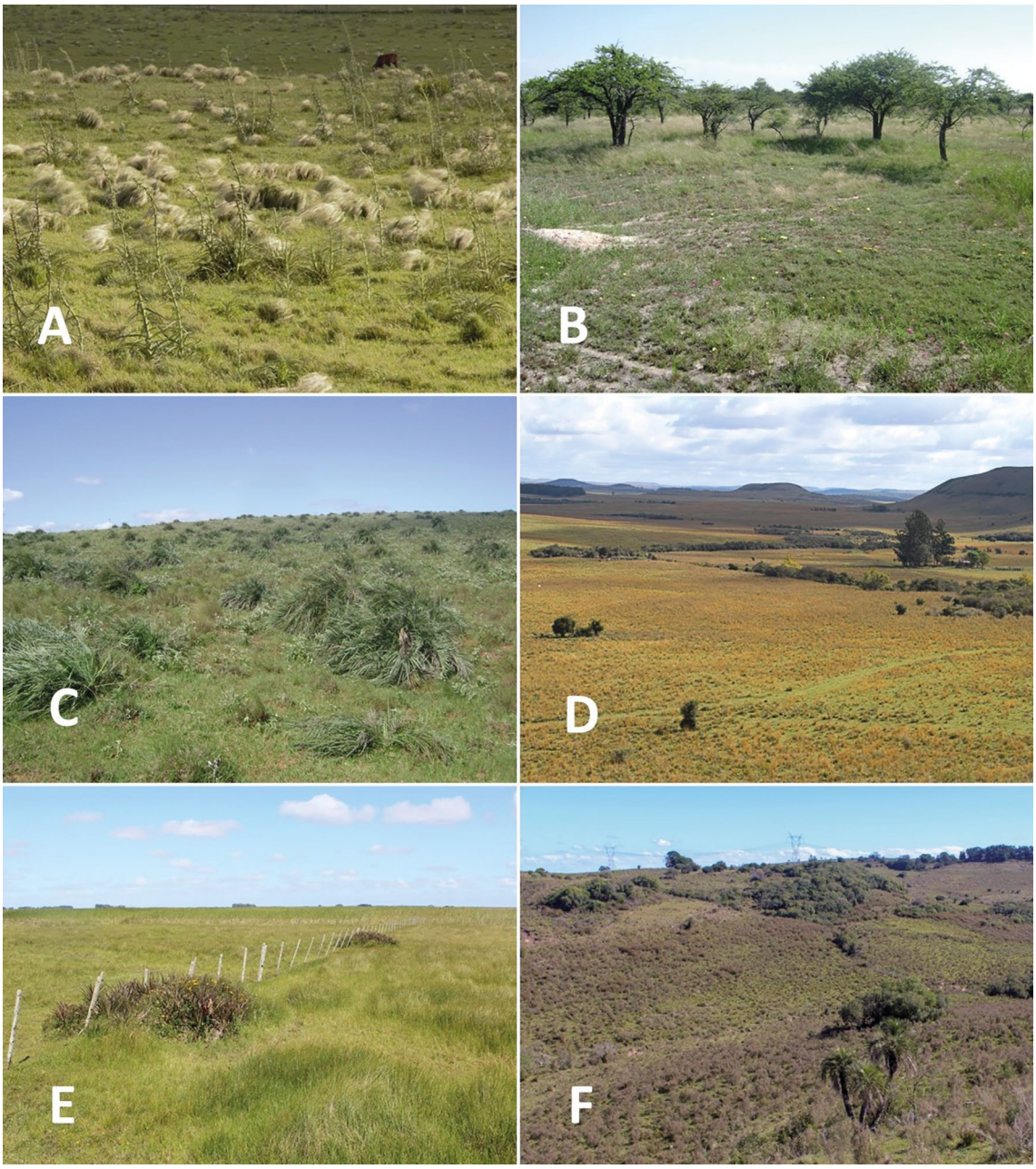
Source: MMA adapted from Hasenack et al. (2010) and Hasenack et al. (2023).

Some of these ecological systems are already severely threatened, as is the case with the Field with Jubata Grass, the Mixed Field with Andropogoneae and Compositae, and the Coastal Field, with small remaining natural areas, largely due to conversion for alternative land use (dryland farming, especially soy and corn) and to urban expansion and rice cultivation, respectively (Hasenack et al., 2023). These ecoregions include ecosystems and physiognomies characteristic of the biome and threatened by high suppression rates, such as wetlands, butiazais, pau-ferro parks, and espinilho parks (Figures 3-A and 3-B). It is also worth noting that the delimitation of the Pampa biome established by IBGE encompasses, in ecotone zones, woodland formations, vegetation disjunctions, and ecosystems associated with the Atlantic Forest biome, which include Mixed Ombrophilous Forest (Araucaria Forest), Dense Ombrophilous Forest, Seasonal Deciduous Forest, Seasonal Semideciduous Forest, as well as woodland and grassland formations belonging to the Pioneer Formation Areas (restingas and alluvial areas).

Wetland (in Portuguese *banhado*) is a term regionally used to designate wetland areas characterized by hydromorphic soils, naturally flooded and with typical flora and fauna. They are typical ecosystems of the Pampa biome that have been severely converted and degraded, especially for the expansion of agriculture (soy and rice cultivation) and urban centers, compromising biodiversity conservation and the multiple environmental services provided by these environments, such as water regulation and carbon storage (Carvalho & Osório, 2007; MMA, 2007; Bolson, 2023; Junk & Cunha, 2024). In the 1960s, the federal government established the Pró-Várzea Program, which, with the goal of draining low-lying lands subject to periodic flooding to enable rice cultivation, converted large wetland areas into arable soils, which is why these ecosystems are currently considered vulnerable and threatened in the state of RS (Carvalho & Osório, 2007; Rodrigues, 2017).

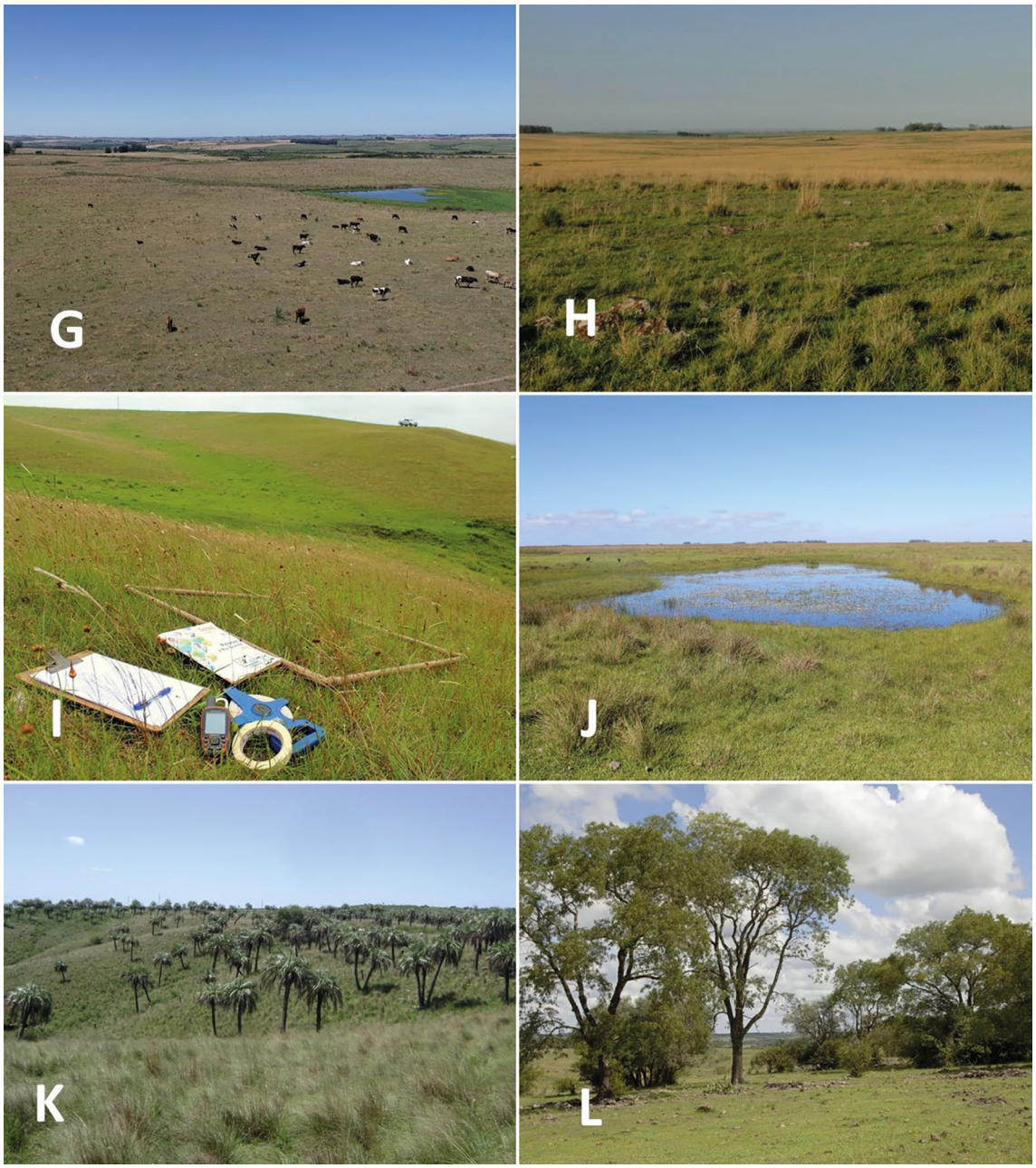
Despite the high conversion rate, the remaining wetland areas of the Pampa are of great importance for wildlife conservation, providing permanent or temporary shelter, breeding, resting, foraging, and watering areas. The wetlands located on the central and southern coast of the state (Coastal Fields ecoregion, sensu Hasenack, 2023) stand out among the main resting and wintering areas for shorebirds in Brazil (ICMBio, 2024). In this sense, the Lagoa do Peixe National Park, located on the central coast of RS, is recognized as a Site of International Importance by the Western Hemisphere Shorebird Reserve Network (WHSRN) for harboring more than 10% of the global population of the red knot (*Calidris canutus rufa*) and the Hudsonian godwit (*Limosa haemastica*).

Figure 3-A. Ecoregions and characteristic physiognomies of the Pampa biome. A) Field with Jubata Grass (*Aristida jubata*), in the municipality of Júlio de Castilhos, RS; B) Field with Espinilho (*Vachellia caven*), in Espinilho State Park, in the municipality of Barra do Quaraí, RS; C) Sandy Field, dotted with Dwarf Palm (*Butia lallemantii*), in the municipality of Manoel Viana, RS; D) Mixed Field with Andropogoneae and Compositae, in the municipality of Rosário do Sul, RS; E) Coastal Field, in the municipality of Rio Grande, RS; F) Shrubland, in the municipality of Pinheiro Machado, RS.



Source: A, B and C: Martin Grings; D, E and F: Fábio Piccin Torchelsen;

Figure 3-B. Ecoregions and characteristic physiognomies of the Pampa biome. G) Grassland, in the municipality of Bagé, RS; H) Shallow Soil Field, in the municipality of Quaraí, RS; I) Mixed Field of the Eastern Crystalline, in the municipality of Jaguarão, RS; J) Wetland, in the municipality of Rio Grande, RS; K) Coatepe Butia Grove, marked by the presence of Yatay Palm (*Butia yatay*), in the municipality of Quaraí, RS; L) Pau-Ferro Woodland (*Astronium balansae*), in the municipality of Itacorubi, RS.



Source: G: Carolina Costa Alff; H, K and L: Martin Grings; I and J: Fábio Piccin Torchelsen.

Although grassland phytophysiognomies are basically defined by the structure (cover and height) of the herbaceous layer and the presence or absence of woody species, it is pastoral management that largely determines the structure, composition and

physiognomy of grassland vegetation (Overbeck et al., 2015). In this sense, grassland plants present numerous adaptations to fire, grazing, and trampling, so that extensive livestock farming can reconcile food production with biodiversity conservation in the biome (Nabinger et al., 2009). Understanding the ecological characteristics of grassland physiognomies and their conservation status, as well as the historical and socioeconomic context of the regions they occupy, is fundamental to controlling deforestation and the suppression of grassland vegetation in the biome, helping to define priorities to avoid biodiversity loss.

In its Brazilian portion, the Pampa covers five geomorphological regions: 1) Coastal Plain, along the marine coast; 2) Rio Grande do Sul Plateau, in the southeastern region; 3) Central Depression of Rio Grande do Sul, in the central region; 4) Campanha Plateau, in the western portion; and 5) Missions Plateau in the northwestern portion (IBGE, 1986). The biome shows wide variation in average temperatures according to the season. In the Central Depression, winter temperatures range between 7 and 15 °C and summer temperatures between 24 and 32 °C, and the Campanha region is considered the warmest in the state (Sartori apud Peixoto et al., 2022). In the coastal region, the average temperature of the warmest month (January) is above 22 °C, caused by continental overheating of the Polar Masses and, less frequently, by the influence of the Atlantic Tropical Mass or the Continental Tropical Mass (Sartori, 2016).

Geomorphological diversity, combined with edaphic, climatic, and historical-cultural particularities, has resulted in significant biodiversity relative to the biome's size, as it holds about 9% of Brazilian biodiversity (12,503 species of plants, animals, fungi, and bacteria) in an area of just over 2% of the national territory (Andrade et al., 2023). In this regard, a study recorded 56 species of vascular plants in a single square meter in the municipality of Quaraí, located in the Shallow Soil Fields Ecoregion, near the border with Uruguay, possibly the richest square meter in plants in Brazil (Menezes et al., 2018).

Although highly biodiverse, the Pampa is the least protected Brazilian biome by Conservation Units (UCs), which correspond to only 3% of its total area (Overbeck et al., 2023; Brasil, 2024). According to the National Register of Conservation Units (CNUC), only 0.54% of the biome corresponds to Integral Protection UCs, 2.32% to Sustainable Use UCs, and 0.09% is in areas of overlap between the two categories (Brasil, 2024). These percentages remain far from the global goal of conserving at least 30% of terrestrial, inland water, coastal, and marine areas by 2030, defined by the Kunming-Montreal Global Biodiversity Framework (GBF), at the 15th United Nations Biodiversity Conference (COP 15) in Montreal, Canada (UNEP, 2024).

In addition to being poorly protected by UCs, the native vegetation in the biome also presents particularly concerning data on its suppression. According to Inpe data, the Pampa was the Brazilian biome with the highest proportional loss of native vegetation. Of the 193,836 km² total original area of the Pampa biome (IBGE, 2019), by 2023, the accumulated suppression of grasslands and woodlands was already 114,164.78 km², corresponding to 58.9% of the biome (Inpe, 2023). The native grasslands of the Pampa

have been rapidly converted by the expansion of the agricultural frontier of soy and forestry (especially eucalyptus, pine, and black wattle), compromising the last remnants of several ecoregions of the biome and resulting in biodiversity and ecosystem service losses (Overbeck et al., 2023). Although the reduction of woodland ecosystems in the biome represents a concerning factor, the loss of grassland ecosystems is about 80 times greater than the loss of woodland ecosystems when comparing the average suppression values between 2019 and 2023 (Vélez et al., 2023). Added to the increasing conversion of grasslands is the problem represented by the biological invasion of animal and plant species, such as annoni grass (*Eragrostis plana Nees*) and gorse (*Ulex europaeus L.*), which have established themselves over extensive areas of the Pampa biome. Being harmful to the survival of native species and less palatable for livestock, annoni grass causes gradual biodiversity loss and makes sustainable livestock farming in native grasslands unfeasible. In addition to the biological invasion by plant species, special mention must be made of the serious threat posed by invasive exotic fauna, especially the territorial and demographic expansion of the wild boar (*Sus scrofa*), responsible for environmental and economic damage and sanitary risks (Sema - RS, 2019). Therefore, the preservation and conservation of native vegetation, as well as the sustainable use of the Pampa's environmental assets, are essential not only for maintaining the ecosystem and biodiversity but also for human well-being and the sustainable economic development of the region (Figure 4).

Figure 4. Livestock grazing on native grasslands in the Coastal Fields ecoregion, near Banhado do Maçarico, in the municipality of Rio Grande, RS.

Author: Fábio Piccin Torchelsen.

2.2 Environmental commitments

Brazil is widely recognized for its leading role in supporting the construction of environmental commitments aimed at the conservation, restoration and sustainable management of natural resources, as well as combating deforestation and the suppression of native vegetation, both nationally and internationally. Many of these commitments are applicable to the grassland and forest ecosystems of the Pampa biome. Despite its national and international relevance, the Pampa biome was only officially recognized in 2004, when it was included in the Brazilian Biomes Map (IBGE, 2004), the result of a cooperation agreement signed between IBGE and the Ministry of the Environment (MMA) in August 2003, when, for the first time, the six currently recognized continental Brazilian biomes were mapped: Amazon, Cerrado, Caatinga, Atlantic Forest, Pantanal, and Pampa. Despite this recognition as a biome, Proposal for Amendment to the Constitution No. 5, 2009, which sought to amend art. 225.4 of the Federal Constitution to include the Pampa as national heritage, was definitively filed at the end of the 2018 legislature, ending its nearly decade-long process in the Federal Senate.

The recent recognition of the Pampa as a biome has a direct influence on national commitments related to the conservation of grassland ecosystems in southern Brazil. Although the 1934 Forest Code (Federal Decree No. 23793, 23 January 1934) applied, according to art. 2, to both forests and other forms of vegetation, the only direct mentions of grasslands are those related to fires, whether intentional, caused in the process of preparing farmland, or accidental, caused by balloon releases and steam engines (art. 22.a, 22.1, and art. 28). Only with the 1965 Forest Code (Federal Law No. 4771, 15 September 1965) was there the consolidation of an objective instrument for the protection of forest and non-forest environments, by establishing the maintenance, as Legal Reserve (RL), of a minimum percentage of 20% of native vegetation on rural properties throughout the country, except in cases of forest and Cerrado vegetation located in the Legal Amazon, where higher percentages were provided (art. 16.I, II, and III). Although this requirement included non-forest ecosystems, the LR provision was expressly attributed to properties in grassland areas located anywhere in the country (art. 16.IV). It is worth noting that the 1934 Forest Code required the maintenance of a minimum percentage of 25% of native vegetation on rural properties “covered by woodlands” throughout the country (art. 23 and 24), which was strictly applied to tree cover, based on legal interpretation (Rajão et al., 2021).

The then-new Forest Code also provided that rural landowners across the country with LR areas smaller than required should proceed with progressive restoration using native species, guiding natural regeneration, or compensating with another area of equivalent ecological importance and size, provided that it belongs to the same ecosystem and is located in the same watershed (art. 44). However, among the economic instruments provided for compensation in that code, the term “forest” persisted, as in the case of the institutions of Forest Easement and Forest Reserve Quota (art. 44-A and 44-B), two instruments expanded in definition and scope in the most recent code, when they were designated Environmental Easement and Environmental Reserve Quota (CRA) (art. 44 and 78 of Federal Law No. 12651, 25 May 2012).

It is also worth noting that the intense debates following the enactment of the 1988 Federal Constitution contributed to a series of adjustments to Brazilian forest legislation, especially for the consolidation of the LR and the approval of stricter rules for the protection of Permanent Preservation Areas (APPs) (Rajão et al., 2021). During this period, several changes were made to various provisions of the 1965 Forest Code through regulations such as Federal Law No. 7803, 18 July 1989, and Provisional Measure No. 2166-67, 24 August 2001, expanding the conservation of forest and non-forest environments located in RLs and APPs, with significant impacts on the conservation of the Pampa biome. However, it was only with the enactment of the Native Vegetation Protection Law (LPVN) (Federal Law No. 12651, 25 May 2012) that other non-forest formations gained greater prominence.

In recent decades, Brazil has played a leading role in a series of multilateral commitments focused on biodiversity and natural resource conservation, with implications for the Pampa biome. In the 1990s, Rio de Janeiro hosted the United Nations Conference on Environment and Development, Eco-92 (Rio-92), which innovated by bringing the concept of sustainable development to the forefront of governmental discussions. Among its main outcomes was Agenda 21, which includes, among its areas of action, combating deforestation, soil loss, and desertification, addressing development patterns through drivers such as poverty and external debt in developing countries, as well as unsustainable production and consumption patterns. Other important products of Rio-92 were the Rio Declaration on Environment and Development, June 1992, the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), and the United Nations Framework Convention on Climate Change (UNFCCC).

In 1992, Brazil became a signatory to the CBD, ratified through Federal Decree No. 2519, 16 March 1998, committing to the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. In 2008, the National Policy on Climate Change (Climate Plan) was established to promote the reduction of greenhouse gas emissions and adapt to the impacts of climate change. At COP 21, held in 2015 in Paris, the Brazilian government presented its Nationally Determined Contribution (NDC) to the UNFCCC secretariat. The NDC includes ambitious emission reduction targets, including reducing greenhouse gas emissions by 37% by 2025 and 43% by 2030, based on 2005 levels. It also includes the commitment to restore 12 million hectares of native vegetation throughout Brazil for multiple uses by 2030, including grasslands. More recently, in November 2024, at COP 29 in Baku, Azerbaijan, Brazil updated its climate targets, including a reduction of 59% to 67% in net greenhouse gas emissions by 2035 compared to 2005 levels, establishing a reduction range instead of a single fixed value. This commitment aligns with the goal of the Paris Agreement to achieve carbon neutrality by 2050, eliminate illegal deforestation by 2030, and limit the planet's average warming to 1.5 °C compared to the pre-industrial period. Additionally, in 2018 Brazil signed the Escazú Agreement, which aims to guarantee access to information, public participation, and access to justice in environmental matters in Latin America and the Caribbean.

It is worth noting that the advances resulting from objectives and guidelines established in the National Policy for the Recovery of Native Vegetation (Proveg), created in 2017, and the National Plan for the Recovery of Native Vegetation (Planaveg), of the same year, reflect Brazil's commitments under international treaties, including the CBD, the Ramsar Convention on Wetlands, and the UNFCCC. These commitments demonstrate a trajectory of growing concern for environmental issues in Brazil, although the implementation of these policies and the achievement of their goals in the Pampa biome remain a challenge and an important task. With regard to the restoration of native vegetation in the state context of RS, State Decree Sema No. 162, 13 September 2022, approved the action matrix for the implementation of the State Program for the Recovery of Native Vegetation (Proveg - RS), related to the national policy, and which promotes the creation of eight thematic axes aligned with the goals of the UN Decade on Ecosystem Restoration (2021-2030). Its objective is to integrate and coordinate policies and actions that encourage the restoration and conservation of native vegetation, including areas of the Pampa.

Among the commitments established at the state level, the Constitution of the State of Rio Grande do Sul provides, in its art. 251, that "everyone has the right to an ecologically balanced environment, and the Public Authorities and the community have the duty to defend it, preserve it, and restore it for present and future generations," a principle based on art. 225 of the 1988 Federal Constitution. Art. 251.1.XVI of the State Constitution, included by Constitutional Amendment No. 48, 23 February 2005, establishes the state's duty to value and preserve the Pampa, its culture, genetic heritage, fauna diversity, and native vegetation, guaranteeing its designation of origin. It should be noted that this Constitutional Amendment was instituted within the scope of the recognition of the Pampa as a biome by IBGE, which occurred the previous year. The State Environmental Code of the State of Rio Grande do Sul (Cema - RS), established by State Law No. 15434, 9 January 2020, pioneers a conceptual definition of the Pampa, defining it as "a biome, which in Brazil occurs exclusively in the State of Rio Grande do Sul, composed of grassland, tree-shrub, and forest formations, predominantly native grasslands" (art. 2.XLIV). This definition was innovative compared to the previous Cema - RS (State Law No. 11520, 3 August 2000), which had no specific references to the biome. The new Cema - RS also innovated by establishing, in its art. 203, the provision of specific regulations detailing characteristics and conservation aspects of the Pampa biome.

Regarding commitments involving Protected Areas, Brazil assumed, at the 10th Conference of the Parties to the Convention on Biological Diversity (COP 10), held in the city of Nagoya, Aichi Prefecture, Japan, 20 proposals aimed at reducing biodiversity loss worldwide, among which was the commitment to the Aichi Biodiversity Targets, which provided for 17% of biomes and ecosystems to be protected worldwide. However, the Kunming-Montreal Global Biodiversity Framework (GBF), established at the 15th CBD Conference (COP 15) in Montreal, Canada, defined more ambitious global targets to be achieved by 2030, including the conservation of at least 30% of terrestrial, inland water, coastal, and marine areas, especially those of particular importance for biodiversity and ecosystem functions and services (UNEP, 2024). The new target, defended by the Brazilian delegation, was established after intense negotiations, based on scientific studies on the resilience of

global ecosystems. In this regard, considering that the existing UCs in the Pampa are still far from the global target, the federal government is studying the creation of new UCs in the biome.

In 2023, with the start of a new federal administration, a renewed commitment was made to reduce the loss of native vegetation and achieve zero deforestation by 2030 across all biomes. Under PPPampa, zero deforestation refers to the elimination of illegal deforestation and the compensation of legal suppression of native vegetation and the greenhouse gas emissions resulting from it, through strengthening the implementation of environmental legislation and the recovery and increase of native vegetation stocks by means of economic incentives for conservation and sustainable management. Considering that the Pampa was the Brazilian biome with the greatest loss of natural areas in percentage terms (Inpe, 2024), there is an urgent need for public policies that contribute to the protection of native vegetation and improve the quality of the conversion of native grasslands in the most threatened ecoregions of the biome (Figure 5).

Figure 5. Livestock grazing on native grasslands in the Shrublands of the Serra do Sudeste ecoregion, in the municipality of Pinheiro Machado, RS.

Author: Fábio Piccin Torchelsen.

2.3 Governance of the 1st phase of the PPPampa

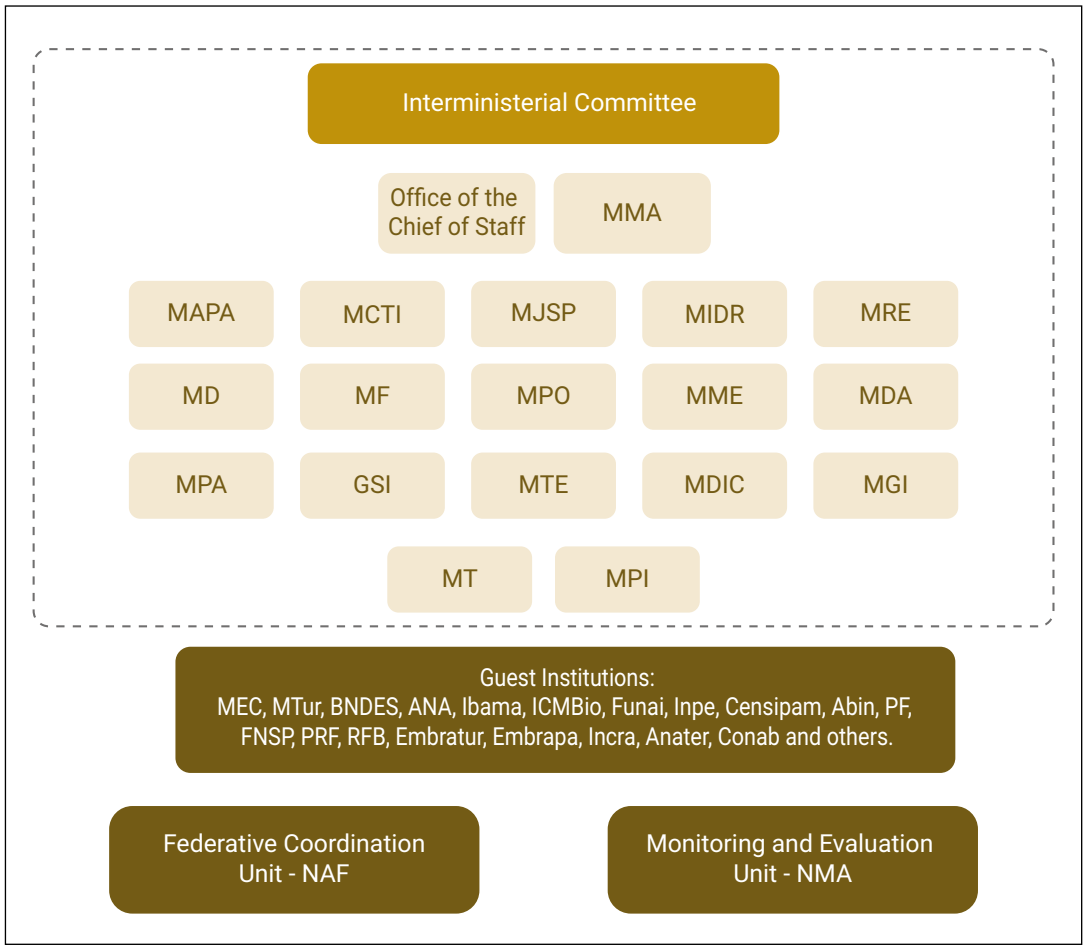
As a way of demonstrating its commitment to biodiversity conservation and the responsible use of natural resources, and in view of the significant increase in deforestation rates observed in recent years in Brazil, the federal government established, through Federal Decree No. 11367/2023, the Permanent Interministerial Commission for Deforestation Prevention and Control (CIPPCD) and issued new rules and guidelines to Federal Decree of 15 September 2010, which required the preparation of the Action Plan for Deforestation and Fire Prevention and Control (PPCD) for all biomes in Brazil.

As part of the preparation of PPPampa, the Ministry of the Environment and Climate Change (MMA) held the I Technical-Scientific Seminar on the Causes and Consequences of Native Vegetation Suppression in the Pampa on 24 April 2024 in Porto Alegre. The event brought together representatives from state and federal governments, civil society, the private sector, and academia. During the seminar, presentations were given on the causes and consequences of vegetation suppression and fires in the biome, as well as an analysis of the intraregional social and economic dynamics related to the emergence of new fronts of suppression of natural remnants in the biome. The purpose was to discuss and promote the exchange of scientific knowledge and gather information and issues relevant to the most recent advances and challenges faced by the biome, in order to provide input for the subsequent phases of the plan's development.

2.3.1. Institutional arrangement and governance model

The governance model for the 1st Phase of the PPPampa follows the procedures established in Federal Decree No. 11367/2023 and is managed by the CIPPCD, with transparency mechanisms and social participation instruments (Figure 6). At the ministerial coordination level, the CIPPCD serves as the deliberative forum for decision-making and strategic proposals for new action plans. Chaired by the Office of the Chief of Staff of the Presidency of the Republic (CC/PR) and coordinated by the MMA, the Interministerial Commission includes the participation of 17 other ministries.

Figure 6. Governance structure of Phase 1 of the PPPampa.



Source: MMA.

As responsibilities, the CIPPCD was assigned the definition and coordination of actions to reduce deforestation rates throughout the national territory, as well as the evaluation, approval, and monitoring of the implementation of the PPCDs for all Brazilian biomes and the establishment of measures to overcome any execution difficulties. It is also the CIPPCD's responsibility to ensure that the actions provided for in the PPCDs promote the development and integration of environmental protection systems and contribute to the conservation of biological diversity and the reduction of greenhouse gas emissions resulting from deforestation, native vegetation suppression, degradation, and fires. For this reason, it is also the commission's role to monitor the development and implementation of public policies that affect the PPCDs, through coordinated actions with states, the Federal District, and municipalities.

After the 1st Technical-Scientific Seminar on the Causes and Consequences of Native Vegetation Suppression in the Pampa, dozens of meetings were held with the members

and guests of the CIPPCD, with the aim of promoting broad discussion on the means and mechanisms to address the identified issues. These discussions made it possible to thoroughly analyze the characteristics, challenges, and opportunities of each thematic axis to generate input and define objectives, expected results, actions, targets, and indicators that will comprise the plan. In order to enable integrated implementation with the state of Rio Grande do Sul and the municipalities within the area covered by the biome, the Federative Coordination Nucleus (NAF) will be established, with periodic meetings between the MMA, other federal actors, the State Department of Environment and Infrastructure of Rio Grande do Sul, and municipal department of environment. The NAF will serve not only as a forum for information sharing but also for identifying potential challenges and opportunities for joint action between the Federal Administration and the states and municipalities, with support from and within the scope of the National Tripartite Commission, created by Complementary Law No. 140, 8 December 2011.

In accordance with art. 11 of Federal Decree No. 11367/2023, an annual monitoring report on the plan shall be published with information on the implementation of the action lines led by each member and invitee of the CIPPCD. To this end, the Monitoring and Evaluation Unit (NMA) will be established, coordinated by the MMA, with participation from ministries, oversight agencies, and representatives of civil society and academia. The NMA may also propose adjustments to targets and indicators to improve the measurement of the effectiveness of the PPCD's actions. Both the NMA and the Federative Articulation Center (NAF) will serve as platforms for supporting future revisions, as outlined in art. 2 of that decree, establishing a routine for generating information to continuously improve the plan.

Instruments related to transparency and social participation were also designed, such as public consultation, technical-scientific seminars, and the preparation of follow-up and monitoring reports on the implementation of actions, with the aim of ensuring proper publicity and transparency of the plan’s actions and expanding and strengthening the channels of participation of states, the private sector, and organized civil society. The elaboration of 1st Phase of the PPPampa was coordinated by the Extraordinary Department for Deforestation Control and Environmental Land Management (SECD/MMA), which drafted the document based on: (a) reports from the transition working groups on environment, agriculture, justice, and Indigenous peoples; (b) inputs gathered during the Technical-Scientific Seminar; (c) inputs from meetings with federal actors; and (d) technical meetings with states and civil society.

3. POLICIES FOR CONTROLLING NATIVE VEGETATION SUPPRESSION IN THE PAMPA

3.1. Federal policies for controlling native vegetation suppression in the Pampa

With the publication of Decree No. 11367/2023, the Action Plans for the Prevention and Control of Deforestation (PPCD) were resumed for the Amazon and Cerrado biomes, and plans were proposed for the other biomes, including the Pampa. The PPCDs are considered instruments for the implementation of the National Policy on Climate Change (PNMC), according to art. 6.III of Federal Law No. 12187, 29 December 2009, as well as the National Policy to Combat Desertification (PNCD), according to art. 6.IX of Federal Law No. 13153, 30 July 2015. They therefore have a strategic role in implementing measures for adapting to climate change and mitigating greenhouse gas (GHG) emissions generated by the suppression of native vegetation in the Pampa biome. They are also essential for preventing and combating desertification and the effects of drought, as well as for strengthening policies for the recovery of areas undergoing degradation throughout the national territory, with special emphasis on the southern half of the state of RS, constantly affected by severe droughts. For this reason, they maintain synergy with the National Policy for the Recovery of Native Vegetation (Proveg), established by Federal Decree No. 8972, 23 January 2017, whose implementation was planned in integration with the instruments of the PNMC, according to art. 5.VI of the aforementioned decree, as well as with the National Native Vegetation Plan (Planaveg), the main implementation instrument of Proveg.

The plans are also integrated with the commitments assumed by Brazil during the Convention on Biological Diversity (CBD), a multilateral international treaty of the United Nations (UN) established during the United Nations Conference on Environment and Development (UNCED), known as Eco-92, held in Rio de Janeiro in June 1992. Among the CBD's objectives are the conservation of biological diversity and the sustainable use of its components, topics addressed in the four axes of the PPCD. In Brazil, the convention was formalized and regulated by several instruments throughout the 1990s. Thus, the CBD agreement entered into force in December 1993, its text having been approved by Legislative Decree No. 2, 1994, ratified by Federal Decree No. 2519, 16 March 1998, and regulated by Federal Decree No. 4339, 22 August 2002. This established principles and guidelines for the implementation of the National Biodiversity Policy (PNB) to be considered for all Brazilian biomes. Regarding the institutional legal framework, the PNB establishes the need for integration of plans, policies, sectoral programs, and other institutional initiatives underway in Brazil, in order to avoid duplication or conflict between actions (topic 17.1). In this sense, the PPPampa acts transversally and in an integrated manner with other actions, promoting the strengthening of institutional arrangements that ensure legitimacy and sustainability in fulfilling different Brazilian environmental commitments, both national and international.

The prevention and control of deforestation, fires, and the confrontation of the climate emergency are among the priorities of the Environmental Cross-Cutting Agenda within the Pluriannual Plan (PPA) of the Brazilian government for the 2024-2027 period (Federal Law No. 14802, 10 January 2024). These constitute major challenges of the current agenda of the federal government for Brazil to meet internationally assumed commitments for the reduction of greenhouse gas emissions. One of the specific objectives of the Environmental Cross-Cutting Agenda is to prevent and control deforestation and the degradation of native vegetation in Brazil, establishing a target of 20% reduction in the total area of native vegetation suppressed per year and per biome, including the Pampa, during the four years covered by the agenda (objective 0237 of Annex III). The DESMAT Indicator reports the percentage reduction of the total area of native vegetation suppressed per year in each biome and can be used for public monitoring of the goal's progress. The Project for Monitoring Deforestation in the Legal Amazon by Satellite (Prodes/Inpe) publishes the data annually on the TerraBrasilis Platform. The PPA (2024-2027) establishes the PPCDs as central elements of the Agenda, providing for the monitoring, evaluation, and annual updating of the plans. It also provides for the intensification of enforcement and the application of restrictive and sanctioning measures, such as the embargo of illegally cleared areas.

Figure 7. Livestock grazing on native grasslands in the Shrublands of the Serra do Sudeste ecoregion, at Cerro da Guarda, in the municipality of Herval, RS.

Author: Fábio Piccin Torchelsen.

3.2. State policies for controlling native vegetation suppression in the Pampa

Considering the responsibilities of each level of government (the Federal Government, states, and municipalities), the state-level participation is essential for the success of policies to control native vegetation suppression, especially in the Pampa biome, which is restricted to the state of Rio Grande do Sul (RS). In the current legal context, according to Complementary Law No. 140, 8 December 2011, the states are responsible for issuing authorizations for the suppression of native vegetation on rural properties located in their territories, with the exception of activities or projects environmentally licensed or authorized by the Federal Administration (art. 8.16.b). They also have the primary authority to oversee interventions that affect this vegetation (art. 8.XIII and art. 17.3).

Among the legal provisions with direct implications for combating deforestation and grassland suppression, State Law No. 10330, 27 December 1994, stands out, establishing the State Environmental Protection System (Sisepra) and creating the State Environmental Council (Consema - RS), a deliberative and normative body responsible for approving and monitoring the implementation of the State Environmental Policy, as well as other plans related to the area. The Sisepra aims to organize, coordinate, and integrate the actions of the various bodies and entities of the public administration in planning, implementing, executing, and controlling the state's environmental policy, as well as monitoring and enforcement actions. The system is composed of a series of bodies and entities, with the Consema - RS as the superior body, the Sema - RS as the central body, the other state departments, agencies of the direct and indirect administration, governmental and non-governmental institutions as support bodies, and, finally, the bodies responsible for managing environmental resources, preserving and conserving the environment, and enforcing environmental protection rules as executing bodies (art. 5). Standing out as an executing body of Sisepra is the State Environmental Protection Foundation Henrique Luis Roessler (Fepam), established by State Law No. 9077, 4 June 1990, which acts as the system's technical body, overseeing, licensing, developing studies and research, and executing programs and projects.

According to art. 10 of Consema Resolution No. 305, 11 December 2015, it is the responsibility of Consema - RS to establish environmental guidelines for the conservation and preservation of the state's resources and natural ecosystems, and to set size and pollution potential criteria for activities subject to environmental licensing, among others. This council is responsible for publishing a series of standards, parameters, and criteria for the evaluation, control, maintenance, recovery, and improvement of environmental quality, through recommendations, motions, and resolutions, with direct impacts on the monitoring and environmental oversight of the state's native vegetation (Sema - RS, 2024). In this regard, two publications of Consema - RS stand out in relation to the protection of the Pampa. First, Consema Resolution No. 360, 14 September 2017, which establishes environmental guidelines for the practice of sustainable pastoral activity on remnants of native grassland vegetation in APP and RL in the Pampa biome.

In practice, by allowing livestock farming in APP and LR and defining guidelines for this, this Resolution recognizes pastoral activity as a sustainable use of the biome. Also noteworthy is Consema Resolution No. 372, 22 February 2018, which defines the need for environmental licensing for any intervention or suppression of native grassland vegetation for land use in the biome.

State Decree No. 51882, 3 October 2014, establishes an important instrument for valuing the native grasslands of RS by instituting the Native Grassland Conservation Index (ICP) as the official technical tool for measuring the conservation index of Pampa grasslands. Developed by the Alianza del Pastizal, the ICP has been used in Alliance initiatives with rural producers in the Southern Cone. The index must be assessed prior to the granting of technical and economic incentives established through official programs and projects, making it necessary to overcome the challenge of its application in state administrative procedures.

The State Environmental Code of the State of Rio Grande do Sul (Cema - RS), established by State Law No. 15434, 9 January 2020, provides a series of planning instruments for the State Environmental Policy, among which, with regard to the conservation of the Pampa, stand out enforcement, the Rural Environmental Registry (CAR), conservation plans and programs, recovery and sustainable use of environmental resources, the State System of Conservation Units (Seuc), the state's environmental information systems, as well as ecological-economic zoning and other specific zonings (art. 14.IV, VII, XVI, and XXIII to XXV, respectively).

The Code proposes significant advances in the conservation of particular physiognomies of the Pampa biome that are severely threatened, establishing, as an aggravating circumstance for environmental infractions, the occurrence on the physiognomies Espinilho (*Acacia caven*) Park, Ironwood (*Myracrodruon balansae*) Woodlands, and Palm (*Butia capitata*) Groves (art. 98.XXII), the first two being restricted to the Pampa (Figure 3). This provision is also included in State Decree No. 55374, 22 January 2020, which regulates Cema - RS regarding infractions and administrative sanctions applicable to harmful environmental conduct and activities. In addition, the Cema - RS defines in its art. 144, as already provided for in State Law No. 11520, 3 August 2000, the wetlands as APP in the state of RS. In this perspective, it is necessary to regulate art. 203 of Cema - RS, still pending implementation, which provides for the regulation of the use and conservation of the Pampa.

The payment for environmental services, provided for in the Cema - RS (art. 21 and 181.3), was regulated by State Decree No. 56640, 2 September 2022, which establishes the State Program for Payment for Environmental Services (Pepsa), whose main instrument is the State Register for Payment for Environmental Services (Cepsa). The program has been publishing periodic calls for proposals, aimed at selecting projects in thematic areas such as Private Natural Heritage Reserves (RPPN), control of invasive species, conservation and restoration of APPs, among others, and has a budget of BRL 15 million

defined in the state's Pluriannual Plan (PPA) for 2024-2027. Initiatives such as Pepsa and Cepsa are important, promising, and need to be strengthened.

Also noteworthy are arts. 206 and 207 of the Cema - RS, which define, respectively, the Coastal Zone of Rio Grande do Sul as a specially protected territorial space, subject to the State Coastal Management Program (Gerco - RS), and the delimitation of the territorial physical space of the said zone, which covers the entire lacustrine/lagoon system of the Coastal Plain, from the municipality of Torres to Chuí. Due to its wide scope, this delimitation includes ecosystems associated with the Coastal Fields ecoregion and the Coastal Subtropical Seasonal Forest, belonging to the Pampa biome (sensu Hasenack et al., 2023). It is important to highlight that the theoretical-scientific delimitation that defines the ecoregions of the Pampa biome does not dispense with the more restrictive treatment given to the areas covered by Federal Law No. 11428/2006 (Atlantic Forest Law), which includes native forest formations and associated ecosystems under the protection of its legal regime.

Among the state programs aimed at the Pampa biome, the Campos do Sul Program stands out. Established in July 2020, the program offers benefits to rural landowners who adopt good practices that ensure the protection of the functional and ecosystem services of native grasslands in the Pampa and Atlantic Forest biomes. Among the benefits is the provision of specialized extension technical assistance and monitoring, in addition to a certificate of membership and compliance issued by Sema - RS. The program targets small producers with areas of natural grassland with a continuous surface area corresponding to at least 20% of the property's area, and large producers with 10 hectares or more of native grassland areas. The program has great potential for synergy with the Premium Products Program, established by State Decree No. 55515, 30 September 2020, and coordinated by the State Department of Innovation, Science and Technology of RS (Sict - RS), which has among its objectives to stimulate and support innovative actions in the production chains of traditional sectors of Rio Grande do Sul. The program establishes a quality seal for products that meet several principles and differentiators, including environmental sustainability, traceability, and transparency, having already implemented the Gaúcho Premium Lamb, Gaúcho Premium Beef, and Premium Extra Virgin Olive Oil seals, the latter almost entirely from crops established on rural properties in the Pampa, with great potential for maintaining native grasslands integrated into the production system.

Regarding the restoration of native vegetation, Sema Ordinance No. 162, 13 September 2022, establishes the State Program for the Recovery of Native Vegetation of the State of Rio Grande do Sul (Proveg - RS), with the aim of promoting, integrating, and coordinating public policies aimed at restoring degraded environments, seeking to expand native vegetation cover in the state, which includes native grasslands in the Pampa. The program seeks to implement cross-sector socio-environmental public policies related to the United Nations Decade on Ecosystem Restoration (2021-2030), aimed at encouraging ecological restoration and increasing habitat connectivity. One of

the program's goals is to increase carbon stocks in order to promote their neutralization in the state, measures that are still quite incipient regarding grassland ecosystems. In this sense, it is worth highlighting the potential of the Pampa grasslands with good livestock management practices and the grasslands under restoration to generate an increase in carbon stocks, which vary according to factors such as land use, soil depth, and local climate (Schossler, 2016; Schirmann, 2016). In the biome, wetlands are the ecosystems with the highest carbon concentration, while areas under agricultural cultivation have lower concentrations (Bolson, 2023). However, delays in analyzing the CAR and implementing the PRA have compromised initiatives aimed at environmental recovery in the Pampa biome. It should be noted that the Planaveg has a recovery target of 300 thousand hectares for the biome.

The Proveg - RS works in synergy with the targets provided for in State Decree No. 56347, 22 January 2022, which addresses the adhesion of RS to the Race to Zero and Race to Resilience campaigns, within the framework of the United Nations Framework Convention on Climate Change. The decree provides, under the coordination of the Chief of Staff of the State of Rio Grande do Sul and Sema - RS, for the preparation and approval of the State Climate Change Plan 2050 and the establishment of the Gaúcho Forum on Climate Change (in Portuguese *Fórum Gaúcho de Mudanças Climáticas*). State Decree No. 56347/2022 is of great importance for combating deforestation and the suppression of native grasslands, as it provides for the improvement, diversification of actions, and expansion of conservation programs and projects and good practices for the use of natural resources. Among them, the forecast for expanding the actions of the Campos do Sul Program and Proveg - RS should be highlighted.

Of great potential for the conservation and restoration of degraded ecosystems in the Pampa, especially the seasonal forests and palm groves, is the Agroforestry and Extractive Environmental Certification Program of Sema - RS, whose objective is to encourage agricultural and forestry practices based on the sustainable use of native plant species, through the environmental regularization of agroecological production and extractivism (Rio Grande do Sul, 2017). The certification works in coordination with the projects Butia Groves Route, Native Fruit Solidarity Chain, and Rural Territories, coordinated by Embrapa Clima Temperado, Rede Ecovida, and the Federal University of Rio Grande do Sul (UFRGS), all with strong activity in the biome. Also noteworthy, with regard to the Pampa, is the Observatory of Agroforestry Systems of the Extreme South of Brazil, an initiative linked to the Saf Legal Project, of Embrapa Clima Temperado, created with the aim of strengthening the agroforestry systems of the region through a monitoring and research platform for accessing and sharing information (Embrapa, 2024).

Also in relation to policies to control environmental degradation in the biome, the State Program for the Control of Invasive Exotic Species (Invasoras RS) stands out, created by Joint Ordinance Sema/Fepam No. 14, 14 May 2018, coordinated by Sema - RS, with the aim of preventing the introduction, monitoring, controlling, and eradicating invasive exotic species in the territory of RS. As part of the program, the Regional Seminar on

Invasive Exotic Species was held on 3 December 2019 in Porto Alegre. Among the main products generated are the Regional Strategy for the Control of Invasive Exotic Species, the State Plan for the Control and Monitoring of Wild Boar (Sus scrofa) in the State of Rio Grande do Sul (Wild Boar Plan - RS), and the Invasoras RS Application, which encourages civil society participation in monitoring exotic species in the state. The program operationalizes actions related to Sema Ordinance No. 79, 31 October 2013, which establishes the List of Invasive Exotic Species of the State of Rio Grande do Sul, many of which occur in the Pampa biome (environments referred to as steppe, savanna, among others) and establishes control rules, among other measures (Figure 8).

Figure 8. Fields with the presence of Gorse (Ulex europaeus), an invasive exotic species, in the Shrublands ecoregion, in the municipality of Pedras Altas, RS.

Author: Fábio Piccin Torchelsen.

Regarding the restoration of grassland areas within UCs, in 2021 the Restaura Pampa Project was established, aiming to develop a recovery plan for degraded areas in two UCs of the biome, the Espinilho State Park and the Ibirapuitã Biological Reserve, supported by Strategies for Conservation, Restoration, and Management for the Biodiversity of the Caatinga, Pampa, and Pantanal Project - Terrestrial GEF. The project was developed by the Foundation for Support to Technology and Science (Fatec) and the Federal University of Santa Maria (UFSM), in partnership with Sema - RS and MMA, with financial

support from the Terrestrial GEF, (Funbio, 2017a). Since 2020, the Terrestrial GEF has also supported two projects in the Ibirapuitã APA, one of the UCs with the highest rates of native vegetation suppression in the biome: the Sustainable Pró-APA Project, which promotes the control of invasion by exotic species such as annoni grass and wild boar, developed by the Alianza del Pastizal, and the Ecological Restoration Project (RestaurAPA), which aims to restore 1,700 hectares of native vegetation, implemented by La Salle University (UniLaSalle), in partnership with UFRGS and Emater-RS (Funbio, 2017b; 2017c). Also within the scope of projects supported by the Terrestrial GEF, the Butia Groves Route Project, developed by Embrapa, deserves mention, as it promotes the strengthening of the production chain involving the traditional management of groupings of Butia palm trees (Butia spp., in Portuguese butiazais), threatened ecosystems in the biome (Rota dos Butiazais, 2024).

Also of great importance for the conservation of the Pampa is the implementation of four state zoning initiatives: the State Ecological-Economic Zoning (ZEE-RS), the Ecological-Economic Zoning of the Northern Coast (Sema - RS, 2022), the Ecological-Economic Zoning of the Mid-Coast (Sema - RS, 2016), and the Environmental Zoning for Silviculture Activity (ZAS). The ZAS is an instrument provided for in State Law No. 15434/2020 (art. 14), of a guiding nature and preceding environmental licensing processes, establishing the regions most suitable for receiving silviculture enterprises (plantations), in order to make productive activity compatible with the conservation of natural ecosystems.

Despite these federal and state initiatives, the high rates of grassland vegetation suppression compromise the last remnants of a series of ecosystems already severely converted or degraded, indicating the need for improvement in the implementation of existing public policies and a more adequate legal framework for the use and conservation of the Pampa. Relevant topics for controlling the suppression of native vegetation in the biome, such as the definitive resolution of the implementation of the CAR and PRA in the state, the issuance of Authorization for Vegetation Suppression and Alternative Land Use (ASV/UAS), and the environmental compensation of enterprises and activities in grassland environments still require advances to promote the conservation and sustainable use of the Pampa.

3.3 Federal policies for controlling fires in the Pampa

Anthropogenic disturbances such as grazing and fire are fundamental for maintaining grassland ecosystems of the Southern Grasslands, including those located in UCs (Behling et al., 2009; Overbeck et al., 2007; Overbeck et al., 2015). However, in fire-use management, factors such as timing and frequency must be considered, as well as synergistic interactions with other disturbances that can cause degradation, such as overgrazing, the presence of invasive exotic species, drainage, and the systematic use of fertilizers, herbicides, and desiccant pesticides in adjacent crops. Soil vulnerability is also a relevant factor to consider, especially in the Sandy Fields ecoregion, which is particularly sensitive to disturbances. These factors must be carefully evaluated, as the current knowledge of

the fire regime in grassland environments indicates the need for an integrated, intercultural, and adaptive management approach. That is, it requires monitoring how different ecosystems and species respond to the various prescribed burning regimes, as well as adjusting management practices. The same applies to grazing regimes, for which efficient methods already exist for maintaining the grassland diversity of the Pampa (Nabinger, 2009). Therefore, combating illegal fires and encouraging, by the public authorities, the regularization of fire-use management are two imperatives in the quest to maintain the biodiversity of the Pampa, both flora and fauna, which depend on open environments to sustain their life cycles. In this regard, authorization/permission for controlled burning is a legal instrument with great potential for the sustainable management of the grasslands, especially in areas where grazing is impractical or absent for long periods.

The federal government has extensive legal regulations related to the use of fire, which date back to the 20th century, including its use in agrosilvopastoral management. The Forest Code of 1934 (Federal Decree No. 23793/1934) defines some rules related to intentional or accidental fires in the context of grassland environments (art. 22, caput and 22.1, and art. 28). Pioneeringly, the decree expressly prohibits "setting fire to fields or vegetation" to prepare the soil for agriculture and artificial pastures, establishing the need for a use license (the replacement of the license by permission occurred with the Forest Code of 1965, and from permission to authorization with Federal Decree No. 2661, 8 July 1998, the latter being the most commonly used). It also conditions the issuance of the license on compliance with certain precautions, such as the construction of firebreaks and protective alignments (in Portuguese aleiramentos), as well as notifying neighbors (art. 22.a). It also prohibits the use of fire in forest areas without the necessary precautions, as well as releasing festive balloons or fireworks of any kind that could cause fires in fields or forests (art. 22.d and 22.1, respectively). It further establishes the need for cooperation among all state and municipal agencies in the event of large-scale fires (art. 67), including possible support from the population in fighting fires. This provision was incorporated into subsequent forest codes, including the State Forest Code of RS (State Law No. 9519/1992). However, the 1934 Code only typifies the crime of arson in forests, for which it sets a penalty of up to three years in prison and a fine.

The Forest Code of 1965 (Federal Law No. 4771/1965) defines as a matter of social interest activities essential to the protection of the integrity of native vegetation, including prevention, firefighting, and fire control (art. 1.2.V.a). It also expands the scope of criminal offenses to "other forms of vegetation," maintaining the same penalties already determined by the 1934 Code (art. 26.e). The 1965 Code echoes both the prohibition of the use of fire as a rule, already established in the 1934 Code, and the possibility of its use in agropastoral practices with permission, in cases where local or regional peculiarities justify its use (art. 27). The use of fire for management purposes would only gain due importance with the publication of Federal Decree No. 2661/1998, which regulates art. 27 of the 1965 Forest Code, more than six decades after its first mention in the 1934 Forest Code. This decree establishes that interested parties must request authorization from the competent agency of Sisnama, by submitting documents, including the Controlled Fire Notice (CQC). If

the request complies with the established criteria, the rural landowner receives the so-called Controlled Fire Authorization (AQC), issued for a specific purpose and for a fixed period (arts. 5 and 8). The AQC can be renewed for the same area, as long as it is for the same purposes and for the same applicant, waiving the resubmission of documents, thus speeding up the administrative procedure (art. 9). It should be noted that the decree remains in force at the time of the preparation of this PPCD.

The LPVN, established by Federal Law No. 12651/2012, dedicates a chapter to the prohibition of the use of fire and the control of fires in Brazil, a topic previously limited to a few provisions and restrictions in the 1934 and 1965 codes. In addition to maintaining the prohibition as a rule in the national territory, it establishes three specific situations in which the use of fire is permitted. In addition to use for agropastoral management purposes, provided it is in justifiable areas, it authorizes controlled burning for the purposes of UCs management and research (art. 38.I, II, and III). It also defines as exceptions to the prohibition the practices of prevention and firefighting (controlled fire), as well as use in subsistence farming activities carried out by traditional and indigenous populations (art. 38.2). The LPVN also consolidates the OEMA as the Sisnama body responsible for issuing authorizations for the use of fire in agropastoral activities, to be issued per rural property or in a regionalized manner.

According to Federal Decree No. 2662/1998 and Federal Law No. 12651/2012, the monitoring and control criteria, essential to prevent forest fires, are established within the scope of the authorization itself, based on current legislation. In the case of rural enterprises subject to licensing and that use fire within the production system (controlled burning of sugarcane straw, for example), there is a requirement to include specific planning for the use of fire and fire control in the studies presented to the licensing authority (Law No. 12651/2012, art. 38.1). It should be noted that Consema Resolution No. 372/2018 establishes cattle raising in an extensive grazing system as a low-pollution-potential activity exempt from licensing, regardless of scale (Codram 117.30), the same applying to medium-sized animal raising in semi-confined or extensive grazing systems, such as sheep and goats (Codram 114.40). The exemption from licensing and, therefore, from specific fire studies, especially regarding livestock, encourages extensive grazing, which is recognized as more compatible with the management of Pampa biodiversity compared to semi-confinement activities (Nabinger, 2009), which require licensing in RS. However, issuing authorizations for the use of fire for agropastoral activities remains a significant challenge.

Although Brazilian legal regulations allow the use of fire in agrosilvopastoral management, holding parties accountable for criminal fires (unauthorized burning) is difficult for oversight bodies, given the need to prove the causal link between the damage actually caused and the action of the owner or agent (LPVN, art. 38.3 and 38.4).

Given that the LPVN provides for a specific national policy for the management and control of fires (art. 40), Federal Law No. 14944, 31 July 2024, was enacted, establishing

the National Policy for Integrated Fire Management (PNMIF). It also establishes the National Committee for Integrated Fire Management, linked to the MMA, composed of representatives of federative entities and civil society, and provides for state and district interinstitutional instances of integrated fire management, composed of agencies and entities responsible for responding to fires, Civil Defense, and the respective Military Fire Brigades. The law also establishes the National Fire Information System (Sisfogo), an instrument that provides for the integration of networks and data systems of fire records, controlled burns, and prescribed burns nationwide, as well as the Federal Integrated Multiagency Operational Coordination Center (Ciman Federal), with an operational nature.

The PNMIF establishes, among its principles (art. 3.I), the shared responsibility of all federative entities in creating policies, programs, and plans that promote integrated fire management. Although it does not make express reference to grassland ecosystems and the Pampa biome, the term "fire," the subject of the law, is broadly defined as "any uncontrolled and unplanned fire affecting forests and other forms of vegetation, native or planted, in rural areas, which, regardless of the source of ignition, requires a response" (art. 2.I). Thus, the law extends its reach to grassland ecosystems present in all Brazilian biomes. In this sense, given the importance of fire for maintaining the biodiversity of the Pampa grasslands, there is compatibility with the definition of a fire-associated ecosystem, defined by the PNMIF as "one in which fire, whether natural or caused, plays an ecological role in its functions and processes" (art. 2.VII).

Beyond authorizations issued per property or in a regionalized manner, the PNMIF establishes the possibility of authorizing the use of fire in a joint manner, defined as that carried out collectively by family farmers, through a joint effort or another form of interaction, covering simultaneously two or more contiguous small family rural properties or holdings (art. 2.V). This use is particularly promising among small rural producers and agrarian reform settlers, as it reduces costs and increases the capacity for community control.

Among the objectives of the PNMIF is promoting the use of fire in a controlled, prescribed, or traditional manner, in ways that respect environmental and sociocultural diversity, as well as seasonality in fire-associated ecosystems (art. 5.II). Among the instruments listed in art. 8, special mention should be made of the Integrated Fire Management Plans (PMIF), forest brigade programs, and the National Fire Information System (Sisfogo), the latter still being improved. In this sense, the PNMIF replaces the Contingency Plans provided for in the LPVN (art. 39 of Federal Law No. 12651/2012) with a broader instrument, the PMIFs, which must be prepared, updated, and implemented by public agencies or private entities responsible for managing areas with native vegetation or forest plantations.

The MMA, together with IBAMA and ICMBio, has long worked to prevent and combat fires across the national territory through the Federal Brigade Program for the Prevention and Combat of Forest Fires, with brigades specifically contracted for this purpose. These efforts are focused primarily on federal areas (Indigenous Lands, Quilombola

Territories, and Federal Conservation Units), selected based on their history of fires and the socio-environmental relevance of each area. It is also important to mention that federal environmental institutions responsible for responding to fires work with annual planning that includes, in addition to the Federal Brigade Program, the implementation of initiatives related to Integrated Fire Management. This approach incorporates ecological, cultural, socioeconomic, and technical aspects of fire, with the objective of reducing emissions of particulate matter and greenhouse gases, conserving biodiversity, and decreasing the severity of fires. It also encompasses training, awareness campaigns, environmental education, construction of firebreaks, development of burning calendars, implementation of controlled and prescribed burns, fires monitoring and suppression, as well as recovery and restoration of affected areas, which continue to be implemented in different regions of the country.

Another policy being developed by federal institutions in response to fires, also provided for in the National Integrated Forest Fire Management Policy (PNMIF), is the recognition, appreciation, and strengthening of community and volunteer brigades and brigade members operating throughout the national territory. This is being carried out through the development of the Federal Volunteering Strategy for Integrated Fire Management actions by the MMA and its affiliated agencies, Ibama and ICMBio, in partnership with other organizations and representatives of civil society. These collectives, increasingly present in environmental protection and conservation, are a valuable resource for preserving Brazil's natural heritage, as they are located in the territory and can assist the federal government with primary and immediate actions to prevent fires, such as community awareness, execution of prescribed and controlled burns, construction of firebreaks, fire monitoring and detection, and the recovery and restoration of areas affected by fires. In some cases, these collectives are also trained for initial suppression, allowing them to provide a first response to hotspots and prevent them from becoming major fires. However, to ensure that this involvement is safe and effective, these groups must be properly trained and equipped, and their activation procedures must be clear, well established, and regulated, this being the main goal of the Federal Strategy.

Moreover, under Complementary Law No. 140, 8 December 2011, federal government actions in areas outside its jurisdiction must be of a subsidiary nature and formally requested by the states or municipalities originally holding authority for administrative action. It follows, therefore, that the responsibility for responding to burnings and fires in a given region should not be attributed solely to the federal government but also to state and municipal governments, which hold primary jurisdiction.

In 2023, by Decree No. 11367/2023, the National Commission for the Recovery of Native Vegetation (Conaveg) was reestablished, which coordinates the implementation, monitoring, and evaluation of Proveg and the implementation of Planaveg, which provides, among other things, for actions to recover degraded areas, including those affected by fires.

3.4 State policies for controlling fires in the Pampa

The Forest Code of the State of Rio Grande do Sul (CFE), established by State Law No. 9519/1992, dedicates a chapter to forest protection, establishing, as a rule, the prohibition of the use of fire or burning in forests and other forms of natural vegetation, in accordance with federal legislation (art. 28). It also establishes the possibility of use, through licensing by the competent forest authority, for phytosanitary treatment, common in the silvicultural management of pests and diseases of black wattle, for example. The total ban on the use of fire in pastures in RS in the 1990s did not put an end to fires for the purpose of annual pasture renewal in the Southern Grasslands. The demand from the agricultural sector, particularly producers in the Campos de Cima da Serra region (high-altitude grasslands of the Atlantic Forest), led to the publication of State Law No. 13931, 30 January 2012, which amended article 28 of the CFE, allowing the use of fire in the controlled management of native and exotic pastures in non-mechanizable areas, provided it is not continuous, for cleaning, removal of clumps of straw, and breaking seed dormancy, through a permit (term used instead of authorization) to be issued by the municipal environmental authority. This measure was established on a temporary basis, until the availability of alternative technology to replace this practice (new wording of art. 28.3).

In this regard, despite the provision in federal legislation for the issuance of AQC by the OEMA, Consema Resolution No. 372/2018 defined as a local impact the field management through controlled burning in non-mechanizable areas, regardless of scale (Codram 10830.00), thus transferring to the municipalities the responsibility for issuing permits, enforcement, and monitoring, to be carried out under State Law No. 13931/2012. It is important to highlight that non-mechanizable fields, those on shallow or rocky soils that make it difficult to manage with agricultural machinery, constitute a considerable portion of the Pampa biome grasslands, housing a series of rare, endemic, or threatened species (Boldrini et al., 2015; Overbeck et al., 2015; Vélez-Martin et al., 2015).

It is worth noting that the National Policy for Integrated Fire Management (PNMIF), Law No. 14944/2024, establishes the shared responsibility of all entities in creating policies, programs, and plans that promote integrated fire management (art. 3.I). This provision is particularly promising for the management and conservation of the Southern Grasslands present in RS, particularly for the grasslands of the Pampa biome, which depend on observing factors such as frequency and periodicity for the maintenance of the flora and its productive capacity.

4. DYNAMICS OF NATIVE VEGETATION SUPPRESSION AND FIRES IN THE PAMPA BIOME

4.1. Dynamics of native vegetation suppression

In 2015, the MMA established the Environmental Monitoring Program of the Brazilian Biomes (PMABB) to meet national demands related to deforestation control and prevention and payment for results in reducing greenhouse gas emissions, as established in Brazil's National Strategy for REDD+ (ENREDD+), Ordinance No. 365, 27 November 2015. Currently, the Satellite Monitoring Program of the Brazilian Biomes (BiomasBR), managed administratively by the Science, Applications and Space Technology Foundation (Funcate), technically coordinated by Inpe, and financially supported by the Amazon Fund, is responsible for carrying out three operational monitoring projects: the Satellite Deforestation Monitoring Program (Prodes), the Real-Time Deforestation Detection System (Deter), and the Land Use and Occupation Mapping System (TerraClass). Prodes and Deter data are available on the TerraBrasilis portal, developed by Inpe for the analysis and dissemination of geographic data.

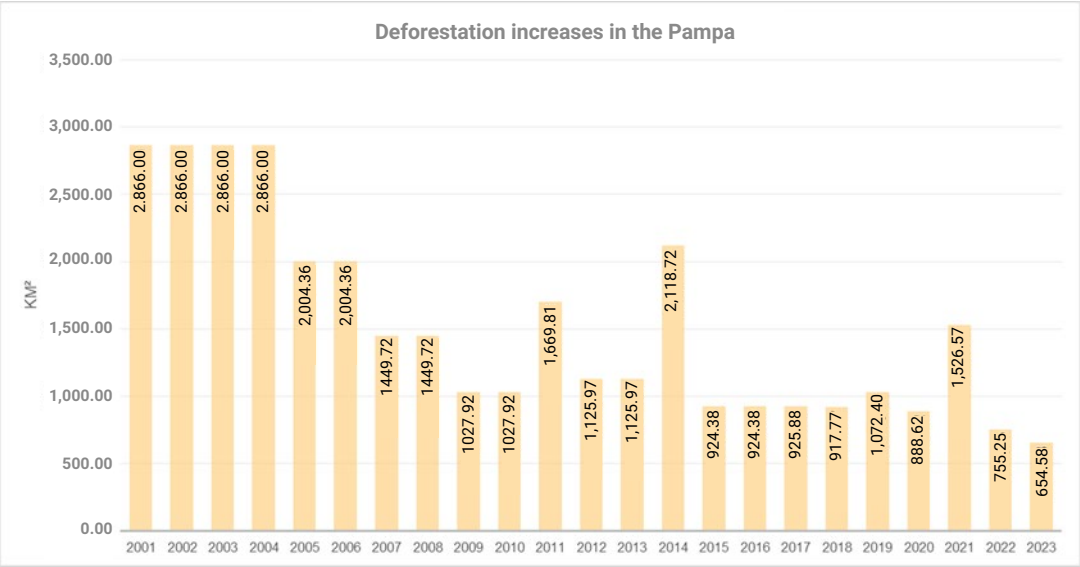
Prodes annually maps deforestation increases by clear-cutting or progressive degradation of primary vegetation in all Brazilian biomes. The concept of deforestation, in satellite monitoring, covers both the suppression of primary arboreal vegetation and the conversion of primary herbaceous vegetation in open, non-forest formations such as grasslands, savannas, and herbaceous restinga (Almeida et al., 2022). Thus, Prodes data on supression increases for the Pampa mainly reflect the suppression of native grassland vegetation, which is the predominant vegetation typology, occupying 32% of the biome, equivalent to 69% of the remaining native vegetation area in 2023 (MapBiomas, 2024b).

Prodes data, except for the Amazon biome, are initially based on a biennial historical series of deforestation increase maps produced between 2000 and 2016, becoming annual starting in 2017 (Almeida et al., 2022). Of the 193,836 km² total original area of the Pampa biome (IBGE, 2019), by the year 2000, 79,121 km² had already been suppressed, corresponding to 40.8% of the biome. At the end of the historical series, in 2023, the accumulated suppression of grasslands and forests was already 114,164.78 km², corresponding to 58.9% of the biome. Therefore, the total accumulated suppression increase during the historical series recorded by Prodes was 35,043.31 km² in just over two decades, which is equivalent to 70 times the area of Porto Alegre, the state capital, and six times the area of the Federal District, with an annual average of 1,523 km².

Despite this, annual increments of native vegetation suppression in the Pampa have been gradually decreasing in recent years. Between 2001 and 2004, the Pampa lost 11,464 km² of native vegetation, an average of 2,866 km²/year. In the period 2005–2006, the average dropped to about 2,000 km²/year, and in the period 2007–2008, it fell again to 1,400 km²/year. From 2009 to 2021, it remained around 1,000 km²/year, with three suppression peaks occurring in 2011, 2014, and 2021, and a progressive decline has

been observed more recently, between 2021 and 2023 (Figure 9). Notwithstanding the observed reduction, if native vegetation suppression remains stable at 2023 levels and no efforts are undertaken for regeneration, restoration, or recovery, the natural grasslands will have disappeared before the end of the century, making the Pampa the most threatened biome in Brazil.

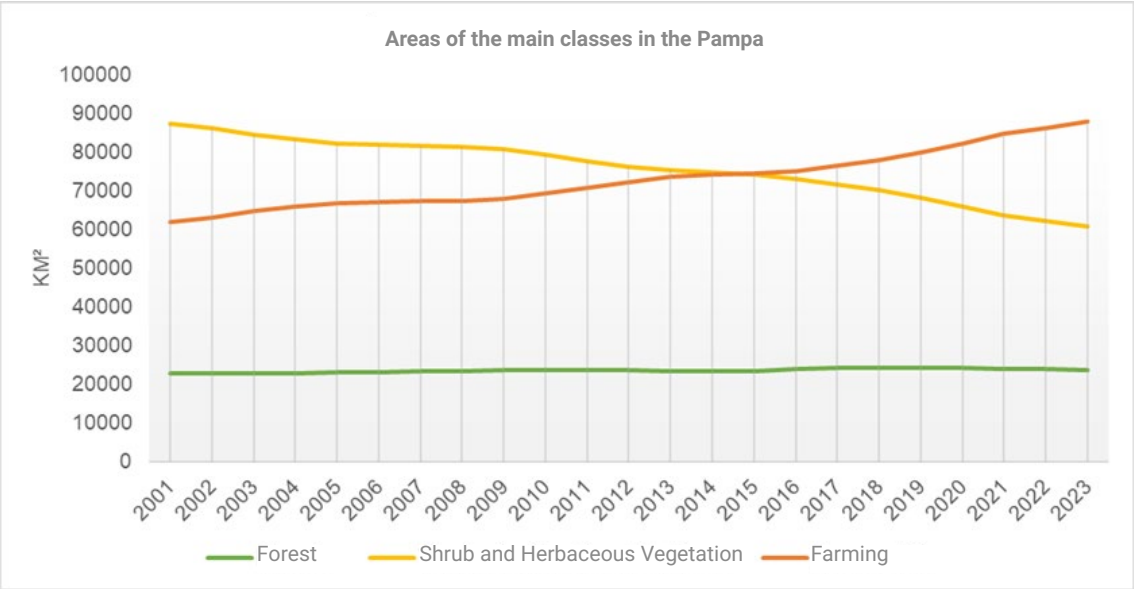
Figure 9. Annual increments of native vegetation suppression (km²) in the Pampa biome between 2021 and 2023.



Source: MMA, adapted from INPE (2024).

The suppression increase data presented by Prodes/Inpe do not differentiate between the biome's phytophysiognomies. Thus, the complementary analysis carried out by MapBiomas (2024) proves relevant as it indicates that the area corresponding to forest phytophysiognomies in the Pampa, between losses due to deforestation and gains from ecological succession, has remained relatively stable since 1985, varying between 21,939 and 24,130 km². On the other hand, the area of native grasslands has decreased in proportion to the increase in areas destined for agriculture and livestock, having been surpassed by the latter around 2015 (Figure 10). Thus, it can be observed that deforestation (forest suppression) corresponds to a small fraction of the annual increase in native vegetation suppression in the Pampa, largely related to grassland suppression. The high international price of soy and the lack of effective policies to encourage sustainable livestock production, among other factors, have significantly contributed to the accelerated loss of native grasslands in the Pampa (Vélez-Martin et al., 2015).

Figure 10. Areas of the main classes in the Pampa biome between 2001 and 2023.



Source: MMA, adapted from MapBiomas (2024).

According to the 2017 Agricultural Census (IBGE, 2020), more than 60% of agricultural establishments in RS have an area smaller than 20 hectares and 30% have an area between 20 and 100 hectares. Although fewer in number, medium-sized rural properties (100 to 1,000 hectares) and large ones (more than 1,000 hectares) account for 38% and 33%, respectively, of the total area of the establishments (IBGE, 2020). Of the total area occupied by agricultural establishments, approximately 42% (more than 9 million hectares) consists of pastures and 36% of permanent and temporary crops. Natural pastures represented, in 2017, about 7.5 million hectares, which corresponds to 82% of the total. However, according to the Rio Grande do Sul Agribusiness Panel (2023), since the 2006 Agricultural Census there has been a reduction in the share of pastures and an increase in the share of crops throughout the state. In the Pampa, in the southern, western border, and Campanha regions, there is a predominance of medium- to large-scale establishments, specializing in beef cattle ranching, rice cultivation, and soybean farming.

Prodes data indicate that, from 2004 to 2023, polygons of native vegetation suppression smaller than 10 hectares account for 9% to 23% of the suppression recorded in the biome, while polygons between 10 and 50 hectares account for 21% to 40%. Polygons between 50 and 100 hectares and those larger than 100 hectares account for 15% to 20% and 20% to 55%, respectively (Figure 11). In the last ten years of the historical series (2013–2023), 74% to 80% of the suppression consisted of polygons smaller than 100 hectares. The varied distribution of deforestation polygons must be considered when defining strategic actions for environmental monitoring and enforcement.

Figure 11. Size of polygons of native vegetation suppression in the Pampa biome between 2004 and 2023.

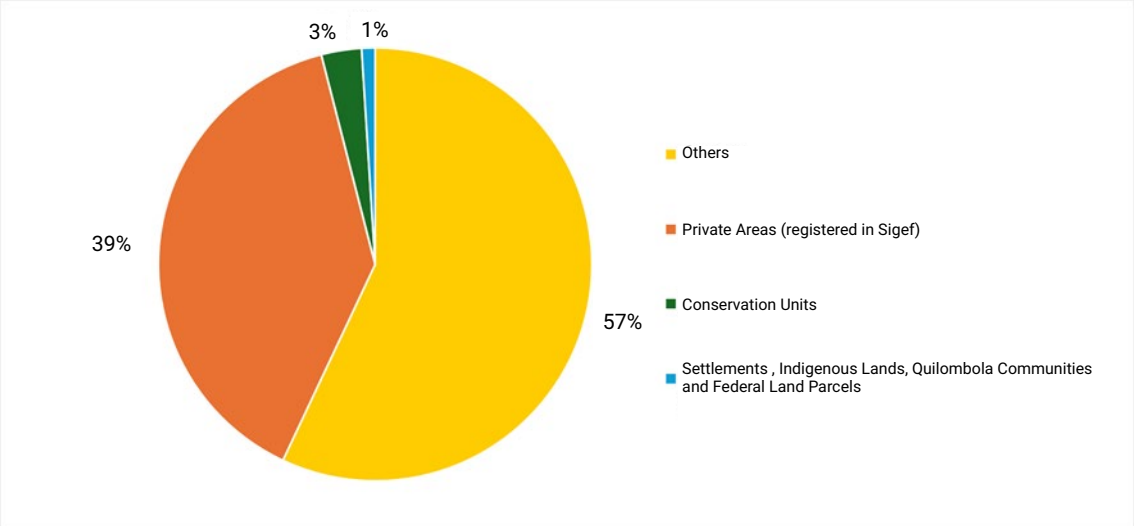
Year	Less than 10ha	Between 10 and 50 ha	Between 50 and 100 ha	Greater than 100 ha
2004	9%	21%	15%	55%
2006	16%	31%	18%	35%
2008	16%	33%	18%	33%
2010	15%	36%	19%	29%
2011	18%	38%	19%	25%
2013	17%	36%	21%	26%
2014	19%	36%	20%	25%
2016	23%	35%	18%	24%
2017	21%	40%	19%	20%
2018	22%	39%	20%	20%
2019	19%	37%	20%	23%
2020	21%	37%	20%	21%
2021	22%	36%	18%	24%
2022	22%	37%	18%	23%
2023	21%	37%	18%	24%

Source: MMA adapted from Prodes/Inpe.

In addition to the polygon size analysis, to support the understanding of the dynamics of deforestation and fires in the biome, it is necessary to understand the distribution among land tenure categories. According to data produced by the MMA based on public data, most of the biome (57%) is occupied by areas classified as “Others,” composed of areas managed by states and municipalities, military areas, or areas without information, not integrated into the database of the National Institute for Colonization and Agrarian Reform (Incra), but which may contain private properties. The category of private areas, which encompasses private lands registered in the Land Management System (Sigef), corresponds to 39% of the biome’s area (Figure 12).

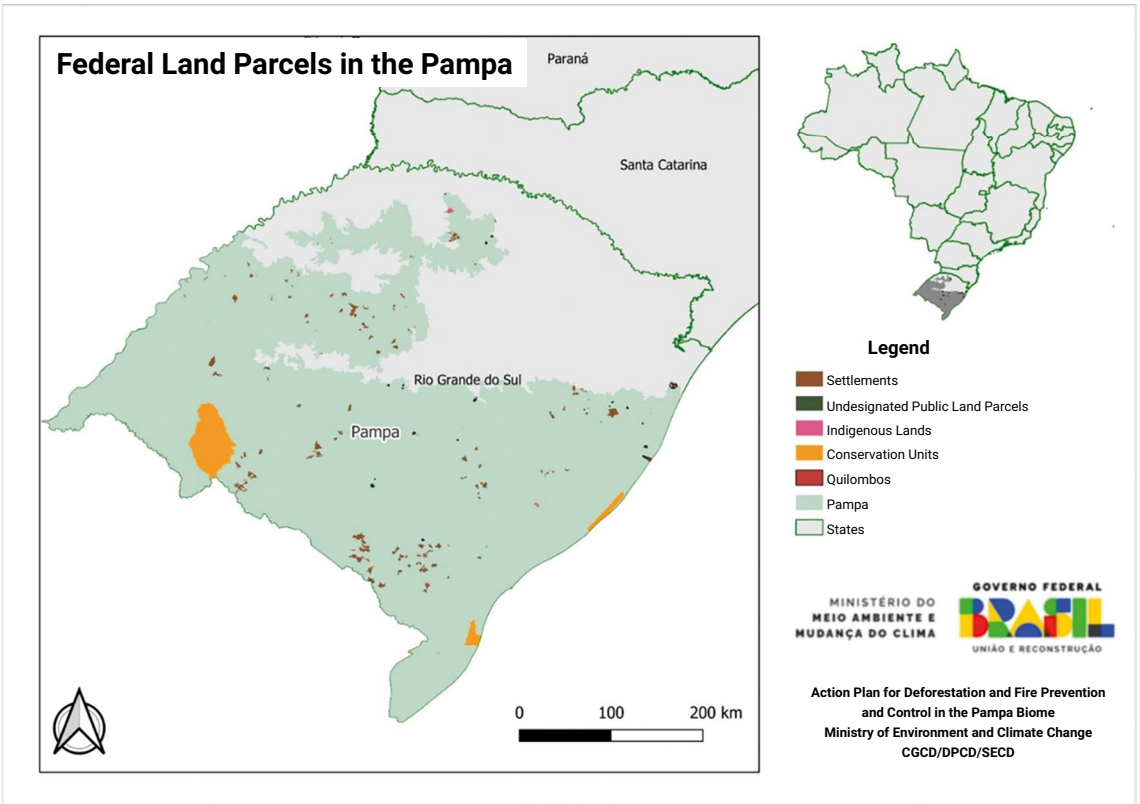
Federal areas, represented by settlements, federal public lands, Indigenous Lands and Quilombola Territories, and Conservation Units under federal administration represent a small portion of the biome (Figure 13). Federal Agrarian Reform Settlements and Undesignated Federal Lands also have little participation in proportional terms: 1% and 0.01% of the territory, respectively. The areas designated for Quilombola Communities and Indigenous Lands correspond to the smallest categories in the biome and amount to only 0.04% and 0.05% of the Pampa territory, respectively. According to the Committee of Traditional Peoples and Communities of the Pampa (2024), many TPCs of the Pampa await recognition of their traditionally occupied territories, including family cattle ranchers, faith healers, artisanal fishers, Romani people, Pomeranians, and Afro-Brazilian religious communities.

Figure 12. Distribution of land title categories in the Pampa biome in 2023.



Source: Adapted from data provided by Incra, MMA, and Funai.

Figure 13. Federal land parcels in the Pampa biome.



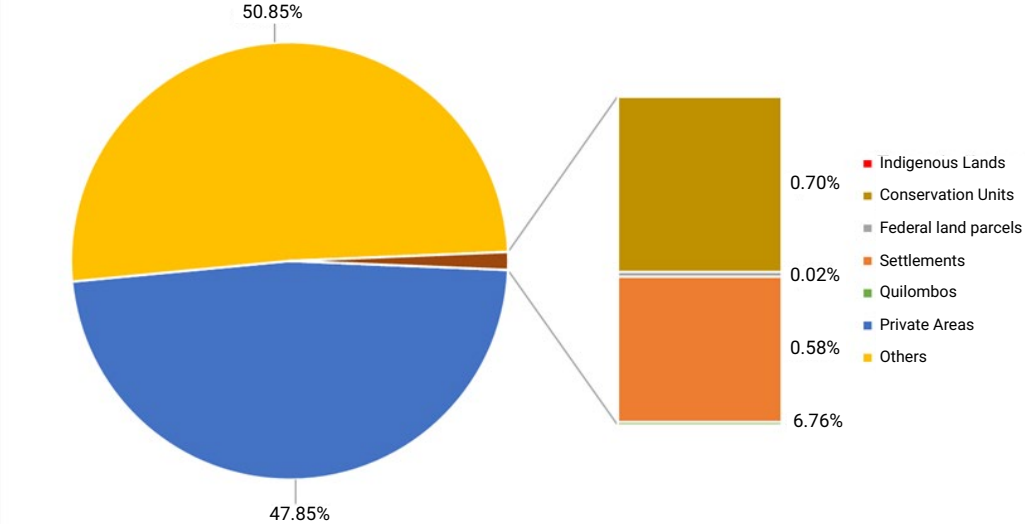
Source: Map based on data provided by the MMA and Funai.

The suppression of native vegetation in 2023 in the Pampa shows an uneven distribution among the different land tenure categories. Of the 654.58 km² of areas cleared in 2023, the “Others” category accounted for 332.84 km² of suppression, which corresponds to 51% of the native vegetation loss. Registered private areas accounted for 313.19 km²,

which corresponds to 48% of the total. Together, these categories represent 99% of the native vegetation suppression identified in 2023 (Figure 14). It is worth noting that Incra's Sigef is mandatory only at the time of the transfer of rural properties and that the Pampa has a consolidated land tenure situation. Therefore, it is expected that a large portion of the areas classified as "Others" consists of private properties not yet included in Incra's database. These numbers make it clear that policies for the prevention and control of deforestation and fires must be designed to adapt to a biome made up of areas where the primary jurisdiction does not belong to the federal government.

In contrast, federal agrarian reform settlements accounted for 3.79 km² of suppression (0.58% of the total), suggesting moderate pressure related to land use for family farming. Conservation Units accounted for 4.56 km² (0.70%). Indigenous Lands (0.00%), Quilombola Territories (0.01%), and Undesignated Federal Land Parcels (0.02%) showed minimal suppression rates, indicating greater preservation in these areas. These data demonstrate the importance of creating new protected areas in the biome, such as fully protected Conservation Units, Quilombola Territories, Indigenous Lands, as well as actions to value and recognize other traditional peoples and communities of the Pampa.

Figure 14. Distribution of deforestation by land title category in the Pampa biome in 2023.



Source: Adapted from data provided by Incra, MMA, Inpe, and Funai.

Regarding Conservation Units, only 3.03% of the Pampa is under protection by federal, state, and municipal UCs, a proportion too low for maintaining biodiversity and ensuring representative ecosystems of the biome (Figure 12). Proportionally, only 1% of the herbaceous and shrubby vegetation characteristic of Pampa grasslands is protected in UCs (MapBiomas, 2023c). The list of the 10 Conservation Units in the Pampa biome that cleared the most native vegetation between 2019 and 2023 (Table 1 and Figure 15) reveals a scenario of pressure, mainly in Environmental Protection Areas (APAs), a sustainable use category that allows controlled economic activities. Together, the APA of Ibirapuitã and the APA of Banhado Grande accumulated 58.54 km² of suppression in that period, corresponding to about 95% of the total observed in UCs included in the list (61.4 km²). In 2023, 99% of the suppression observed in all the biome's UCs occurred in these two protected areas. These data show that sustainable use categories, especially those where land ownership is predominantly private, are more vulnerable to the loss of natural areas in the Pampa.

It is important to highlight that APAs are generally large areas, composed of public or private lands, with some degree of human occupation, allowing productive activities in compliance with rules and restrictions established by legislation and the Management Plan of each UC. Increases in the conversion of native vegetation in these protected areas are particularly harmful, as they are established in areas endowed with especially important abiotic, biotic, aesthetic, or cultural attributes for human populations' quality of life and well-being (art. 15 of Law No. 9985, 18 July 2000). Among the basic objectives of APAs are to protect biological diversity, regulate the occupation process, and ensure the sustainability of natural resource use. Thus, the suppression of native vegetation in the APA of Banhado Grande and the APA of Ibirapuitã undermines these objectives, as it mainly affects remaining areas of Mixed Grasslands of Andropogoneae and Compositae, one of the most converted and threatened in the biome.

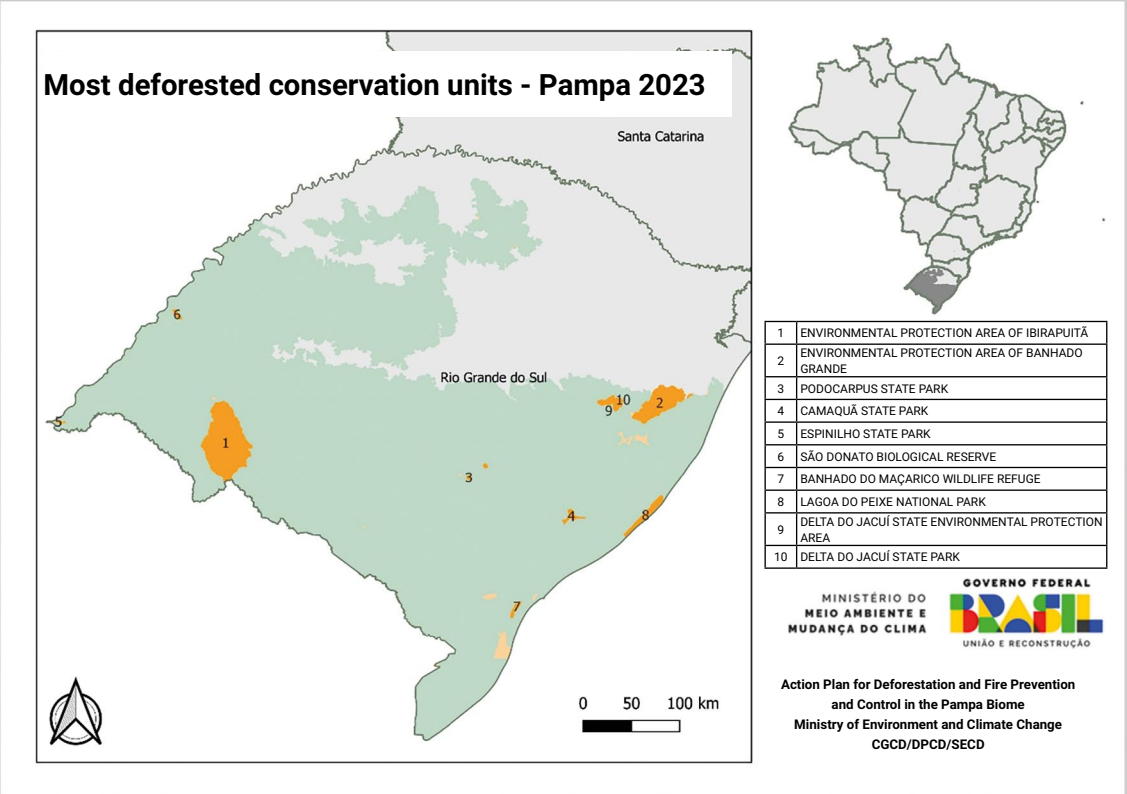
In contrast, more restrictive category UCs, such as National and State Parks and Wildlife Refuges (REVIS), show significantly lower suppression rates, indicating greater effectiveness in conserving native vegetation. Together, the eight remaining UCs on the list account for only about 1% of the suppression in the biome's UCs between 2019 and 2023. However, these protected areas still face significant challenges for the conservation of native vegetation. In this sense, it is worth mentioning the case of the Podocarpus State Park, located in the Shrubland Ecoregion, in the Serra do Sudeste, which was created with the purpose of protecting mosaic grassland-forest areas composed especially of the "Pinheiro bravo" pine (*Podocarpus lambertii*). Despite being established 50 years ago, through State Decree No. 23798, 12 March 1975, the park is still in its initial implementation phase, lacking a Management Plan and an Advisory Council (Sema - RS, 2024b). Besides, it still requires land tenure regularization.

Table 1. List of the 20 Conservation Units with the largest areas of native vegetation suppression between 2019 and 2023.

		Annual Deforestation (km²)						
Name of Conservation Unit	**State**	**2019**	**2020**	**2021**	**2022**	**2023**	**Contribution**	**Trend**
ENVIRONMENTAL PROTECTION AREA OF IBIRAPUITÃ	RS	1.96	3.85	9.712	2.17	3.12	68%	
ENVIRONMENTAL PROTECTION AREA OF BANHADO GRANDE	RS	8.90	8.02	14.92	4.50	1.39	31%	
PODOCARPUS STATE PARK	RS	0.98	0.04	0.31	0.06	0.02	1%	
CAMAQUÃ STATE PARK	RS	0.00	0.00	0.00	0.15	0.01	0%	
ESPINILHO STATE PARK	RS	0.00	0.00	0.00	0.00	0.01	0%	
SÃO DONATO BIOLOGICAL RESERVE	RS	0.00	0.00	0.00	0.00	0.00	0%	
BANHADO DO MAÇARICO WILDLIFE REFUGE	RS	0.00	0.34	0.07	0.15	0.00	0%	
LAGOA DO PEIXE NATIONAL PARK	RS	0.22	0.04	0.06	0.06	0.00	0%	
DELTA DO JACUÍ STATE ENVIRONMENTAL PROTECTION AREA	RS	0.05	0.00	0.19	0.00	0.00	0%	
DELTA DO JACUÍ STATE PARK	RS	0.00	0.00	0.11	0.00	0.00	0%	
Sum of the 10 most deforested	RS	12.11	12.29	25.36	7.08	4.56	100%	
Grand Total	RS	12.11	12.34	25.36	7.09	4.56		

Source: Data obtained by cross-referencing information on Conservation Units (CNUC) and Prodes/Inpe 2023.

Figure 15. Conservation Units with the largest areas of native vegetation suppression in the Pampa biome in 2023.



Source: Map based on data provided by the MMA and Funai.

The data suggest a need for improvements in public policies for the management, monitoring, and environmental oversight of the Conservation Units (UCs) with the highest conversion rates, focusing on the Environmental Protection Area (APA) of Banhado Grande (state management) and the APA of Ibirapuitã (federal management). Although full protection UCs play a more effective role in preserving remnants of the Pampa's

natural areas, these protected areas still face significant challenges, largely related to regional economic pressures and pending implementation of Management Plans and Advisory Councils, land tenure regularization, and enforcement.

Data on native vegetation suppression identified in municipalities within the Pampa during the historical series of Prodes/Inpe (2001-2023) indicate relatively scattered suppression across the biome. The 10 municipalities with the largest suppression areas account for 12,267.20 km² of cleared land, corresponding to 35% of the total observed in the period (Table 2). The remaining suppression is spread across approximately 150 municipalities, with variable percentages ranging from 0.01% to 2.3% of the total area (approximately 2 km² to 800 km²). Alegrete leads the suppression ranking, with about 5.7% of the total cleared area, followed by São Gabriel (4.73%) and Dom Pedrito (4.44%). Bagé contributed 3.73%, while Encruzilhada do Sul and Santana do Livramento accounted for 3.11% and 2.91%, respectively. These municipalities, mostly located in the southwestern portion of Rio Grande do Sul, have been heavily influenced by soybean expansion over the past two decades. According to the Socioeconomic Atlas of Rio Grande do Sul (2022), São Gabriel and Dom Pedrito are among the municipalities in the state that produced the most soybeans between 2020 and 2022 (averaging more than 200,000 tons annually).

Table 2. List of the 10 municipalities with the largest areas of native vegetation suppression in the Pampa biome between 2001 and 2023, suppressed area and percentage relative to the total verified in the biome during the period.

City	Area (km²)	%
Alegrete	1,993.92	5.69
São Gabriel	1,657.70	4.73
Dom Pedrito	1,556.94	4.44
Bagé	1,308.23	3.73
Encruzilhada do Sul	1,090.32	3.11
Sant'Ana do Livramento	1,019.52	2.91
Rosário do Sul	958.55	2.74
Uruguaiana	923.71	2.64
Piratini	885.43	2.53
Cachoeira do Sul	872.88	2.49
Total	**12,267.20**	**35.01**

Source: Data from the Prodes Program for the Pampa biome, available on the TerraBrasilis Portal.

In 2023, the 10 municipalities that suppressed the most native vegetation in the Pampa showed individual suppression ranging from about 17 km² to just over 50 km² of total area. Together, these municipalities accounted for a total of 309.8 km² of converted natural areas, corresponding to 47.33% of the total area cleared in the biome in that year (Table 3). The municipalities of Alegrete and Sant'Ana do Livramento lead the 2023 list, with 50.38 km² (7.7%) and 44.81 km² (6.85%) of accumulated suppression area, respectively. The data suggest a persistence of high comparative suppression rates in at least six municipalities over the past two decades, namely Alegrete, Bagé, Dom Pedrito, Piratini, Sant'Ana do Livramento, and São Gabriel, all located in the Campanha Gaúcha region and adjacent areas.

Table 3. List of the 10 municipalities with the largest areas of native vegetation suppression in the Pampa biome in 2023.

City	Area (km²)	%
Alegrete	50.38	7.70
Sant'Ana do Livramento	44.81	6.85
São Gabriel	36.56	5.58
Piratini	34.44	5.26
Santo Antônio das Missões	31.67	4.84
Dom Pedrito	28.46	4.35
Bagé	23.18	3.54
Santiago	21.41	3.27
Lavras do Sul	21.25	3.25
Herval	17.64	2.70
Total	**309.80**	**47.33**

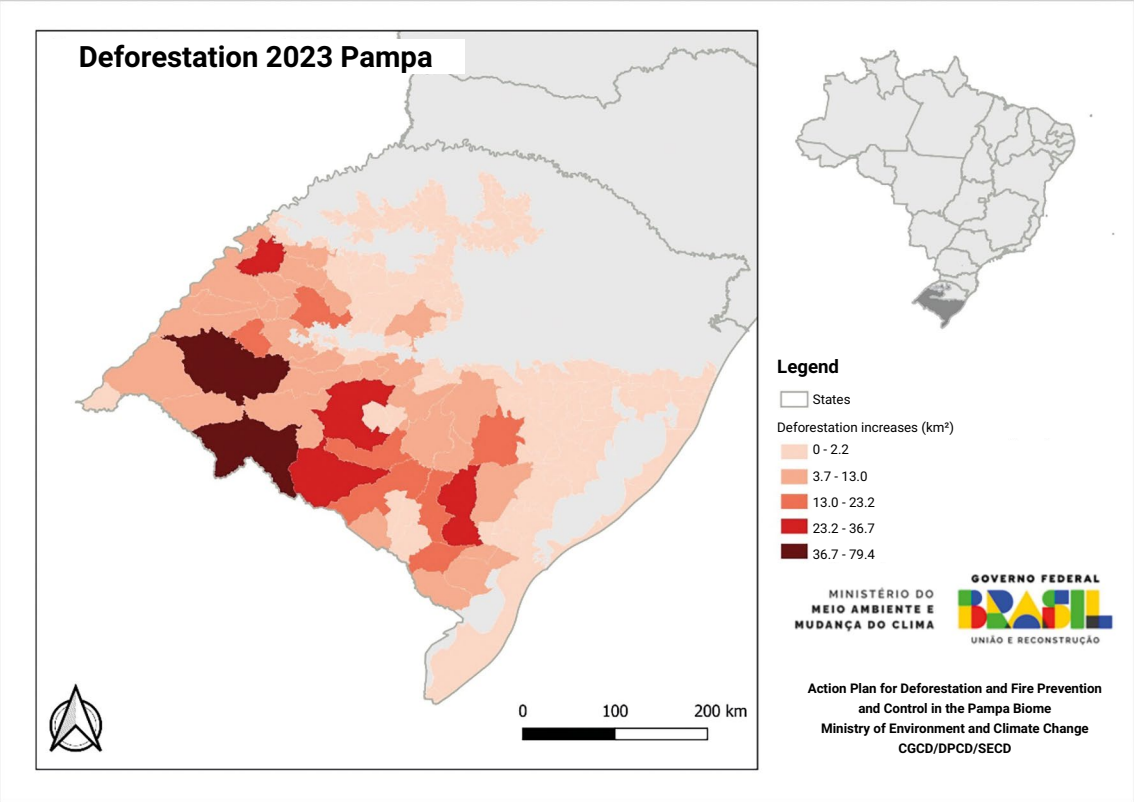
Source: Data from the Prodes Program for the Pampa biome, available on the TerraBrasilis Portal.

Despite the high dispersion suggested by the historical series data, the map of native vegetation suppression increment by municipality in the Pampa biome in 2023 (Figure 16) reveals a relatively concentrated arc of suppression in the Campanha Gaúcha region (Southern Border), Western Border, and Serra do Sudeste, encompassing the ecoregions of Shallow Soil Grasslands, Mixed Grasslands with Andropogoneae and Compositae, Espinilho Grasslands, Grass-Dominated Fields, and Shrubby Grasslands. These data may be related to the expansion of the agricultural frontier, especially soybean cultivation, toward the southern half of the biome. Historically, the expansion began in the Central

Plateau, in the Fields with Jubata Grass ecoregion, and in the state's Central Depression, in the Mixed Field with Andropogoneae and Compositae ecoregion, and has been moving towards the south of the biome (Prodes/Inpe).

It is worth noting the advance of the agricultural frontier over the Shrubby Grasslands located in the Serra do Sudeste, which stand out for their diversity and high degree of vascular plant endemism (Torchelsen et al., 2020). Although the Serra do Sudeste is widely considered unsuitable for agriculture due to its geological, topographic, and edaphic characteristics, the lower land prices compared to other regions of the state have driven the expansion of soybean cultivation (Belarmino et al., 2018), resulting in the suppression of extensive areas of native grasslands previously used for extensive livestock farming. In this region, agriculture increased by 221% between 2004 and 2019, rising from 42 thousand to 135 thousand hectares, representing the highest percentage growth of agricultural area in the entire state during this period (Oliveira, 2021). As the best lands are allocated to agriculture, the region has shown the highest percentage losses of sheep (33%), cattle (34%), and dairy cows (39%) in all of Rio Grande do Sul (Oliveira, 2021).

Figure 16. Accumulated suppression increments by municipality in the Pampa in 2023.



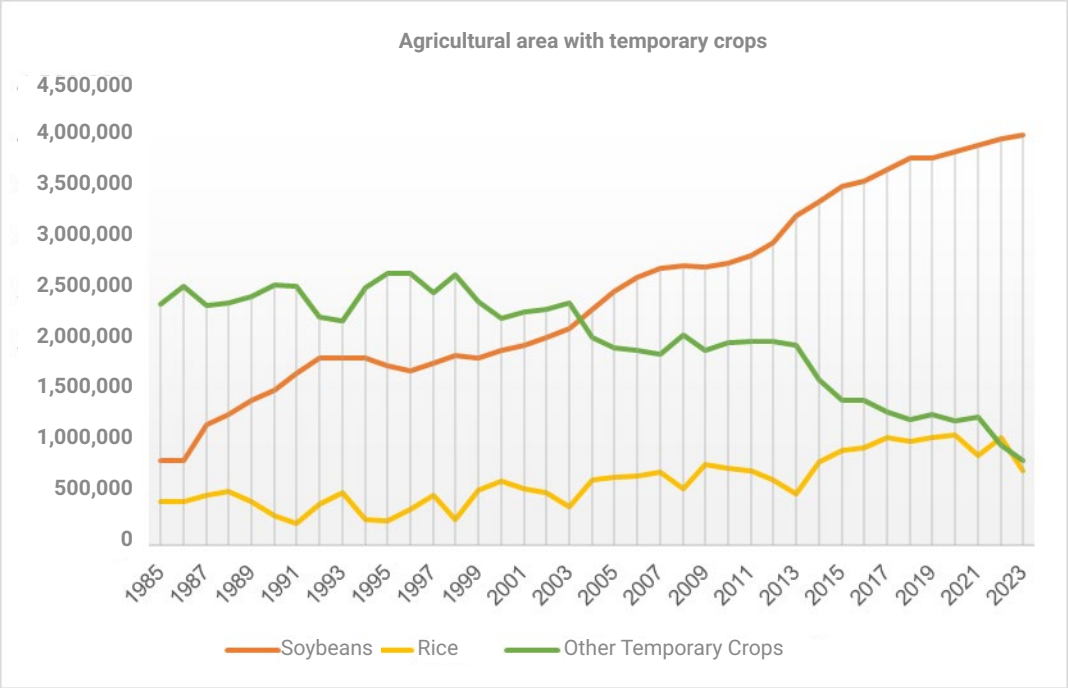
Source: Map created by the MMA using Prodes/Inpe data on deforestation in the Pampa (Prodes/Inpe).

4.1.1. Expansion of agriculture and forestry in the Pampa biome

Among the main factors responsible for the reduction of native grassland vegetation in the Pampa biome are the expansion of agriculture, silviculture, and the cultivation of exotic pastures (Overbeck et al., 2015; Vélez-Martin et al., 2015; Mengue et al., 2020). Over the past two decades, the accelerated reduction of the Pampa's native grasslands has been mainly related to the growing demand for agricultural commodities, which intensified during the commodity supercycle period (2004 to 2011) (Overbeck et al., 2007; Capoane & Kuplich, 2018). With the expansion of the soybean frontier toward the southern half of the state of Rio Grande do Sul, areas historically used for extensive livestock farming have been converted for the expansion of annual crops, especially soybeans (Capoane; Kuplich, 2018; Silveira; González; da Fonseca, 2017). This expansion is largely due to the higher profitability of this activity compared to extensive livestock farming and other temporary crops practiced in the region (Leusin Júnior & Feix, 2023). After soybean harvest in the fall, these same areas are used for livestock grazing with cultivated pastures. These changes in land use and land cover have generated significant impacts on local biodiversity, soil structure, and hydrological cycles, accelerating degradation and the loss of essential ecosystem services (Staude et al., 2018; Gallego et al., 2023). It has also led to the expansion of specialized services geared toward temporary agriculture in the southeastern and southwestern regions of the state.

In the Pampa biome, the area cultivated with soybeans grew from 8,243 km² in 1985 to 40,159 km² in 2023, a percentage increase of 387%, while the area cultivated with rice increased from 4,234 km² in 1985 to 7,261 km² in 2023, a percentage increase of 71% (Figure 17). On the other hand, during the same period, the area allocated to other temporary crops showed a significant reduction of 65%, dropping from 23,607 km² to 8,292 km². This decline is directly related to the expansion of soybeans, which has become the dominant crop, replacing other forms of agricultural production in various regions of the Pampa. Thus, the area allocated to agriculture and livestock in the Pampa, including agriculture, silviculture, and cultivated pasture, already occupies 45% of the biome's total area, surpassing the native vegetation cover, which accounts for 43%, with 31% composed of herbaceous and shrubby formations and 12% of forest vegetation (MapBiomas, 2024a).

Figure 17. Evolution of the agricultural area (km²) of soybeans, rice, and other temporary crops in the Pampa between 1985 and 2023.



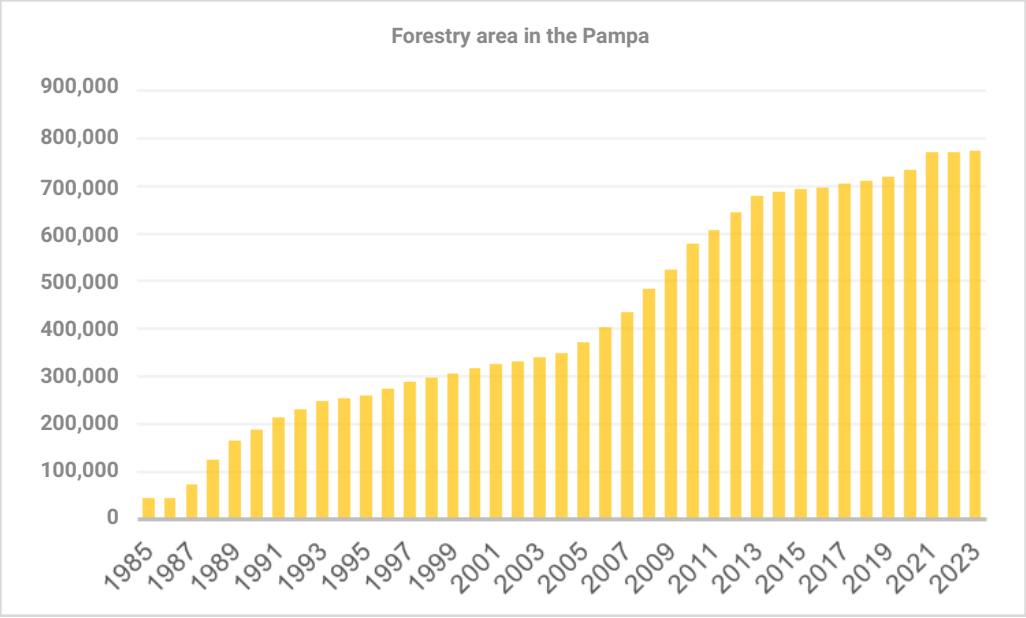
Source: Data obtained from Collection 9 of the MapBiomas Project (2024).

According to the Agribusiness Panel of Rio Grande do Sul (Leusin, 2024), soybean cultivation has expanded its area at the expense not only of livestock but also of other crops, such as corn. Data from the Municipal Agricultural Production survey (IBGE, 2023), presented in the Panel, reveal that the most significant increases in the area planted with soybeans in the state occurred in the Pampa, especially in the southeastern region, which recorded growth of 419.5% between 2010 and 2022, and in the southwestern region, with an increase of 250.1% in the same period. According to Oliveira (2021), between 2004 and 2019, the area allocated to agriculture in the Pampa increased by 8,085 km², with emphasis on the expansion of soybean cultivation, which grew by 7,360 km², representing an increase of 149%. In that same period, the area cultivated with rice remained relatively stable at around 5,350 km², while corn cultivation decreased by 44%, equivalent to 370 km². In the last two decades, there has been a reduction in the number of animals dedicated to beef cattle ranching in the state, which dropped from 14.7 million head of cattle in 2004 to 11.1 million in 2021, the lowest level in the historical series that began in the mid-1970s, which was reflected in a sharp decline in Rio Grande do Sul's share of national beef production (Leusin Júnior & Feix, 2023). Between 2004 and 2019, the cattle herd in the Pampa decreased by 1.5 million head, which accounts for more than half (55%) of the total reduction of 2.7 million head recorded across the entire state during the period (Oliveira, 2021). Antunes (2020), when evaluating the relationship between the increase in soybean production and the decrease in the cattle herd in the Pampa, found that for every 100 hectares cultivated with soybeans, there was an average reduction of 76 head of cattle.

In the last two decades, silviculture has become established as one of the main economic activities in the biome, especially with the cultivation of exotic species such as eucalyptus, pine, and black wattle, used in the production of paper, pulp, timber, and other derivatives. Since 2005, the state government of Rio Grande do Sul has been establishing government incentives for the development of planted forests, with the aim of transforming the economic matrix of the southern half of the state, historically focused on livestock, into a timber and pulp-producing region (Suertegaray & Silva, 2009).

In Rio Grande do Sul, silviculture occupies 9,269.59 km², of which 83% (7,726.20 km²) are located in the Pampa biome (MapBiomas, 2024a). Over four decades, the planted forest area in the biome increased significantly, from 441.76 km² in 1985 to 7,726.20 km² in 2023 (Figure 18), which corresponds to a percentage increase of 1,648% (MapBiomas, 2024a). This expansion occurred largely in native grassland vegetation areas (93.56%), mainly in the ecoregions of the Mixed Grasslands with Andropogoneae and Compositae in the Central Depression, and the Shrublands of the Serra do Sudeste (Mengue et al., 2020), the former already severely converted by agriculture and the latter widely recognized for their high diversity and floristic endemism (Torchelsen et al., 2020).

Figure 18. Evolution of the silviculture area (km²) in the Pampa between 1985 and 2023.



Source: Data obtained from Collection 9 of the MapBiomas Project (2024).

Moreover, the consequences of converting large areas of native grasslands into soybean and eucalyptus monocultures may go beyond environmental problems, resulting in social and economic effects, as it leads to the replacement of sustainable practices such as livestock farming on native grasslands, altering traditional ways of life, reducing the diversity of economic activities and food security (Suertegaray & Silva, 2009; Ribeiro & Quadros, 2015). In this regard, it is necessary to strengthen public policies for the

protection of native grasslands, especially in the Central Depression and Serra do Sudeste, regions closest to industrial plants and under pressure from the cultivation of eucalyptus and soybean monocultures.

4.1.2. Legality of native vegetation suppression in the Pampa biome

According to the LPVN, the replacement or compensation for vegetation suppression for UAS is required only for forest environments, with no express mention of grassland environments (art. 26.3.II and 26.4.II), which indicates the need to advance this regulation, under penalty of differentiated and unjustified treatment regarding the forest phytophysiognomies present in the biome.

In compliance with Federal Law, Cema - RS establishes that the suppression of native vegetation for UAS will depend on the registration of the property in the CAR and prior authorization from the OEMA. Furthermore, regarding the grasslands of the Pampa biome, state regulations establish the need for prior authorization for UAS in remaining areas of native vegetation and in "rural areas consolidated by native vegetation suppression with pastoral activities," that is, areas with livestock activity disregarded as remnants of native vegetation. In addition, the state law determines that the producer is responsible for prioritizing, for conversion, areas with the presence of exotic herbaceous species and, for maintenance, areas of remaining native vegetation, so as to allow the formation of ecological corridors between RLs and APPs (Figure 19).

It is further noted that the activities exempt from the issuance of ASV/UAS by Cema - RS (art. 219) provide for the maintenance of the native grassland base and, for this reason, do not characterize vegetation suppression, contributing to the continuity of productive activities in line with the conservation of the Pampa. Included among such situations are the introduction of herbaceous forage species (exotic or native) for pasture enrichment, mowing for biomass reduction, and clearing of successor native vegetation formed by pioneer tree and arborescent species. Considering that grazing aligns with the preservation of grasslands, pastoral activities in extensive systems are also exempt from the issuance of ASV/UAS when practiced on areas of remaining native vegetation or in rural areas consolidated by native vegetation suppression with pastoral activities, practices likewise permitted in APP and RL, conditioned to good environmental practices and registration in the CAR.

Figure 19. Suppression of native grasslands using agricultural machinery on a rural property located in the municipality of Arroio Grande, RS, in an ecotone area between the Shrublands and the Mixed Fields of the Eastern Crystalline ecoregions.

Author: Fábio Piccin Torchelsen.

However, the suppression of native vegetation in the Pampa still presents some significant challenges. One of them is the absence of regulatory provisions for environmental compensation and/or replacement in cases of suppression of grassland vegetation. Considering this aspect, Sema Normative Instruction No. 1, 30 November 2018, establishes procedures to be observed for Mandatory Forest Replacement (RFO) in RS resulting from the suppression of native vegetation in the Atlantic Forest and Pampa biomes. The NI provides for three types of forest replacement: environmental compensation by equivalent area, by seedling planting, and, in cases of public utility, by conversion into projects.

In this regard, although Sema NI No. 1/2018 establishes that RFO should preferably occur by allocating an area equivalent to the one suppressed, located in the same watershed and with the same ecological characteristics of the biome, this provision has not been applied to the Pampa grasslands. This is due to the waiver of RFO for cases in which the suppression of native vegetation does not generate woody raw material in forest environments (art. 4.3). Thus, in native grassland areas with sparse tree vegetation, the application of woody component compensation predominates, with no regulation for compensation or replacement for the suppression of the Pampa native grasslands.

Since tree seedling planting compensation and environmental compensation by conversion into projects are not applicable to grasslands, both of which depend on calculations based on suppressed woody material, no form of compensation for the suppression of native grasslands has been carried out within the administrative licensing procedure in the state. Thus, although there are administrative procedures and guidelines for technical compensation projects resulting from the suppression of native vegetation, these have not been applied according to the phytophysiognomic and ecological characteristics of the Pampa grasslands.

It is worth noting that the aforementioned Normative Instruction provides, within the scope of environmental compensation by equivalent area, for the possibility of establishing Environmental Easement in perpetuity (recorded in the property deed) or Private Natural Heritage Reserve (RPPN), as well as the acquisition and donation to the government of an area located within a legally established UC that is still pending land regularization (art. 8.1 and 8.2). Therefore, the application of environmental compensation in suppressed grassland environments in the Pampa biome can contribute to promoting instruments to safeguard native grasslands in the form of allocating protected areas.

Regarding environmental compensation, a new instrument was proposed by State Decree No. 52431/2015, which, among other provisions, establishes environmental compensation in an area equivalent to 20% of the sum of the areas declared as consolidated by suppression of native vegetation with pastoral activities and of remaining native vegetation, including APP, RL, AUR, and administrative easement areas. The decree also provides for a new timeframe for regularization purposes. According to the text, the situation of properties located in the Pampa that carried out suppression without authorization until 25 May 2012 is considered regular. After being challenged in a Public Civil Action, the effects of the decree were suspended by a court injunction, currently maintained by the Justice Court of RS. Given the accelerated conversion of native grasslands observed in the biome, such proportional (not equivalent) compensation, if established, will be insufficient to maintain the appropriate percentage balance of remaining Pampa areas, resulting in a growing decline of grasslands in the biome.

To analyze the legality of vegetation suppression in the biome, it is pertinent to conduct a comparative analysis between Prodes/Inpe data and the Vegetation Suppression Authorizations (ASVs) issued. The cross-check of suppression increment data detected by Prodes/Inpe in the biome between 2018 and 2022 and the ASVs/UASs databases issued by Fepam, at the state level, and by Ibama, at the federal level, indicates that 94% of vegetation loss may have occurred without valid authorization (ICV, 2024) (Table 4). For the analyzed period, the year 2021 recorded the largest suppressed area, totaling 152,657.26 hectares, of which 143,482.51 hectares (94%) may have been illegal.

These data indicate potential shortcomings in the full integration of federal and state data into Sinaflor, as well as the need to strengthen public policies aimed at command, control, and encouraging the legalization of suppressions. It is worth noting that the Online Environmental Licensing System (Sol), from Sema - RS, recognizes, under the

scope of “authorizations for native vegetation suppression in the Pampa biome for UAS” (code 10740.00), the so-called “authorizations for the use of irregularly converted areas” (code 6511), which are based on regularized illegal suppression areas. Considering that the methodology used by ICV does not differentiate between the types of authorization granted, the percentage referring to vegetation loss without prior authorization may be underestimated.

Table 4. Authorized and unauthorized (illegal) suppression of native vegetation in the Pampa biome, result of the cross-check between the Prodes-Pampa database (2018-2022) and federal and state ASVs/UASs.

YEAR	AUTHORIZED DEFORESTED AREA		UNAUTHORIZED DEFORESTED AREA	
	Hectares	%	Hectares	%
2018	3,760.92	4.10	88,015.73	95.90
2019	5,338.89	5.20	97,401.06	94.80
2020	5,850.62	6.58	83,011.35	93.42
2021	9,174.75	6.01	143,482.51	93.99
2022	3,783.60	5.01	71,741.64	94.99
TOTAL	**27,908.78**	**5.46**	**483,652.29**	**94.54**

Source: Instituto Centro Vida – ICV (2024).

4.1.3. Weaknesses in environmental legislation and in enforcement and monitoring actions

Pending regulations related to the use and conservation of the Pampa, combined with weaknesses in sectoral policies and in instruments and procedures related to licensing, enforcement, and environmental monitoring, have favored the increase in the rates of native vegetation suppression in the biome. Gaps in infra-legal regulations, such as decrees, resolutions, ordinances, and normative instructions, have had practical implications on administrative procedures carried out by environmental agencies of different federative entities, affecting licensing, authorization, enforcement, and monitoring actions in grassland and forest areas of the Pampa. In this sense, identifying and discussing the main factors conditioning the suppression and degradation of native vegetation in the biome, as well as strategic agendas for the conservation of species and ecosystems, are essential for proposing legal improvements, as well as public policies, plans, programs, and projects.

4.1.3.1. Regulation of the use and conservation of the Pampa biome

Since the recognition of the Pampa as a biome by IBGE in 2004, and Constitutional Amendment No. 48/2005, which included in the Constitution of the State of RS the duty of the government to value and preserve the Pampa, the biome remains poorly protected by specific provisions in federal and state legal regulations. In this sense, it is worth highlighting the importance of regulating art. 203 of State Law No. 15434/2020, still pending implementation, which provides for the legal definition of the biome's characteristics and the detailing of aspects related to conservation. The regulation of this article is crucial to ensure the sustainable development of the biome, maintaining the landscape, biodiversity, ecosystem services, water regime, human health, and social stability, and, therefore, economic activities in line with the ecological and cultural vocations of the biome.

In this sense, Federal Law No. 11428/2006 and its regulatory decree (Decree No. 6660/2008) are successful models in regulating the use and conservation of remnants of native vegetation of the Atlantic Forest biome, the most degraded in the country. This regulation represents a milestone in reducing deforestation rates from 6500 km²/year in 2006, the year the law was implemented, to 765 km² in 2023, the last year of the historical series, an 88% reduction in annual deforestation in less than two decades (Prodes, 2024). One of the determining factors for this reduction is the proposal of a percentage balance of remnants by the set of provisions of the legal regime instituted by both the law and the decree, which should be considered in the regulation of the Pampa.

To this end, two instruments for maintaining native vegetation should be observed within the scope of licensing or authorization of enterprises and activities: the percentage of native vegetation to be maintained at the intervention site, applicable to urban areas and metropolitan regions, ranging from 50% to 30% (art. 30 and 31), and environmental compensation by an area equivalent in ecological and percentage terms to the suppressed area, applicable to both rural and urban areas. Thus, in rural properties, the provision for maintaining the Legal Reserve (RL) and the Permanent Preservation Areas (APPs), combined with compensation by equivalent area, ends up establishing, in theory, a percentage balance between losses and gains of native vegetation areas. Therefore, given the increasing loss of grassland vegetation in the Pampa, the instrument of environmental compensation brings strategic reasonableness for maintaining native grasslands in private properties located in rural areas of the biome. It also has great potential for maintaining a minimum percentage balance of remnants of native vegetation in each ecoregion, and should be considered in the regulation of the use and conservation of the biome.

Beyond compensation by equivalent area, it is essential to establish a remaining percentage of native vegetation to be maintained per enterprise or licensed activity, similar to that established by Federal Law No. 11428/2006. In this sense, the Technical Report of the Southern Grasslands Working Group, instituted by Sema-Fepam Ordinance No. 12/2019, entitled "Guidelines and criteria for the authorization of suppression

of Grasslands of Rio Grande do Sul," from September 2020 (Sema - RS, 2020), was pioneering in suggesting the formal recognition of the grassland phytophysiognomies of RS, using geospatial information as a subsidy for analyzing suppression requests submitted to the OEMA.

The report proposes the conservation of minimum percentages of remnants of native grasslands in each rural property, subject to suppression requests, in addition to the 20% RL area and the APPs provided for by Federal Law No. 12651/2012, ranging from 9% to 30%, established according to the conservation status of each ecoregion. For the purpose of issuing ASV/UAS, the report proposes verifying the location of the property (local scale), the ecoregion in which it is located (regional scale), and the minimum grassland area that must be maintained, respecting the RL and the APPs. The vegetation cover report must indicate the occurrence of endangered species, so that measures can be taken to avoid negative impact, adjusting the suppression limits (mitigation) or denying the request. In addition to the presence of endangered species, the report suggests verifying the incidence on polygons of the Map of Priority Areas for the Conservation, Sustainable Use, and Sharing of Benefits of Brazilian Biodiversity (updated by MMA Ordinance No. 463, 18 December 2018) and observing the areas relevant to the conservation of threatened fauna, soils, and water resources.

However, the evaluation of the successional stage of the vegetation, fundamental for characterizing ecologically equivalent areas for mitigating environmental impacts of enterprises and activities, is particularly complex when applied to grassland ecosystems (see Conama Resolution No. 417, 23 November 2009, for Restinga grasslands, and Conama Resolution No. 423, 12 April 2010, for Highland Grasslands). It is worth noting that there are currently no infra-legal regulations establishing the successional stages of the Pampa grassland ecosystems. It is of utmost importance that such regulations consider a list with indicator plants of conserved grasslands of the biome, establishing sustainable activities that can be developed on these grasslands, as well as objective criteria for grassland restoration and environmental compensation (Rolim et al., 2024). Thus, the regulation of art. 203 of State Law No. 15434/2020 presents particular challenges to be overcome for safeguarding the last fragments of native grasslands of the most severely converted or degraded ecoregions of the Pampa.

4.1.3.2. The issue of Consolidated Rural Areas and the Rural Environmental Registry in the Pampa biome

Recent changes introduced by State Decree No. 52431/2015 and State Law No. 15434/2020 have been the subject of controversy, largely related to the concept of consolidated rural area and its implications for the Rural Environmental Registry (CAR) of properties located in the Pampa biome. Federal Law No. 12651/2012 defines consolidated rural area as a rural property area with anthropic occupation existing prior to 22 July 2008, with buildings, improvements, or agrosilvopastoral activities (art. 3.IV), which must be declared at the time of registration of the property in the CAR, with implications for a series of provisions that establish the regime of RL and APP.

The assumption that pastoral activities do not maintain grassland vegetation has been considered mistaken by the scientific community, based on evidence that the plants that make up these grasslands coevolved with large herbivores, showing, for the most part, adaptations that allow their persistence under pastoral management (Baggio et al., 2021). Scientific literature indicates that the vegetation of the Southern Grasslands requires an adequate disturbance regime for biodiversity maintenance, which includes fire and grazing by domestic animals, enabling the reconciliation of economic activities with the maintenance of biodiversity and ecosystem services (Ferreira et al., 2020; Overbeck et al., 2023).

However, State Decree No. 52431/2015, which addresses the implementation of the CAR in RS, divides the concept of consolidated rural area into two distinct types: "consolidated rural area by suppression of native vegetation for alternative land use" and "consolidated rural area by suppression of native vegetation with pastoral activities" (art. 5.I and II). The first concept defines "areas with anthropic occupation existing prior to 22 July 2008, where there was cutting, destruction, uprooting, desiccation, devitalization by any means, or any other practice that promotes the conversion of land use, with the exclusion of native species from the environment, for the purpose of introducing buildings, improvements, or agrosilvopastoral activities, admitting, in the latter case, the adoption of fallow regime." On the other hand, the second concept defines "areas with anthropic occupation existing prior to 22 July 2008, with pastoral activities where part of the native vegetation was maintained." The decree also defines a third concept essential for understanding the situation related to consolidated use and the CAR in the Pampa biome: "area of native vegetation remnant," absent in Federal Law No. 12651/2012, defined as "area covered by native vegetation of forest, grassland, or any other plant physiognomy, without anthropic occupation existing prior to 22 July 2008." Therefore, livestock activities existing prior to this cutoff date are considered consolidated and, consequently, disregarded as areas of native vegetation remnants, even when sustainable grassland management practices are adopted.

The notion of consolidated use of grasslands historically managed by livestock has direct implications for the application of Federal Law No. 12651/2012 in small and large properties located in the Pampa biome. According to the federal law, consolidated use exempts the maintenance, recomposition, and/or compensation of a 20% RL in rural properties of up to four fiscal modules that, on 22 July 2008, had an area smaller than the percentage required at the time, with the RL constituted by the area occupied with the native vegetation existing at that time, prohibiting new suppressions (art. 67). In RS, the size of the fiscal module varies from 10 to 40 hectares, depending on the municipality (Embrapa, 2024). Considering that in RS more than 60% of agricultural establishments have an area smaller than 20 hectares and 30% have an area between 20 and 100 hectares (Agricultural Census - 2017), it is expected that the majority of rural properties in the state are covered by the provision of art. 67 of the Native Vegetation Protection Law (LPVN).

In this sense, the interpretation that remnants of native grasslands under livestock management constitute consolidated areas compromises the maintenance of the said 20% RL in small properties in the Pampa.

Furthermore, it should be noted that, according to the LPVN, every property larger than four fiscal modules in the Pampa must maintain, as RL, 20% of native vegetation, grassland or forest. However, this provision has been questioned based on art. 68 of the LPVN, which establishes that owners or possessors of rural properties who suppressed native vegetation respecting the RL percentages provided by the legislation in force at the time the suppression occurred are exempt from promoting recomposition, compensation, or regeneration for the percentages required in Federal Law No. 12651/2012. Although the general concept of RL was already present in the Forest Code of 1934, its first concrete mention only appears in the Forest Code of 1965, through an amendment introduced by Federal Law No. 7803/89. Only with a new amendment to the Forest Code of 1965, introduced by Provisional Measure No. 2166-67 of 2001, does the first express mention of the maintenance of RL in non-forest environments occur throughout the national territory.

Five years after State Decree No. 52431/2015, the distinction of consolidated areas was incorporated into the new Cema - RS (State Law No. 15434/2020), expanding the concept of consolidated rural area by suppression of native vegetation with pastoral activities to include buildings, improvements, and agrosilvopastoral activities, and therefore covering agricultural and silvicultural activities (art. 2.III and IV). The conceptual differentiation proposed both in State Decree 52431/2015 and in State Law No. 15434/2020 implies a reduction in environmental protection in the Pampa, resulting in intensified land use and biodiversity loss, compromising the biome's ecological integrity.

State Decree No. 52431/2015 was challenged in a Public Civil Action filed by the State Public Prosecutor's Office (MPRS), and a court injunction, upheld by the RS Court of Justice, maintains that native grasslands under grazing constitute remnants of native vegetation of the Pampa biome and must be recorded as such in the CAR, ensuring the Legal Reserve (RL) (Overbeck et al., 2023). Recently, on 28 January 2025, this understanding was consolidated in an agreement between the MPRS, the state of RS, the Federation of Agriculture of RS (Farsul), the Federation of Rice Growers Associations of Rio Grande do Sul (Federarroz), and the Federation of Agricultural Workers in RS (Fetag), signed at the Regional Environmental Court of Porto Alegre and incorporated into the records of the aforementioned Public Civil Action. With the agreement, the parties recognize that extensive grazing management does not constitute consolidated use of native grassland areas. However, consolidating the terms of the agreement still represents an immense challenge, given the need to adapt the provisions of the Cema - RS and to regulate, by act of the state environmental agency, the consolidated use by anthropization of native vegetation with replacement by invasive exotic species. Another challenge is the review, during CAR analysis, of areas registered as consolidated by grazing activity, which may require reclassification as remnants of native vegetation.

4.1.3.3. Pending regulation of forestry and its impact on the natural grasslands of the Pampa biome

Environmental regulations for silvicultural activities in RS have undergone major changes over the last two decades. The first state ZAS originated from a public civil action filed by the Public Prosecutor's Office in 2006, which resulted in the discussion and approval of Consema Resolution No. 187 of 9 April 2008. The ZAS established restrictions on the size of forest stands according to ecologically pre-established limits for each Natural Landscape Unit (UPN), established based on the integration of geomorphology, original potential vegetation, soil, and altimetry data. It also established the periodic review of databases for fauna, flora, water resources, and environmental vulnerability studies for each UPN.

In 2018, studies were initiated for the update and implementation of a new ZAS, with the first stage being the assessment of water availability and, in 2019, the updating of biodiversity data, culminating in the publication of Consema Resolution No. 498 of 14 September 2023, applicable both to new plantings and to the renewal of existing forest plantations. The new resolution requires an environmental license for the establishment and operation of new silvicultural enterprises, considering the respective classifications of size and polluting potential of the species (low, medium, or high) (art. 5). It also stipulates that the use of any exotic species without classification in the linked sectors must undergo an environmental feasibility analysis by the OEMA (art. 7), a highly important issue to prevent the introduction of invasive species in the state, as occurred with Pinus spp. (pine) and Hovenia dulcis (Japanese raisin tree), whose use was regulated only in the 2010s (Sema - RS Ordinance No. 79 of 31 October 2013; Sema - RS Normative Instruction No. 14 of 10 December 2014; and Consema Recommendation No. 7 of 18 June 2020). However, Consema Resolution No. 498/2023 still requires improvements in identifying the resilience limits of grassland ecosystems and in monitoring threatened species impacted by forest stands.

With the approval of Bill 1366/2022 in the Senate, the federal government enacted Federal Law No. 14876 of 31 May 2024, which excludes silviculture from the list of potentially polluting activities and users of environmental resources, amending Federal Law No. 6938/1981 (Mapa, 2024). As a result, environmental licensing for plantations was simplified, and the forestry sector was exempted from paying the Environmental Control and Enforcement Fee (TFCA). The OEMA of RS continues to apply the provisions of State Law No. 14961 of 13 December 2016 (State Agricultural Policy for Planted Forests and Their Products), Consema Resolution No. 372/2018, and Consema Resolution No. 498/2023, among other associated infralegal regulations, which require licensing and compliance with environmental criteria for the establishment and regularization of plantations. However, the future of administrative procedures related to silviculture in the state is uncertain and, depending on developments, may have implications for the conservation of the Pampa biome (Figure 20).

Figure 20. Landscape marked by forestry management of pine and eucalyptus in the Shrublands ecoregion, southern region of the Serra do Sudeste, in the municipality of Pinheiro Machado, RS.

Author: Fábio Piccin Torchelsen.

4.1.3.4. Protection of wetlands

Wetlands were defined by the first Cema - RS (State Law No. 11520/2000) as "extensions of land normally saturated with water where typical fauna and flora develop" (art. 14.XIV). The law differentiates wetlands from flood-prone areas, defined as "areas or land temporarily saturated with water resulting from rainfall, due to poor drainage," for which subdivision of the area is permitted for purposes of urban expansion (art. 14.VI and art. 192.IV). The reference to hydromorphic soils remains implicit in the concept of wetland established by the law, while there is an explicit mention of the biota as a defining element of these environments. Pioneeringly, the law establishes three instruments for the protection of wetlands. First, these ecosystems are included among the Special Use Areas, along with estuaries, lagoons, and the state coastal plain, among other areas and assets protected by the government, thus recognized as objects of special protection (art. 51). They are also considered Permanent Preservation Areas (APPs) in the state of RS (art. 155.VI), and finally, they are defined as environments to be specially protected in the Coastal Zone, when used as feeding, breeding, shelter, and refuge areas for native fauna species, whenever so defined by Fepam, with only uses that ensure their conservation being permitted (art. 241.IV).

Also regarding the differentiated treatment of wetlands and other humid areas, the law establishes that, within the scope of granting and licensing processes for the use of surface or groundwater that may affect wetlands, the maintenance of adequate historical average levels for sustaining aquatic life in these ecosystems and for public supply must be obligatorily considered (art. 123.IV). Therefore, the former Cema - RS introduced a series of provisions for the protection of wetlands in the state, partially maintained in the following years.

Fifteen years after the publication of the said law, State Decree No. 52431/2015 maintains, for purposes of registering rural properties in the CAR, a dual characterization of wetlands, defining them based on soil and biota. Thus, wetlands are defined as "extensions of land with soils naturally flooded or saturated with water for a period of not less than 150 days per year, continuous or alternating," excluding ephemeral situations, which are characterized "by flooding or soil saturation by water only during or immediately after periods of rainfall" (art. 6). Ephemeral situations are therefore equivalent to the flood-prone areas defined by State Law No. 11520/2000. A list of organisms associated with wetlands is established by the decree, limited to 12 flora species and 12 fauna species, establishing the need to verify the spontaneous occurrence of at least one flora species and the regular occurrence of at least one fauna species (only as auxiliary) for the purpose of characterizing these environments.

The definition of a minimum period of flooding or water saturation, although artificial, brings objectivity to the characterization of wetlands through geospatial tools, especially for the purposes of registration, evaluation, and validation of the CAR. However, the absence of records in areas registered in the Sicar does not eliminate the need for a detailed verification of the occurrence of these ecosystems in licensing processes, which includes the requirement for field studies. Climate change and sporadic El Niño/La Niña events have subjected a number of humid environments to periods of prolonged drought, a factor to be considered when analyzing criteria solely based on time, which reinforces the need for soil analyses and on-site verification of plant groups typical of humid areas, endowed with adaptations to water stress, such as cyperaceae, droseraceae, and juncaceae, as provided in the aforementioned decree. It should be noted that wetlands host a number of rare, endangered, or even migratory fauna species that use these environments occasionally, periodically, or permanently for watering, foraging, resting, sheltering, or reproduction, and that are particularly sensitive to human interventions, such as drainage, landfills, and fires.

With the publication of the new Cema - RS (State Law No. 15434/2020), the conceptual definition of wetlands was significantly enhanced, and wetlands are now defined as "humid ecosystems characterized by hydromorphic soils naturally flooded or saturated with water periodically, excluding ephemeral situations, where typical fauna and flora develop, with characteristics and peculiarities defined in regulation" (art. 2.XIII). Thus, they gain legal recognition as an ecosystem and, beyond the associated biota, are expressly defined by hydromorphic soils. The wetland protection instruments referred

to in State Law No. 11520/2000 were maintained (art. 117, 144, and 208.IV), except for classification as a Special Use Area.

Regarding wetlands located in urban areas, Consema Resolution No. 380, dated 13 September 2018, expands the classification criteria defined by State Decree No. 52431/2015, including, for characterization purposes, the presence of hydromorphic soils, the emergence of the aquifer saturation zone on the ground surface, and the occurrence of the gley horizon in the first 50 centimeters of soil (art. 3), requiring the report of legally qualified professionals (art. 5). These criteria present great potential for extension to wetlands located on rural properties in the Pampa biome, making the characterization of these environments more objective, beyond fauna and flora inventories.

Despite the ecological importance and legal advances in wetland protection, the absence of on-site inspections can hinder the identification of these ecosystems in licensing or environmental authorization processes. When preserved, wetlands are often impacted by disturbances such as landfills, drainage, fires, or desiccation by herbicides, the latter caused by drift from aerial spraying in adjacent agricultural crops. In this sense, it would be important to advance public policies that ensure the establishment of a protection strip composed of native vegetation, whether arboreal, arborescent, or grassland, as a Permanent Preservation Area (APP), for wetlands located on rural or urban properties, similar to what is established by Federal Law No. 12651/2012 for veredas, ecosystems typical of the Cerrado biome.

4.1.3.5. Environmental enforcement in the Pampa biome: challenges and opportunities

Of fundamental importance in analyzing the effectiveness of environmental enforcement in combating deforestation in Brazilian biomes is the distribution of responsibilities among federal entities for the licensing or authorization of enterprises or activities involving the management or suppression of vegetation in urban and rural environments. These responsibilities were essentially established by Complementary Law No. 140/2011 and encompass the entirety of the licensing or authorization administrative procedure, linking the federal entities to environmental compensation, the regularization of illegal suppressions, environmental enforcement and monitoring, and, consequently, the administrative process for investigating related infractions. Different realities in terms of human, logistical, economic-financial, and technological resources, as well as training and appreciation of inspectors, condition greater or lesser effectiveness in controlling the suppression of native vegetation, according to historical and political circumstances.

Over the last four decades, the states have been assigned the largest share of enforcement related to the control of deforestation and fires (see Conama Resolution No. 1, of 23 January 1986; Conama Resolution No. 237, of 19 December 1997; and Complementary Law No. 140/2011). State entities, through the State Environmental Councils, define and regulate enterprises or activities that cause or may cause environmental impact at the local level, considering the criteria of size, polluting potential, and nature of the activity

(art. 9.XVI of Complementary Law No. 140/2011). In addition to occasional changes in infra-legal regulations, administrative actions (powers) assigned to the states are constantly delegated, through agreements, to municipal entities, on the condition that the municipality has an environmental agency with capacity and a Municipal Environmental Council (art. 5). It is worth noting that delegation must consider the existence of a qualified environmental agency, with its own or consortia technicians, duly trained and in a number compatible with administrative demand.

In addition to verifying the responsibilities assigned to the entities, whether primary or delegated by agreements, a detailed study of infra-legal regulations (decrees, resolutions, ordinances, normative instructions, among others) established by State Councils and by OEMAs is of utmost importance for a better understanding of the conditioning factors of native vegetation suppression in Brazil. It is also essential for proposing improvements that reduce suppression rates, degradation, and indiscriminate regularizations.

Complementary Law No. 140/2011 defines, among its fundamental objectives, the promotion of decentralized and efficient environmental management, as well as the harmonization of policies and administrative actions to avoid overlapping actions between federal entities, in order to avoid conflicts of responsibilities and ensure efficient administrative action (art. 3.I and III). In this sense, the scope of administrative actions of each federal, state or municipal agency related to environmental licensing or authorization and to the enforcement of management and suppression of native vegetation is defined according to territorial factors, the nature of enterprises or activities (military, nuclear, and others), and the scope of impact (local, state, or regional). The complementary law also establishes the possibility of institutional cooperation instruments between federal entities, such as public consortia, agreements, technical cooperation agreements, and delegation of responsibilities and administrative actions (art. 4), eventually established to increase or even enable actions related to environmental licensing and enforcement.

Among the administrative enforcement actions of the Federal Government provided for by the aforementioned complementary law, the approval of the management and suppression of vegetation in federal public forests, federal unallocated lands, or UCs established by the Federal Government (except in APAs, to which the criterion of the establishing authority does not apply) and in activities or enterprises licensed or environmentally authorized by the federal government stands out (art. 7.XV). As highlighted in this PPCD, the areas (land categories) under Union enforcement account for less than 3% of the total area of the Pampa biome, with suppression rates insignificant when compared to areas under private domain. In this sense, it is up to the states and municipalities to enforce almost the entire territorial area of the biome, approving the management and suppression of vegetation in public forests and unallocated lands under their domain, as well as in UCs and enterprises licensed or environmentally authorized by these entities (art. 8.XVI and art. 9.XV). The states have the primary responsibility to approve the management and suppression of vegetation in rural properties, subject to the powers of the federal government.

In Brazil, enterprises and activities must be licensed or authorized by a single level (federal, state, or municipality), and the resulting vegetation suppression must be authorized by the licensing authority. In the Pampa biome, which does not have a specific law regulating its use and conservation, the municipal environmental agency is, as a rule, responsible for authorizing the suppression of native vegetation only in urban areas, as defined by the Master Plan or an equivalent instrument. Suppression in rural areas is authorized by the municipal authority only when associated with an enterprise or activity of local impact to be licensed, according to the types defined in Annex I of Consema Resolution No. 372/2018. This does not apply to disjunctions, enclaves, and associated ecosystems under the scope of the Atlantic Forest Law (Federal Law No. 11428/2006), which is more restrictive, except for enterprises and activities of local impact, provided that the respective municipalities have an agreement delegating authority with the state, with state authority prevailing in all other cases. Thus, according to the resolution, the suppression of native vegetation for UAS in rural areas of the Pampa (Codram No. 10740.00) is licensed by the state, while in urban areas it is licensed by the municipality (Codram No. 10740.20). Intervention and/or suppression of native vegetation to carry out low-impact activities in APP in the Pampa also requires municipal-level licensing (Codram 10740.10).

As the division of urban and rural zones has taken on a predominant role in environmental licensing since Federal Law No. 11428/2006 and Complementary Law No. 140/2011, the last decade has seen a growing influence of the topic in debates regarding the expansion of urban polygons in the context of revising the Master Plans of municipalities located in the Pampa biome. Such changes, in many cases, aim to influence the environmental authority of these entities, under the argument of excessive restrictions and lack of promptness by the OEMA, a particularly sensitive topic in the context of deforestation control.

It should be noted that the primary authority to oversee and investigate any infractions related to licensed or authorized enterprises and activities does not prevent the issuance of notices and the investigation of potential infractions by other federal entities, with the notice issued by the agency responsible for licensing or authorization prevailing (art. 17). In RS, State Law No. 10330/1994, which establishes the State Environmental Protection System (Sisepra), defines as executing agencies a wide range of agencies responsible for managing natural resources, including Sema - RS, Fepam, and the Military Brigade, sometimes with the joint action of the Criminalistics Department of the General Institute of Forensics (IGP-RS), the Federal Police (PF), and the Federal Highway Police (PRF). It is also important to highlight the increasing role of the Environmental Command of the Military Brigade (CABM) in monitoring environmental violations in the state, although mostly in the gaucho plateau region, in areas of the Atlantic Forest biome (Operation Green Force).

On the other hand, violations involving fires are monitored and investigated by Fepam, CABM, and the Military Fire Department of Rio Grande do Sul (CBMRS). Complementary Law No. 14920, of 10 August 2016, establishes, among the CBMRS's responsibilities, to

monitor activities that pose a risk to the environment, as well as to conduct investigations of fires and accidents, respecting the authority of other agencies (art. 3.V and VI).

In this context, given the recognized deficits in terms of resources and structure of the executing agencies, action through joint operations presents great potential in combating the suppression of native grasslands and forest remnants in the Pampa biome. Command-and-control operations have proven highly effective in combating deforestation in Brazilian biomes, as seen in the Amazon biome, where deforestation dropped by 83% between 2004 and 2018, according to Prodes/Inpe data, coinciding with the intensification of operations defined from the early phases of the Action Plan for Deforestation Prevention and Control in the Legal Amazon (PPCDAm).

Given the need for enforcement operations to suppress native grasslands on rural properties in RS, Ibama-RS Superintendence has conducted, since 2013, Operation Campereada, which focuses on the largest polygons of suppression and degradation of native grasslands in the Pampa and Atlantic Forest biomes. By mid-2023, the operation had already embargoed about 21,000 hectares and issued around BRL 35 million in fines across RS (Ibama/Communications). Joint action in the Pampa biome is justified based on the principles of integrated planning and intersectoral coordination, which govern the organization and operation of Sisepra (State Law No. 10330/1994, art. 4) and presents great potential for controlling native vegetation suppression in the Pampa.

4.1.3.6. Threatened or regionally extinct species in the Pampa biome

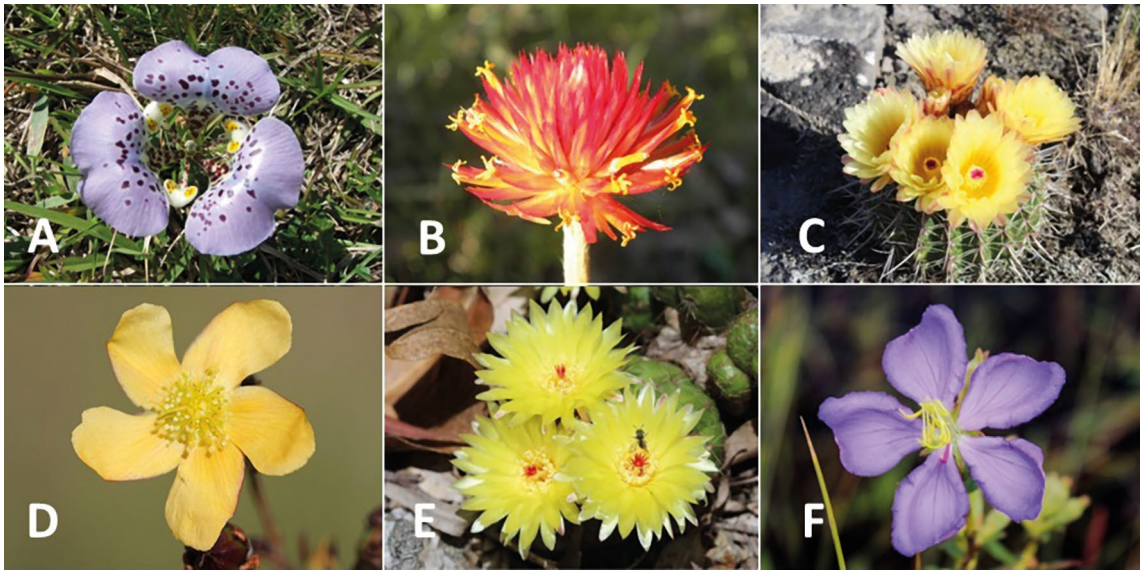
Another duty common to all federal entities, established by Complementary Law 140/2011, is to prepare the list of fauna and flora species that are threatened with extinction or regionally extinct within their respective territories. In addition to serving as a basis for public conservation policies directed at threatened species, the official lists qualify the administrative procedure for assessing the ASVs/AUAs, as well as the enforcement actions of federal entities, serving as the basis for aggravating infractions involving these species and irregularly converted areas. Thus, they are of significant importance in controlling the suppression of native vegetation and in restoring degraded ecosystems of the Pampa biome.

Considering the commitments assumed by Brazil under the CBD, as well as the principles and guidelines for implementing the National Biodiversity Policy, provided in Decree No. 4339, of 22 August 2002, and Decree No. 4703, of 21 May 2003, the government enacted MMA Ordinance No. 43, of 31 January 2014, which created the National Program for the Conservation of Threatened Species (Pro-Species). The program's main objective is to adopt preventive, conservation, management, and administrative actions aimed at minimizing threats and the risk of extinction of Brazilian species. Among the tools of the Pro-Species Program are the Official National Lists of Threatened Species, the National Action Plans for the Conservation of Threatened Species (PAN), and databases and information systems designed to support extinction risk assessments (art. 3). The ordinance provides for the annual update of the national lists by the MMA based on

the conservation status assessments of Brazilian fauna and flora species (art. 6.4). In this context, the federal government established the Official National List of Flora Species Threatened with Extinction, through Ordinance No. 443, of 17 December 2014, and the Official National List of Fauna Species Threatened with Extinction, through MMA Ordinance No. 444, of 17 December 2014, both updated in their most recent versions by MMA Ordinance No. 148, of 7 June 2022, which includes 3209 threatened flora species and 764 fauna species, including restrictions on the collection, transport, processing, storage, and handling of these species.

At the state level, the most recent versions of the lists are contained in State Decree No. 51797, of 8 September 2014, which declares the List of Wild Fauna Species Threatened with Extinction in the State of Rio Grande do Sul, and State Decree No. 52109, of 19 December 2014, which declares the List of Flora Species Threatened with Extinction in the State of Rio Grande do Sul, thus not updated for a decade (Figure 21). These lists make no mention of the area, biomes, or municipalities where the species occur, which hinders their application by municipal agencies. These decrees were amended in 2018, providing for a biennial review for both lists, which had not occurred by the preparation of this PPCD (State Decree No. 53902, of 30 January 2018; and Decree No. 54171, of 30 July 2018, respectively).

Figure 21. Some threatened grassland species in the state of Rio Grande do Sul, according to State Decree No. 52109, 19 December 2014, occurring in the Pampa biome. *A. Kelissa brasiliensis* (Baker) Ravenna (Iridaceae), Vulnerable; B. *Gomphrena sellowiana* Mart. (Amaranthaceae), Critically Endangered; C. *Parodia mammulosa* (Lem.) N.P.Taylor (Cactaceae), Endangered; D. Hypericum *teretiusculum* A. St.-Hil. (Hypericaceae), Vulnerable; E. Parodia ottonis (Lehm.) N.P. Taylor (Cactaceae), Vulnerable; F. *Tibouchina asperior* (Cham.) Cogn (Melastomataceae), Endangered.



Author: Fábio Piccin Torchelsen.

It is worth highlighting the growing importance of the lists published by municipal entities in the Pampa biome. Recently, the List of Threatened Species of Native Flora of State Decree No. 52109/2014 was published, with natural occurrence in the municipality of Porto Alegre (Comam Resolution No. 2, of 5 January 2024), which is located in an ecotone area between the Pampa and Atlantic Forest biomes. The resolution presents major advances regarding the characterization of the biome in which the species occur, by citing the biological form (herb, shrub, etc.) and the habitat (grassland or forest), assisting in the operationalization of the lists within the scope of environmental administrative procedures.

The lists of threatened species still require periodic updates consistent with the information constantly contributed by the scientific community, in order to speed up conservation measures. In this regard, an emblematic case is that of the Muñoa's Pampas Cat (Leopardus munoai) (Figure 22), a species described in 2020 from populations previously considered to belong to another threatened species, the Pampas cat (Leopardus colocola) (Pro-Carnívoros, 2024). The Muñoa's Pampas Cat is an extremely rare species, restricted to the Pampa biome, currently considered the most threatened feline on the planet, with no more than 50 individuals estimated in the wild (Menegassi & Santos, 2023; Pro-Carnívoros, 2024). However, this species is classified by the International Union for Conservation of Nature (IUCN) as "Near Threatened" (Lucherini et al., 2016). In Brazil, the species was listed as "Vulnerable," still under L. colocola (MMA Ordinance No. 148/2022), a category far too mild when considering the most recent data on the species. In the state list, it was classified as "Endangered," also under the previous name, an equally mild category, remaining as such since 2014. Critical conservation cases, such as that of the Muñoa's Pampas Cat, indicate the need for updates to the lists and the creation of more dynamic databases, in order to more quickly define priority areas for conservation and for combating the suppression of native vegetation in the Pampa biome.

Figure 22. Muñoa's Pampas Cat (*Leopardus munoai*), an endemic species of the Pampa biome and threatened with extinction, recorded in the Ibirapuitã Environmental Protection Area.

Author: Luíza Nicolini de Simoni.

4.1.4. Exploitation of mineral resources

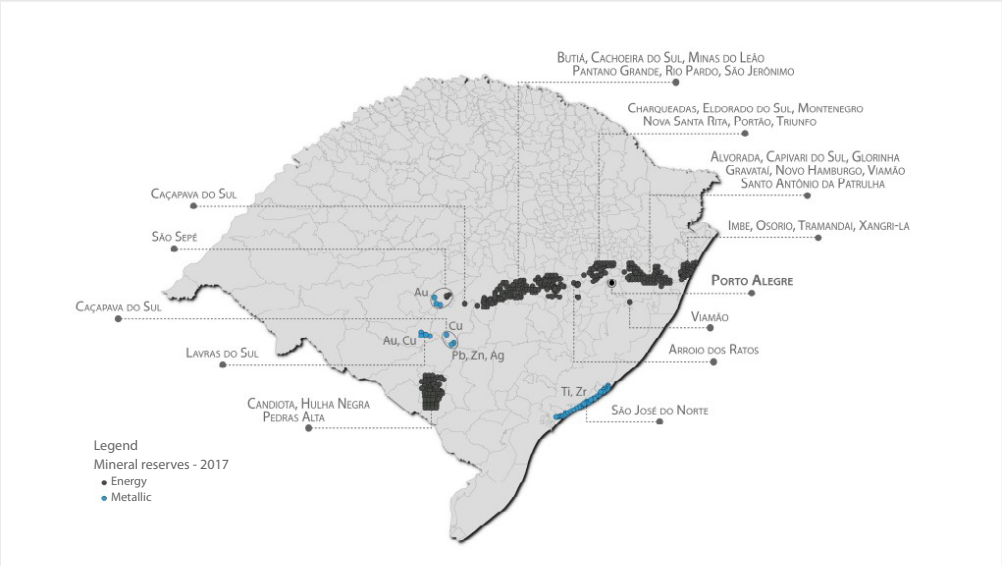
According to the Brazilian Mineral Yearbook (Brasil, 2023), referring to the base year 2021, the municipality of Caçapava do Sul (RS), in the Pampa, stands out as one of the main Brazilian mineral reserves of zinc, lead, and copper. Over the past two decades, this municipality, located in the Serra do Sudeste, in the Camaquã River basin, has been the subject of a plan to resume mineral exploitation in the Minas do Camaquã locality, in the Guaritas region. Considering its beautiful landscapes and geological heritage formed by the presence of the so-called Guaritas, geological formations that give the region its name, as well as hosting significant biodiversity, with a large number of endemic, rare, and threatened species, the region was included among the Priority Areas for Biodiversity Conservation of the Pampa Biome (MMA, 2018), being the target of federal and state projects for the establishment of protected areas and for stimulating sociobiodiversity products.

The implementation of infrastructure inherent to mining involves the suppression of native vegetation in the area of direct influence of the enterprise, as well as the introduction of invasive species and the suspension of large volumes of particulates in the area of indirect influence, due to the heavy truck traffic between mining hubs and ore outflow zones, particularly to the Port of Rio Grande. These issues are particularly

sensitive in the Shrubland Fields ecoregion, one of the most conserved and biodiverse in the Pampa biome, also sought after for the expansion of forestry activities in the state. It can also generate other forms of environmental degradation, such as changes in soil and water quality, affecting the hydrological regime of Camaquã River tributaries and potential contamination related to the lead and gold mining production chain, if improperly managed. Such pressures can be mitigated and compensated for by measures established during environmental licensing. However, mining activity in the region has been contested by PCTs, especially by family livestock farmers in the Alto Camaquã region, concerned about the proximity of the enterprises to the Camaquã River, the largest water body in the Serra do Sudeste, and to their traditional productive activities, which have conserved the biodiversity of the fields through the management of cattle, goats, and sheep (Committee of Traditional Peoples and Communities of the Pampa, 2018).

The Brazilian Mineral Yearbook points to 48 mining title grants throughout the state of RS (Brasil, 2023). In addition to zinc, lead, and copper exploitation, a series of mining enterprises are planned for the southern half of the state of RS, in the Pampa biome, including the extraction of coal, as well as phosphate, silver, and gold, among other metallic minerals. According to the State Mineral Yearbook - Rio Grande do Sul (Brasil, 2019), referring to the base year 2017, several metallic and energy mineral reserves have been sought for exploitation, especially in the southern half of the state. In this regard, besides the Caçapava do Sul region, there is gold mining in the municipality of São Sepé, gold and copper mining in Lavras do Sul, and more recently titanium and zirconium mining in São José do Norte, in the Coastal Plain of the state. Regarding coal exploitation in the biome, the regions of Butiá, Minas do Leão, Cachoeira do Sul, and Pântano Grande, in the Central Depression, in the Mixed Andropogoneae and Compositae Fields ecoregion, stand out. Another important coal mining region is concentrated in the municipalities of Candiota, Hulha Negra, and Pedras Altas, located in the Campanha Gaúcha, at the intersection of the Grassland Fields and Shrubland Fields ecoregions (Figure 23).

Figure 23. Location of metallic and coal reserves in Rio Grande do Sul.



Source: Adapted from the State Mineral Yearbook of Rio Grande do Sul - base year 2017.

According to the National Mining Plan - 2030 (Brasil, 2010), almost all coal produced in Brazil originates in the coal mining region of the states of Santa Catarina and Rio Grande do Sul and, despite its low calorific value, is basically intended for thermoelectric power generation. In 2008, national production was 6.5 million tons, of which 53% was extracted in RS (PNM 2030). According to the report Mining in Rio Grande do Sul: sectoral diagnosis and vision of the future, the state concentrates approximately 89% of Brazilian coal reserves, divided mainly into two carbo-chemical complexes, the Campanha and the Baixo Jacuí, both in the Pampa biome and in the ecotone region with the Atlantic Forest biome (Rio Grande do Sul, 2018). Through State Law No. 15047, of 29 November 2017, the State Policy for Mineral Coal was created and the state carbo-chemical hub was established, with strong growth trends due to the installation of new enterprises in the coming years, which requires attention to mitigating and compensatory measures related to the suppression of native vegetation (Figure 24).

Figure 24. Clay mining in the Shrublands ecoregion, in the municipality of Candiota, RS.

Author: Carolina Costa Alff.

4.2. Inadequate fire management

According to data from Prodes (2024), the Pampa was the Brazilian biome with the lowest number of hotspots in 2023 (717 hotspots), representing only 0.38% of the total 189,901 hotspots recorded that year for all of Brazil. In terms of burned area, there were 1,180 km², which corresponds to only 0.32% of the 372,346 km² burned in the same year across the country (Table 5). The number of hotspots was nine times lower, and the burned area 11 times smaller than that recorded for the Pantanal biome, which has a similar total area and analogous challenges related to the sustainable management of grassland ecosystems, since both contain native pasture areas traditionally used for livestock. This difference is possibly due to edaphoclimatic particularities that condition persistent, large-scale fires in the Pantanal region, affecting the interior of conserved forest areas, which does not occur in the more humid Pampa woodlands. According to researcher Eduardo Vélez (MapBiomas), paradoxically, the Pampa biome shows a lower comparative proportion of burned area because it has more areas converted to agriculture, an activity that does not employ fire as a management practice (Custódio, 2022). However, the number of hotspots and burned area should not serve as a comparative parameter between affected areas, as a single hotspot can last for days or even weeks and generate fires that are more or less concentrated in certain regions. In the same sense, the measurement of the area is not an indicative of the relevance for the conservation of the biodiversity affected (Inpe, 2024).

Table 5. Number of hotspots and burned area recorded in 2023 in Brazilian biomes.

Biome	Number of Hotspots in 2023	%	Burned Area (km2) in 2023	%
Amazon	98,639	51.94%	91,860.00	24.67%
Cerrado	50,713	26.70%	149,864.00	40.25%
Caatinga	21,550	11.35%	100,311.00	26.94%
Atlantic Forest	11702	6.16%	16,135.00	4.33%
Pantanal	6,580	3.46%	12,996.00	3.49%
Pampa	717	0.38%	1,180.00	0.32%
Total	**189,901**	**100%**	**372,346.00**	**100%**

Source: BDqueimadas (Inpe, 2023).

In the Pampa, the historical series (2003-2023) shows a fluctuation between a minimum number of 708 hotspots, recorded in 2014, and a maximum of about 1,800, in 2003. This fluctuation is quite significant when compared to the average number of hotspots recorded throughout the period (1,155 hotspots). The number of hotspots recorded in 2023, the last year of the series, was the second lowest of the past 20 years, surpassing only the number recorded in 2014, while the burned area was the ninth smallest recorded in the same period. The annual difference between the number of hotspots and burned area indicates that a possible reduction of the first parameter does not necessarily lead to a reduction of the second. The number of hotspots remained proportionally high between 2003 and 2006, with an average of 1,780 hotspots/year, dropping to an average of about 910 hotspots/year in the following decade, between 2007 and 2018, with some peaks above the average, such as the one observed in 2016. Then, it rose again to an average of approximately 1,450 hotspots/year between 2019 and 2021, followed by a significant drop to an average of 730 hotspots in the last two years of the historical series. On the other hand, in terms of burned area, the average of the historical series was 1,374 km²/year in the Pampa biome (Table 6 and Figure 25).

The years 2003, 2009, and 2020 deserve special mention and analysis, as they show values above 2,000 km² of burned area, considerably higher than the average. In 2020, the largest record of burned area in the 20 years of the series occurred, with 3,119 km², more than twice the average, as well as the second highest record of hotspots (1,685), second only to the hotspots recorded in 2003. These annual fluctuations are largely related to the alternation between wetter periods and prolonged and intense drought in the southern half of the state, conditioned by climate change and the La Niña phenomenon, which causes periods of extreme drought in the summer, especially between January and February. The change in the state's natural vegetation cover, associated with a

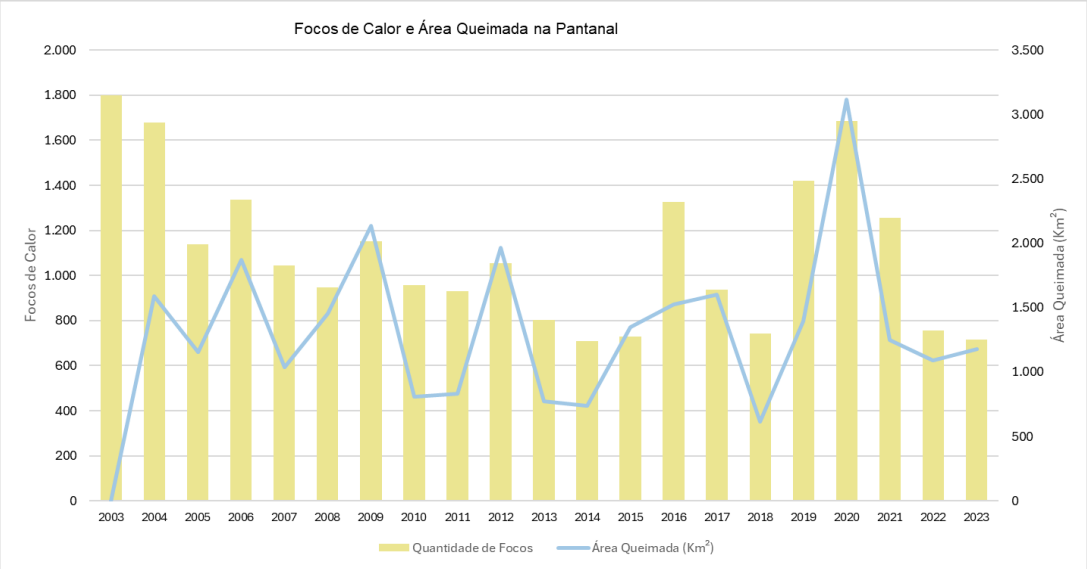
warmer climate, with reduced rainfall in the winter and increased precipitation in the spring and autumn, indicates a trend toward worsening periods of drought and intense, concentrated rainfall (Valporto, 2022), which reinforces the need for integrated policies to combat deforestation and fires.

Table 6. Number of hotspots and burned area (km²) recorded from 2003 to 2023 in the Pampa biome.

Year	Number of Hotspots	Burned Area (km²)
2003	1,798	2,488
2004	1,677	1,589
2005	1,138	1,156
2006	1,336	1,870
2007	1,045	1,039
2008	948	1,452
2009	1,152	2,138
2010	956	811
2011	931	830
2012	1,053	1,963
2013	801	774
2014	708	741
2015	730	1,350
2016	1,327	1,527
2017	936	1,602
2018	742	615
2019	1,420	1,398
2020	1,685	3,119
2021	1,256	1,247
2022	754	1,089
2023	717	1,180

Source: BDqueimadas (Inpe, 2023).

Figure 25. Hotspots and burned area (km²) recorded from 2003 to 2023 in the Pampa biome.



Source: BDqueimadas (Inpe, 2023).

Among the 10 municipalities with the highest number of hotspots in 2023 is Encruzilhada do Sul, with 113 hotspots, about 16% of the total recorded for the biome, followed by Canguçu (48 hotspots, 6.7%) and Bagé (36 hotspots, 5%) (Table 7). All other municipalities had 30 or fewer hotspots recorded in their territories. Encruzilhada do Sul and Canguçu share borders and are located in the Serra do Sudeste, in the Shrubland Fields ecoregion, in areas dominated by a grassland-forest mosaic with intense agrosilvopastoral activity, which may indicate possible use of fire associated with pasture renewal and the burning of forestry residues in the post-harvest period. Another area with relative density of hotspots is formed by the municipalities of Triunfo and Montenegro, in the Central Depression region of the state, already in an ecotone area with the Atlantic Forest biome, indicating possible use of fire for similar purposes (Figure 26).

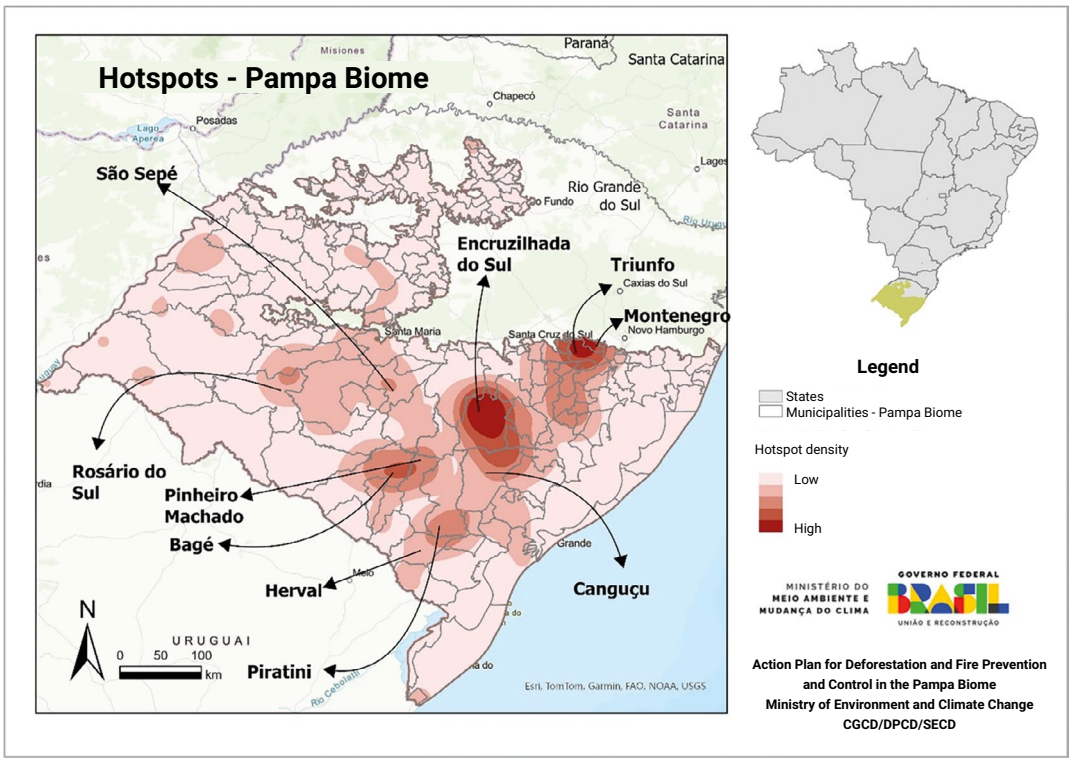
It is important to note that Bagé and Encruzilhada do Sul are on the list of municipalities with the largest areas of accumulated native vegetation suppression during the Prodes/Inpe historical series (4th and 5th place, respectively), which suggests a possible overlap with the conversion of natural areas for alternative land use. Furthermore, it is worth highlighting that São Gabriel, Piratini, and Bagé are on the list of the 10 municipalities with the largest areas of native vegetation suppression in 2023, ranking 3rd, 4th, and 7th, respectively. Together, the 10 municipalities with the highest number of hotspots account for 50% of the total recorded in the biome in 2023, and the top three account for 27.5% of the total.

Table 7. The 10 municipalities with the highest number of hotspots in the Pampa biome in 2023.

City	Number of Hotspots	Percentage
Encruzilhada do Sul	113	15.76
Canguçu	48	6.69
Bagé	36	5.02
Triunfo	30	4.18
Montenegro	27	3.77
Piratini	25	3.49
São Gabriel	25	3.49
Pinheiro Machado	21	2.93
Dom Feliciano	18	2.51
São Sepé	16	2.23

Source: BDqueimadas (Inpe, 2023).

Figure 26. Regions with concentration of hotspots in the Pampa biome in 2023.



Source: Map prepared by the MMA based on data from BDQueimadas (Inpe, 2023).

In terms of land tenure categories, the largest number of hotspots recorded in 2023 occurred in areas classified as “others” (462 hotspots, about 64%), which include state and municipal areas, followed by private areas (235, about 33%), agrarian reform settlements (15, about 2%), and UCs (5, less than 1%). Indigenous lands and undesignated federal land parcels recorded no hotspots in that year. Together, the areas classified as “others” and private areas account for a total of 697 hotspots (about 97% of the total) and a total of 1,141.57 km² of burned area (also about 97% of the total). Federal land parcels account for less than 3% of hotspots and just over 3% of burned area, which highlights the importance of implementing actions related to integrated fire management in the Pampa biome by state and municipal entities.

The data related to hotspots in the Pampa biome indicate strong annual oscillation, potentially related to periods of drought, with the available data still insufficient to link such oscillation to variations in the number of burn permits issued by the state and municipalities located in the biome. They also indicate the need to increase and integrate networks and data and information systems on integrated fire management in Sisfogo, in accordance with art. 16.II of Federal Law No. 14944 of 2024. Given the possible link with deforestation, this reinforces the need to cross-check Sisfogo data with systems such as Sinaflor and Sicar, in order to make enforcement actions more effective. Thus, they endorse the importance of integrated policies to combat deforestation and fires, as well as to encourage sustainable agricultural and livestock production activities, focusing on the 10 priority municipalities.

5. AXES AND STRATEGIC OBJECTIVES OF THE PPPAMPA

Through the analysis of the dynamics of native vegetation suppression in the Pampa biome and the guidelines defined by Federal Decree No. 11367/2023, the Interministerial Commission established the Strategic Objectives, the Expected Results, and the Lines of Action with their respective targets and indicators to achieve them, as can be seen in Annex A - Summary Chart. These parameters make up the matrix structure of PPPampa, provide overall interoperability, and guide public policies for reducing deforestation in the biome. The established strategic objectives are set out in Table 8.

Table 8. Axes and strategic objectives of the PPPampa.

Eixos	Objetivos Estratégicos
Axis I. Sustainable productive activities	**Objective 1.** Promote the sociobioeconomy, sustainable grassland and forest management, and the recovery of suppressed or degraded areas.
	Objective 2. Encourage sustainable agricultural and livestock activities.
	Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable production activities.
Axis II. Environmental monitoring and control	**Objective 4.** Strengthen the performance of federal institutions and ensure accountability for environmental crimes and administrative infractions related to the suppression and degradation of native vegetation.
	Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of native vegetation suppression, degradation, and production chains.
	Objective 6. Implement Integrated Fire Management to prevent and combat fires in native vegetation.
	Objective 7. Improve systems and integrate data on authorization for vegetation suppression and alternative land use, embargoes, and state and municipal infraction notices into federal systems.
	Objective 8. Strengthen federative coordination to promote actions to control the suppression of native vegetation and implement the Native Vegetation Protection Law.

Axis III. Land and territorial planning	**Objective 9.** Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.
	Objective 10. Expand and strengthen the management of protected areas.
	Objective 11. Coordinate and/or align the planning of major projects and infrastructure developments in the region with the goal of achieving zero deforestation by 2030.
	Objective 12. Carry out territorial planning and implement instruments provided by law to ensure the role of native vegetation in maintaining and recovering the water regime and the quality and quantity of water.
Axis IV. Regulatory and economic instruments	**Objective 13.** Create, improve, and implement regulatory and economic instruments to control native vegetation suppression and conserve biodiversity.

Based on the proposals for expected results and the lines of action established, the framework will be supplemented with targets and indicators. These should serve as guidelines for internal planning by all ministries and related bodies, with clearly identified targets, indicators, actors, and partners. These targets and indicators will be used to monitor and evaluate the PPPampa. As the plan is implemented, especially within the Monitoring and Evaluation Center, new indicators and targets will be developed and presented. These will be subject to evaluation and incorporation during the plan's annual update, as outlined in art. 2, Decree No. 11367/2023.

After this brief overview of the general structure, the foundations of each axis are presented, along with the main lines of action that form the core pillars supporting the plan (see Annex A).

5.1 Axis I - Sustainable productive activities

Due to the socioeconomic and environmental characteristics of the Pampa biome, it is essential to focus development efforts on actions that prioritize the sustainable use of resources. Reconciling economic production with environmental conservation is the main challenge for the sustainable production activities axis of the PPCDs. For the Pampa biome, this reconciliation is proposed through three strategic objectives:

> Objective 1. **Promote sociobioeconomy, sustainable management of native vegetation, and the restoration of suppressed or degraded areas:** focused on the need to expand production opportunities within the economic chains of sociobiodiversity and sociobioeconomy;

Objective 2. Encourage sustainable agricultural and livestock activities: with emphasis on more appropriate management systems, efficient water use, environmental compliance, recovery of degraded areas, control of invasive exotic species, and reduction of the opening of new areas;

Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable productive activities: as a support strategy for Objectives 1 and 2.

Strategic Objective 1 aims to promote sociobioeconomy, sustainable grassland and forest management, and the restoration of suppressed or degraded natural areas. With respect to grassland ecosystems, using native grasslands for livestock, mainly cattle, sheep, goats, and horses, under proper management, is the main strategy for sustainable use, allowing the maintenance of natural ecosystems while generating economic benefits. In addition to livestock, strategies should be developed to value the ecosystem services provided by grasslands, such as rural and ecological tourism, pollination, erosion control, and maintenance of hydrological cycles. Regarding the forest component, the strategy should focus on the collection and processing of forest products, both timber (stakes, fence posts, handicrafts, household utensils, and others) and non-timber, highlighting agroforestry and agroecological production of native fruits, as well as the sustainable use of genetic resources aimed at industry (medicines, pharmaceuticals, resins, among others). This objective also seeks to implement actions to reduce pressure on native forest resources and to restore ecosystem services. Thus, Strategic Objective 1 aims to strengthen the bioeconomy in the biome through four major action lines: expanded and strengthened bioeconomy, sociobiodiversity, and agroecological transition (1.1); promoted and enhanced nature tourism, ethnical tourism, and regenerative tourism (1.2); and expanded restoration of native vegetation with social participation and the building of community and collaborative foundations, income generation for the local population, and technological innovation in ecological restoration of Pampa ecosystems (1.3).

Regarding the recognition and promotion of bioeconomy and sociobiodiversity products (1.1), it is essential to create and strengthen mechanisms to insert such products into national and international markets. In this regard, incentives for programs and actions supporting and promoting bioeconomy (1.1.1), the strengthening and expansion of public purchasing programs (PAA, PNAE, PGPM, PGPM-Bio, and Family Farming Seal) (1.1.2), as well as the creation and promotion of sustainable businesses and green jobs, aiming at agroecological transition and ethnical development (1.1.3), are crucial. In developing these action lines, the National Sociobioeconomy Plan, currently under development, stands out. It foresees coordinated action between the MMA, the MDA, and the MDS. In addition to strengthening sustainable use, processing, and fair trade of native species (plant extractivism), the plan will also aim to strengthen artisanal fishing, agroecological, agropastoral, and agroforestry systems, traditional agricultural systems (SATs), agrobiodiversity, family and community forest and grassland management for multiple uses, meliponiculture, and community-based tourism.

The sustainable exploitation of grassland and forest products, combined with strengthening production chains and fair trade systems and sustainable businesses, is an effective way to maintain native vegetation cover and avoid conversion to alternative land use. These activities can be developed concurrently with nature tourism, ethnical tourism, and regenerative tourism (1.2), preferably on a community basis, integrating private properties and UCs (1.2.1). In this regard, the National Network of Long-Distance Trails and Connectivity (RedeTrilhas), a federal government initiative aimed at connecting points of cultural and natural heritage throughout the country, stands out.

The ecological restoration of native grasslands and seasonal forests, as well as of converted or severely degraded ecosystems (1.3), such as wetlands, butia groves, and pau-ferro woodlands, is also of utmost importance in the Pampa. It is worth emphasizing the importance of this theme in combating the degradation of Sandy Grasslands in the western part of the state, as well as increasing carbon stocks and generating jobs and income (1.3.1). Various initiatives for the recovery and restoration of native vegetation and degraded areas have been implemented in the Pampa biome and are expected to scale up in the near future. In this regard, noteworthy examples include the Strategies for Conservation, Restoration, and Management for the Biodiversity of the Caatinga, Pampa, and Pantanal Project, coordinated by MMA and executed by Funbio (Terrestrial GEF), and the Sema-RS Project Bank, supported by funds from environmental liabilities subject to Mandatory Forest Replacement (RFC). Strengthening and expanding the implementation of the National Plan for the Recovery of Native Vegetation (Planaveg) will allow restoration actions to scale up with the additional expectation of generating jobs and income. Another action associated with expanded native vegetation restoration is the promotion of integration between restoration actions and those provided for in the Watershed Revitalization Program (1.3.2).

Strategic Objective 2 seeks to stimulate sustainable agricultural and livestock activities. This includes timber use, with particular emphasis on managing valuable woods of domestic interest (fence posts, boards, and high-calorific firewood) or for the commercialization of manufactured goods (carved handicrafts) by traditional populations and family properties, representing an underexplored source of income in the biome. It also includes non-timber use, particularly the production of native fruits (butia, feijoa sellowiana, among others) and linking the activity to beekeeping and especially meliponiculture (Figure 27).

Figure 27. Beekeeping associated with livestock in native grasslands interspersed with seasonal woodlands in the Shrublands ecoregion, in the locality of Torrinhas, municipality of Pinheiro Machado, RS.

Author: Fábio Piccin Torchelsen.

New suppression can be avoided by encouraging livestock farming and sustainable agricultural production, resulting in reduced pressure on critical areas of deforestation and suppression of native vegetation and ensuring the social, environmental, and economic promotion of agriculture and livestock (2.1.1). In this sense, production techniques such as adjusting animal stocking rates and pasture deferment are particularly promising for grazing management in native grasslands of the biome, providing livestock farming with high productivity levels, minimizing the effects of climatic events, and preserving the hydrological regime. Beyond livestock farming, other productive activities have been gaining ground and achieving good economic results, and they can be carried out in harmony with the conservation of native vegetation, with emphasis on olive farming, winegrowing, and the production of native fruits such as butia. Grape and olive planting is carried out in small areas, with lower impact on native grasslands, high productivity, and potential for rural tourism.

Thus, higher rates of agricultural and livestock productivity per unit area must be achieved, ensuring sufficient job and income generation to keep the population in rural areas. For this, strengthening and expanding rural technical assistance, market access, and public policies aimed at family farming are necessary (2.1.2).

The success of the previous strategic objectives depends on Objective 3, which provides for expanding knowledge production through research and technical assistance with inclusive outreach and diversified practices for target audiences (3.1). Despite advances in technical and scientific knowledge about sustainable management of the Pampa's native grassland and forest vegetation, more tax incentives and market recognition are still needed for products coming from non-deforested or non-suppressed areas, such as meat produced in natural grasslands. In the context of ecosystem restoration, the main challenges are related to the restoration production chain and the formation of an input market, particularly to supply seeds of native grassland species from the biome's various ecoregions, as well as training qualified professionals to interpret the main ecological indicators and carry out appropriate restoration techniques (Figure 28).

Figure 28. Harvesting of native grassland seeds for environmental restoration using agricultural implements at the Experimental Agricultural Station of the Federal University of Rio Grande do Sul, located in the Mixed Fields of Andropogoneae and Compositae ecoregion, in the municipality of Eldorado do Sul, RS (Dutra-Silva, 2023).

Author: Fábio Piccin Torchelsen.

5.2. Axis II - Environmental monitoring and control

As already described, the Pampa biome is composed almost entirely of private areas, which, under Complementary Law No. 140/2011, are managed by the OEMA. The activities of federal environmental agencies and the Federal Police, as primary responsibilities, take place in federal land parcels such as UCs and indigenous lands. Thus, given the distribution of powers in these legal frameworks, the actions of the state and municipalities are essential for controlling deforestation and grassland suppression. In this sense, given the high annual increase in native grassland suppression identified in the biome, environmental monitoring and control, carried out through the planning and implementation of command-and-control actions, are the main tools the state has for rapid intervention against suppression. However, it is necessary to increase the production of strategic information and the integration of databases and monitoring systems. These databases have an important function of supporting environmental monitoring planning and execution based on spatial intelligence to optimize the use of available resources.

To address these challenges, Axis II of the PPPampa includes five strategic objectives:

> **Objective 4. Strengthen the role of federal institutions and ensure accountability for environmental crimes and administrative violations related to native vegetation suppression, the occurrence of fires, and environmental degradation.**
>
> **Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of suppression, degradation, and production chains.**
>
> **Objective 6. Implement Integrated Fire Management to prevent and combat fires in native vegetation.**
>
> **Objective 7. Improve systems and integrate data on authorizations for native vegetation suppression, embargoes, and state and municipal notices of violation into federal systems.**
>
> **Objective 8. Strengthen federal coordination to promote actions to control native vegetation suppression and fires and to implement the Native Vegetation Protection Law.**

The strategic objective 4 aims to strengthen the role of federal agencies, expanding their capacity and increasing the effectiveness of administrative, civil, and criminal procedures related to accountability for environmental crimes and violations. To this end, it seeks to ensure the accountability of offenders through intensified action against environmental crimes (4.1.1) and the strengthening of institutional capacity with human, technological, and logistical resources to effectively address environmental crimes and violations (4.2.1). Collaborative actions also include cross-border integration between Brazil and neighboring countries.

Strategic objective 5 addresses the improvement of systems for controlling and monitoring suppression, degradation, and production chains, including strengthening

and integrating deforestation prevention and control actions provided for in the National Action Plans for the Conservation of Endangered Species - PAN (5.1.1). It also proposes implementing monitoring mechanisms and establishing parameters and procedures to measure the impact of suppression and degradation on native vegetation, air, soil, and water resources (5.1.2). Additionally, it covers the strengthening of community-based monitoring initiatives for fires, degradation, and native vegetation suppression, promoting safety mechanisms for those involved (5.1.3). In terms of governance and institutional cooperation for monitoring, it includes goals related to establishing protocols for communication of suppression and fire events, enabling risk identification (prevention) and a more coordinated and efficient response (5.1.4). Furthermore, it provides for a line of action related to implementing and developing air pollution monitoring, including the preparation of inventories and State Plans for Air Emission Control in the Pampa (5.1.5).

Strategic objective 6 focuses on implementing a framework of actions related to best practices for integrated fire management in the biome. Consequently, it encompasses enhancements in the capacity for prevention, preparedness, and response to fires (6.1). Thus, among its lines of action are activities related to implementing the Federal Brigades Program, the implementation of the National Integrated Fire Management Policy, and supporting awareness campaigns and training programs (6.1.1, 6.1.2, and 6.1.3).

Strategic objective 7 focuses on improving and integrating data systems for authorizations for native vegetation suppression (ASV and UAS), embargoes, and state and municipal notices of violation into federal systems (7.1 and 7.1.1). As pointed out in the chapter on the dynamics of native vegetation suppression, existing integration is deficient and requires greater alignment with Sinaflor, a system that integrates ASVs and UASs issued by federative entities, and with Sicar. In addition, the data indicate the need to enhance monitoring of compliance with these authorizations through a technological solution that can qualify authorized and unauthorized deforestation, generating data to support command-and-control actions based on spatial intelligence. Furthermore, a platform is needed to integrate data on environmental fines and embargoes under the responsibility of federative entities into the federal system to allow the construction of a unified national database that can be used by oversight agencies, financial agents, and others, reducing possible overlaps (7.1.2).

Objective 8 was structured with the aim of strengthening joint work between the Union, states, and municipalities, in order to expand the results of efforts employed in structural actions to control native vegetation suppression and fires in the Pampa biome. Expected outcomes include aligning state and municipal initiatives for preventing and controlling deforestation and fires with federal plans (8.1) and improving Sicar to support states in implementing the Native Vegetation Protection Law (8.2). In this scope, noteworthy actions include assisting in the preparation of a State Plan and Municipal Plans for Deforestation and Fire Prevention and Control (PPCDQs) (8.1.1). In addition, actions will also be carried out with state and municipal agencies that work in the prevention and response to fires, for monitoring fire permits and implementing integrated fire management (8.1.2). Regarding the improvement of Sicar, efforts will be made with the state to enhance CAR as a tool for controlling deforestation (8.2.1).

5.3. Axis III - Land and territorial planning

Axis III - Land and territorial planning of the PPPampa - seeks to align and guide land allocation and use in order to optimize conservation efforts, minimize the impacts of large-scale developments, and enhance existing legal instruments to promote sustainable use and reduce deforestation, as reflected in its four strategic objectives:

> **Objective 9. Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.**
>
> **Objective 10. Expand and strengthen the management of protected areas.**
>
> **Objective 11. Coordinate and/or align the planning of large enterprises and infrastructure and development projects in the region with the goal of achieving zero native vegetation suppression by 2030.**
>
> **Objective 12. Conduct territorial planning and implement existing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality.**

The conservation and sustainable use of natural resources initially depend on land tenure security to ensure responsibility and rights. In the Pampa biome, there is a challenge regarding land tenure regularization, especially for Indigenous Lands, Quilombola Territories, and areas of traditional communities and family farmers, partners in conservation and sustainable use in the biome. Land tenure and territorial organization in the Pampa biome (strategic objective 9) will seek to avoid and resolve conflicts, ensuring rights and accountability for specific actors. Thus, it is necessary to allocate federal public lands for protection, conservation, and sustainable use of natural resources, the recognition of territorial rights, as well as the prevention and control of native vegetation suppression (9.1.1). Encouraging and strengthening the creation of inter-institutional bodies and programs for managing land conflicts (9.1.2) is equally important and enhances conservation and the sustainable use of natural resources.

Strategic objective 10 of PPPampa aims to expand and strengthen the management of protected areas, with a special focus on creating, consolidating, and strengthening the management of Conservation Units in the biome (10.1.1), observing the areas and actions prioritized for conservation and sustainable use (Decree No. 5092/2004 and Ordinance No. 463, 18 December 2018). It is important to consider the possibility of connectivity among protected areas, seeking to create ecological corridors and mosaics linking Conservation Units with other protected areas such as Indigenous Lands and Quilombola Territories, considered instruments of territorial management, as well as other conservation and restoration initiatives (10.1.2). In this sense, the objective also aims to strengthen and integrate actions related to habitat connectivity provided for in the National Action Plans for the Conservation of Endangered Species - PAN (10.1.3).

The positive contribution of Indigenous Lands and Quilombola Territories to conservation and sustainable use needs to be consolidated, mainly through effective and efficient land tenure regularization and recognition of their territories (10.2.1). In this context, the plan addresses the need to develop and implement territorial and environmental management plans for Indigenous Lands, Quilombola Territories, and territories of other traditional peoples and communities, with technological and economic support and technical assistance for carrying out sustainable activities (10.2.2).

One of PPPampa's strategies to prevent native vegetation suppression consists of the proper planning of large enterprises and infrastructure projects in the region. In this context, the main focus of strategic objective 11 will be action in the face of expanding infrastructure projects, regulating and minimizing their negative effects on conservation and seeking compensatory measures. To avoid or mitigate the negative environmental impacts of these enterprises, it is important to regulate, develop, and implement instruments (such as Technical, Economic, and Environmental Feasibility Studies - EVTEA and Strategic Environmental Assessments - AAE) to proactively contribute to environmental and territorial governance for controlling environmental degradation and native vegetation suppression; and to contribute to the promotion of actions to restore deforested areas and to mitigate GHG emissions resulting from land-use change in their area of influence (11.1.1). Special efforts must be made to avoid opening new natural areas for the installation of enterprises, favoring already anthropized areas. Other criteria should be taken into account, such as the presence of or impacts on rural residents and communities, negative interference in ecological corridors, or in the dispersal of invasive exotic species, or the conservation of endangered species and their occurrence areas.

Strategic objective 12 provides for the carrying out of land-use planning and the implementation of instruments that ensure the role of native vegetation in maintaining and recovering the water regime and water quality. Maintaining vegetation cover through the protection of Permanent Preservation Areas (APPs) is essential for the availability of water resources and protection against erosion and degradation. The protection and recovery of native vegetation in these areas should be promoted, integrating and considering effective and sustainable agricultural systems. In this regard, the development and revision of the state's Ecological-Economic Zoning (ZEE) can support more appropriate and sustainable land-use planning in economic, social, and environmental terms.

Also within the framework of the Native Vegetation Protection Law (Law No. 12651/2012), PPPampa highlights the need to prepare a proposal for priority areas for Legal Reserve compensation, focusing on the recovery of headwater areas, aquifer recharge areas, and wetlands, the creation of ecological corridors, and the conservation and control of invasive exotic species and the recovery of native vegetation, soil, as well as ecosystems and endangered species (12.1.1).

The environmental restoration of degraded areas on public lands (conservation units, indigenous lands, settlements, right-of-ways, military areas, etc.) could be an important driver of the restoration production chain in the biome, generating expertise and ecosystem services, in addition to contributing to achieving the goal established in Planaveg (Dutra-Silva, 2023).

5.4. Axis IV - Regulatory and economic instruments

Regulatory and economic instruments seek to guide and promote conservation, sustainable use, and restoration of natural resources, reducing native vegetation suppression and fires while also supporting the development of economic activities, sustainable production chains, and the strengthening of the socioeconomic rights of populations. Thus, the strategic objective of Axis IV is:

> **Objective 13. Create, improve, and implement regulatory and economic instruments to control deforestation and fires.**

The control of native vegetation suppression and fires must be supported by measures that discourage economic activities that favor native vegetation suppression, and by effective systems of regularization, monitoring, and enforcement. Although the Amazon Fund allocates resources for monitoring deforestation in other biomes, there are few funds available for the implementation of PPPampa-specific actions. Therefore, it is necessary to establish coordination and inter-fund governance actions and special projects (Climate Fund, FNMA, FNDF, FNRB, FDD, etc.) to enable the implementation of programs and projects arising from the PPPampa lines of action (13.1.1).

Another essential measure is the promotion of initiatives for classifying economic activities according to their environmental, social, and governance impacts, known as the Green Taxonomy (Brazilian Sustainable Taxonomy) (13.2.1), which provides for the measurement and disclosure of socio-environmental impacts and their mitigation. It is also important to highlight the promotion of tax incentives for the bioeconomy, the implementation and consolidation of sustainable production systems, such as agrosilvopastoral and agroforestry systems, as well as the restoration production chain and certification of good livestock practices on native grasslands. The main target audience of this action will be traditional peoples and communities and family farmers (13.3.1).

In terms of rural credit (13.4), it will be essential to adapt the access rules to Pronaf and other lines of credit for financing sustainable use and extraction actions, certification of products from sustainable livestock on native grasslands, agroecological systems, and sociobiodiversity chains (13.4.1).

The National Strategy for REDD+ (ENREDD+), a document that formalizes, to Brazilian society and the UNFCCC signatory countries, how the federal government has structured efforts for the REDD+ agenda, will be aligned with the current challenges of climate change mitigation through forest policies. Thus, reviewing and implementing ENREDD+ is a fundamental initiative for raising resources through REDD+ results-based payments to finance actions to control native vegetation suppression (13.5.1). In the case of the Pampa, care must be taken to ensure that national strategies for REDD+ do not exclude non-forest ecosystems, in this case, native grasslands.

With regard to environmental compensation instruments (13.6), regulatory instruments such as the Environmental Reserve Quota (CRA), legal reserve compensation, and replacement mechanisms must be regulated and promoted. In this regard, it is necessary

to highlight the need to revise Decree No. 9640/2018, which regulates the Environmental Reserve Quota (CRA), to ensure the integrity of the instrument's environmental purpose (13.6.1). Furthermore, it is necessary to regulate existing regulatory instruments to encourage the sustainable use of resources in Conservation Units, considering aspects related to technical assistance, community forest management, the National Policy on Climate Change, and ENREDD+ (13.7.1).

PPPampa also provides for the submission of bills or other relevant legal acts for the prevention and control of deforestation and fires (13.8). Outstanding issues in infralegal regulation related to Integrated Fire Management (13.8.1) require attention, as well as the review of provisions of the Environmental Crimes Law, the Native Vegetation Protection Law, and Federal Decree No. 6514/2008. In this regard, it is important to highlight the increase in penalties related to environmental crimes against flora, including fires (13.8.2).

On the global stage and in Brazil, there is growing recognition of the need to conserve natural areas through Payment for Environmental Services (PSA). This mechanism, provided for in Federal Law No. 14119/2021 and in the Federal Payment for Environmental Services Program (PFPSA), must be regulated, implemented, and strengthened (13.9). Instruments such as the Green Grant Program must be adapted to the reality of the biome, seeking to encourage and promote the sociobioeconomy, conservation, use, and sustainable management of natural resources (13.9.1). Payment for Environmental Services initiatives designed and implemented by state and municipal governments must also be strengthened.

In addition, it is essential to implement incentives for sustainable activities and penalties for predatory practices aimed at conserving native vegetation and water resources, including for sustainable irrigation, as already developed in other contexts, such as the Water Producer Program, supported by the MIDR and implemented by the National Water and Basic Sanitation Agency (13.9.2).

Regarding the Brazilian emissions reduction market (MBRE) (13.10), Law No. 15042, of 11 December 2024, regulates the Brazilian Greenhouse Gas Emissions Trading System (SBCE) and aims to encourage emissions reduction in accordance with the National Policy on Climate Change (Federal Law No. 12187/2009) and with international agreements adhered to by Brazil. The monetization of carbon credits could enable and provide a favorable environment for the implementation of productive activities aligned with environmental conservation and the maintenance of carbon stocks. However, it is necessary to regulate the carbon market in Brazil, defining operating rules and standards, considering the specificities of the Pampa (13.10.1). Added to the previous topics is the need to improve the regulatory process for regularizing Quilombola Territories and the territories of traditional peoples and communities (13.11 and 13.11.1).

Finally, there is still a significant mismatch between ASV/UAS and the areas actually cleared as reported by monitoring systems. Thus, it is necessary to strengthen and integrate command and control at all three federal levels, as well as to establish regulatory standardization for the issuance and integration of authorizations in Sinaflor and to define criteria for the disclosure of information (13.12 and 13.12.1).

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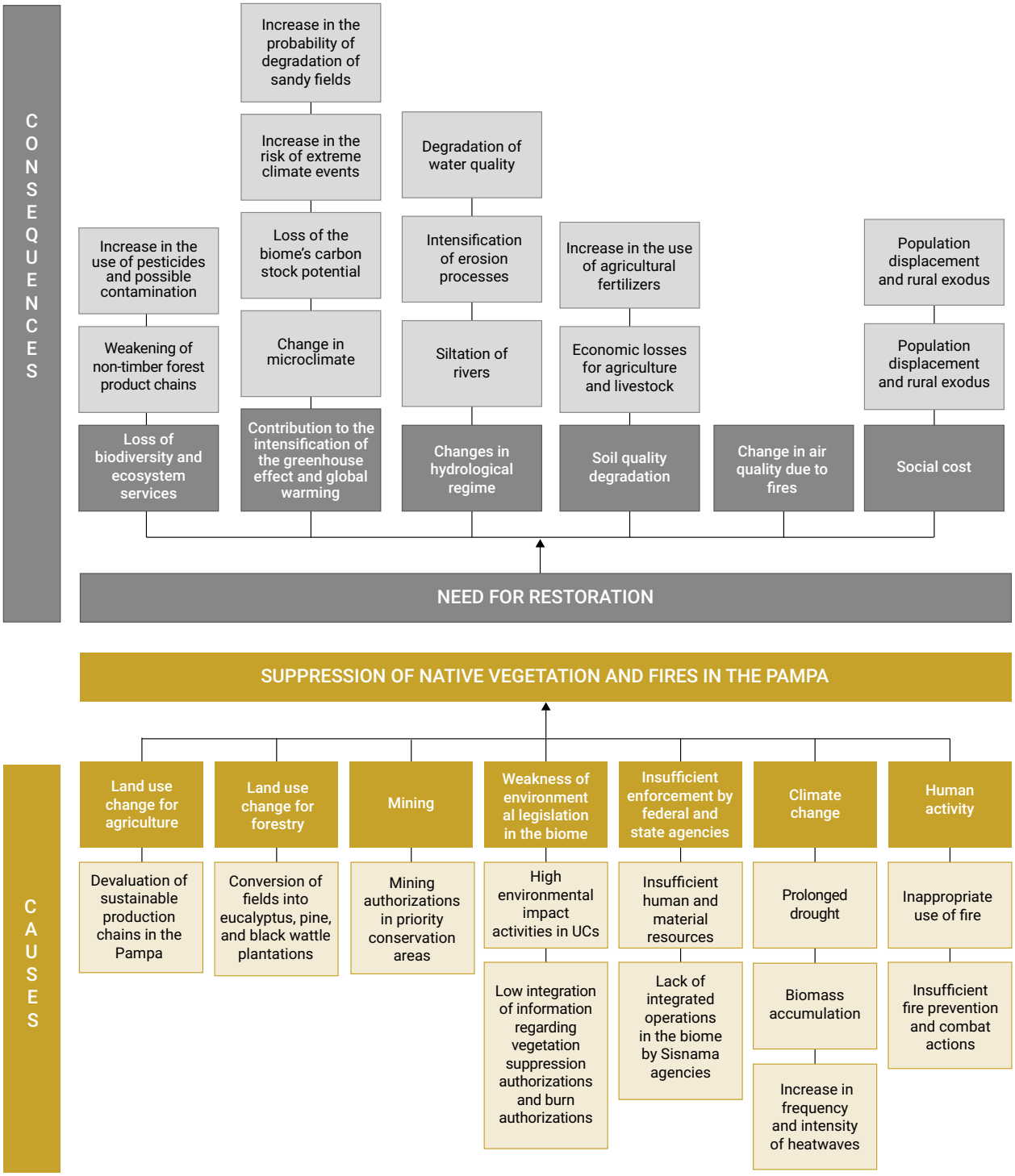
ANNEX A - PROBLEM TREE



ANNEX B - SUMMARY TABLE OF STRATEGIC OBJECTIVES, EXPECTED RESULTS AND ACTION GUIDELINES

Axis I - Sustainable Productive Activities				
Strategic Objective 1. Promote the socio-bioeconomy, the sustainable management of native vegetation, and the recovery and restoration of areas with suppressed native vegetation or degraded areas.				
Expected Result 1.1. Bioeconomy, sociobiodiversity, and agroecological transition expanded and strengthened.				
Line of Action 1.1.1. Develop and implement programs and actions to support the bioeconomy.				
Goal	Indicator	Deadline	Key Actor	Partners
1.1.1.1. Elaborate the National Socio-Bioeconomy Plan.	a) Number of steps completed for the development and implementation of the plans b) Elaborated plan	2025	SBC – MMA	MIDR, MCTI, MDIC, Mapa, Conab, MF, MDS and members of the National Bioeconomy Commission
1.1.1.2. Establish a priority bioregional territory in the Pampa biome.	Number of selected territories	2025	MIDR	MMA
1.1.1.3. Promote the sustainable use of natural resources, aligned with the cultural and economic needs of traditional communities	Sustainable management projects developed and implemented with community participation	2026	ICMBio	Sustainable Work Program - MTE
1.1.1.4. Map species of socioeconomic importance for the Pampa communities.	Structuring of a biocultural community protocol and monitoring of Pampa sociobiodiversity	2026	ICMBio	
1.1.1.5. Create a database of traditional knowledge associated with Pampa biodiversity.	Scientific article published	2026	ICMBio	
1.1.1.6. Increase by 50% support for sustainable productive inclusion projects for Indigenous peoples, traditional peoples and communities, family and small-scale farmers, and community enterprises, enhancing sociobiodiversity product chains.	a) Number of supported projects b) Number of territories and families benefited	2027	MDA	SNPCT – MMA, MDIC, Mapa, MCTI, Funai – MPI
1.1.1.7. Increase support for sustainable productive inclusion projects for Indigenous peoples, traditional communities, family and peasant farming, and community enterprises, valuing sociobiodiversity product chains compared to the average of the past four years.	% increase in supported projects	2027	Conab	SNPCT – MMA, MDIC, Mapa, MCTI, MD, MDIC, SFDT, MDA, Funai, MPI, MTE

1.1.1.8. Implement 15 projects to stimulate sociobiodiversity and agroecological product chains through productive support and/or expansion of local infrastructure for transport, sanitation, connectivity, and renewable energy.	a) No. of projects implemented/year b) Total investment amount (BRL)/ year	2027	Mapa	ICMBio, SBC and SNPCT-MMA, ANA, MD, MDS, SNPCT, GSIPR and Secom
1.1.1.9. Implement 10 projects to stimulate sociobiodiversity and agroecological product chains through productive support and/or expansion of local infrastructure for transportation, sanitation, connectivity, and renewable energy.	a) No. of projects implemented/year b) Total investment amount (BRL)/ year	2027	MIDR	ICMBio, SBC and SNPCT-MMA, ANA, MD, MDS, SNPCT, GSIPR and Secom
1.1.1.10. Implement 30 projects to stimulate sociobiodiversity and agroecological product chains through productive support and/or expansion of local infrastructure for transportation, sanitation, connectivity, and renewable energy.	a) No. of projects implemented/year b) Total investment amount (BRL)/ year	2027	MDA	ICMBio, SBC and SNPCT-MMA, ANA, MD, MDS, SNPCT, GSIPR and Secom
1.1.1.11. Promote and strengthen research networks for the development and application of new technologies and social technologies aimed at socio-biodiversity chains and agroecological products with a focus on native species.	No. of Science and Technology Institutes involved in sociobioeconomics research/year	2026	SBC – MMA	MCTI
1.1.1.12. Create economic instruments and/or adapt existing ones (e.g. fiscal stimuli, payment for environmental services) to foster community-based bioeconomy.	No. of community-based projects/ enterprises benefited/year	2027	SBC – MMA	
Line of Action 1.1.2. Strengthen and expand government procurement policies and programs (PAA, PNAE, PGPM, PGPM-Bio, and the Family Farming Seal).				
Goal	Indicator	Deadline	Key Actor	Partners
1.1.2.1. Increase commercialization actions through government procurement programs (PAA, PNAE) compared to 2024 values.	% increase in government purchases	2027	Conab	Seab, Conab – MDA, MDS, MPI, MMA, MDIC, Funai, Emater, GIZ
1.1.2.2. Inclusion of Pampa products in the agenda of the Minimum Price Guarantee Policy for Sociobiodiversity Products - PGPMBio.	Number of products included in the agenda	2027	Conab	Conab, MDA, MMA, IBGE, MPO
Line of Action 1.1.3. Promote sustainable businesses and create green jobs, strengthening the bioeconomy, agroecological transition, and ethnodevelopment.				
Goal	Indicator	Deadline	Key Actor	Partners

1.1.3.1. Adjust and strengthen the Pronatec Extrativista program.	Number of people assisted	2027	MDA	Conab, MPI, MEC
1.1.3.2. Promote initiatives for socioproductive inclusion, territorial and environmental management, and institutional strengthening for traditional peoples, communities, and family farmers.	Number of initiatives carried out	2025	SNPCT – MMA	IDH, Funatura, IEB, MTE
1.1.3.3. Implement a program of economic incentives and support for productive organization, rural extension, and technical assistance for forestry, agroforestry, and native grassland enterprises, including community-based ones.	Number of enterprises supported	2026	SBC – MMA	MTE
1.1.3.4. Develop and implement support programs for micro and small business enterprises and community-based ventures and enable access to technological development applied to sustainable businesses.	Number of projects for micro and small business enterprises and community-based ventures supported	2026	SBC – MMA	MTE
1.1.3.5. Promote the management of sustainable fishing, focusing on producing a protein source for self-consumption, income generation, monitoring, and territorial management.	No. of initiatives: 2 initiatives, plans, or projects for local fishery management (scientifically based and participatory).	2026	SBC – MMA	MTE
1.1.3.6. Launch a call for proposals to accelerate businesses focused on environmental conservation and the green economy in Brazilian biomes.	a) Number of businesses accelerated b) Income generated (BRL)	2026	SBC – MMA	MTE
Expected Result 1.2. Nature tourism, ethnotourism, and regenerative tourism promoted and expanded.				
Line of Action 1.2.1. Expand nature, rural, community-based, and conservation unit tourism.				
Goal	Indicator	Deadline	Key Actor	Partners
1.2.1.1. Establish pilot projects to promote ecotourism and regenerative tourism.	Number of projects established/year	2027	SBC – MMA	MTur, Embratur, MDIC
1.2.1.2. Establish a community-based and ethnotourism program in the Pampa.	Community-based and ethnotourism program established	2027	SBC – MMA	MTur, Embratur, MDIC, MPI, Funai
1.2.1.3. Monitor visitation numbers in 100% of conservation units where visitation is a primary objective (National Parks and Natural Monuments)	% of conservation units with monitoring of the number of visits, in accordance with Normative Instruction No. 05/2018	2027	ICMBio	Private sector
1.2.1.4. Offer training slots to 20% of staff in Pampa Conservation Units in courses promoted by the General Coordination of Public Use and Environmental Services (CGEUP/ICMBio) or on the theme of visitation management in Conservation Units.	Number of training slots offered to develop powers related to visitation management in Conservation Units	2025	ICMBio	

1.2.1.5. 200 km of Long-Distance Trails marked and recognized by MMA.	Kilometers of long-distance trails cumulatively marked in federal Conservation Units under Joint Ordinance MMA/MTur/ICMBio No. 407/2018, and recognized by MMA under Joint Ordinance MMA/MTur/ ICMBio No. 500/2020.	2025	ICMBio	MMA
1.2.1.6. Promote visitation and sustainable tourism through the implementation of the Visitation and Sustainable Tourism Program in federal Conservation Units.	a) Phases of the Program implemented b) Number of Conservation Units benefited	2027	ICMBio	MMA, MTur, Embratur
1.2.1.7. Implement the National Development Plan for Recreational and Sport Fishing (PNPA), taking into account the particularities of the biome	Number of fishers benefited per year	2027	MPA	MMA
Expected Result 1.3. Expanded restoration of native vegetation, with social participation and the creation of community and collaborative bases, income generation for the local population, and technological innovation in ecological restoration.				
Line of Action 1.3.1. Promote the recovery and restoration of native vegetation, supporting and strengthening the National Policy for the Recovery of Native Vegetation (Proveg), through the implementation of Planaveg, contributing to reducing degradation, combating desertification, conserving biodiversity, increasing carbon stocks, and generating employment and income.				
Goal	Indicator	Deadline	Key Actor	Partners
1.3.1.1. Implement the macro-actions outlined in Planaveg, focusing on arrangements for recovering native vegetation in APP and RL areas, in public areas (conservation units and indigenous lands) and in rural areas with low productivity in the Pampa.	Number of completed steps for plan implementation.	2027	SBio – MMA	Membros da Conaveg
1.3.1.2. Incorporate actions to promote the recovery of native vegetation into state public policies in the Pampa and strengthen other forms of collective organization at the landscape scale through the work of the Planaveg Territorial Articulation Center.	Number of state public policies and other forms of collective organization aligned with Planaveg	2027	SBio - MMA	Members of the Planaveg Territorial Articulation Center
1.3.1.3. Improve the monitoring of native vegetation recovery in public and private areas.	Area monitored/year	2027	PF-MJSP	MMA, Inpe, OEMA
1.3.1.4. Develop a portfolio of projects for the restoration and recovery of natural vegetation.	Project portfolio developed.	2027	MIDR	SBio - MMA, OEMA
1.3.1.5. Promote integrated management of micro-basins, including actions for soil and water conservation, vegetation cover recovery, and social mobilization.	Number of micro-basins covered/ year	2027	MIDR	SBio - MMA, OEMA

1.3.1.6. Execute projects of the Account Management Committee for the Eletrobrás Watershed Revitalization Program and the Thematic Climate Adaptation Plan for Water Resources.	a) Number of drainage basins served; b) hectares recovered/year	2027	SQA – MMA	OEMA
1.3.1.7. Implement measures to reintroduce and preserve native fauna species in degraded forest areas, aiming to contribute to ecosystem recovery and restoration, resilience, pollination, seed dispersal, and ecological balance.	Number of pollinator insect projects developed and implemented/year	2027	ICMBio	SBio - MMA, Ibama, SFB, OEMA, NGOs, and local organizations
1.3.1.8. Carry out compensatory planting due to road and railway construction, duplication, capacity increase, modernization, maintenance, etc., and indicate priority areas for planting.	a) Area with compensatory planting carried out/year	2027	MT	MMA
1.3.1.9. Promote actions of diagnosis, implementation, or monitoring of ecological restoration of ecosystems in at least 10,000 hectares of degraded areas within federal UCs, corridors, and critical areas for species conservation in the Pampa.	Degraded area (ha) with diagnosis, implementation, or monitoring of restoration.	2027	ICMBio	MMA, Ibama, SFB, NGOs and local organizations
1.3.1.10. Make available the polygons of degraded areas in federal UCs in the Pampa that are eligible to receive restoration projects.	Website implemented providing polygons of degraded areas available for restoration projects in federal UCs as open data.	2027	ICMBio	MMA
1.3.1.11. Train more than 90% of managers of federal Conservation Units in the Pampa in ecological restoration project management.	a) % of Pampa UC with staff trained in ecological restoration project management b) Number of staff trained/year	2027	ICMBio	MMA, Ibama, SFB, NGOs and local organizations
1.3.1.12. Encourage and promote studies and research on the sandification process, its causes and consequences for the Pampa, its ecosystem dynamics, and actions that can be developed to contain the process.	Number of research projects in progress	2027	MCTI	SNPCT – MMA, ICMBio, UFRGS, UFSM
1.3.1.13. Make at least 20% of the Pampa a protected area by 2034, as established by the Brazilian Action Plan to Combat Desertification and Mitigate the Effects of Drought (PAB Brasil).	Percentage of the Pampa as a protected area	2027	ICMBio	SNPCT – MMA, Ibama
1.3.1.14. Create a program for the recovery of native pastures, including the control of invasive exotic species and the replacement of exotic pastures with natural pastures (native grasslands) on private lands.	Native area recovered (ha)	2027	Mapa	MMA, Embrapa, Emater - RS, Universities, Sustainable Work Program - MTE
Line of Action 1.3.2. Promote the integration of native vegetation recovery and restoration actions with those provided in the Drainage Basin Revitalization Program.				

Goal	Indicator	Deadline	Key Actor	Partners
1.3.2.1. Five integrated micro-watershed management projects supported annually through partnership agreements.	Number of projects supported per year.	2027	MIDR	Sustainable Work Program - MTE
Strategic Objective 2. Encourage sustainable agricultural and livestock activities.				
Expected Result 2.1. Expansion of sustainable agriculture and livestock.				
Action Line 2.1.1. Encourage sustainable livestock and crop production to reduce pressure on critical areas of native vegetation suppression, ensuring the social, environmental, and economic promotion of agriculture and livestock.				
Goal	Indicator	Deadline	Key Actor	Partners
2.1.1.1. Develop and implement the National Program for Rural Environmental Management.	a) Number of phases completed for program development. b) Program under implementation in priority territories.	2027	SNPCT – MMA	MDA, Mapa, MIDR
2.1.1.2. Make socio-environmental compliance checks of private areas available.	a) Number of family production units b) Number of SAF units c) Number of structured honey houses	2025	PF	MMA, MJSP, OEMA
Action Line 2.1.2. Strengthening and expanding access to markets and public policies for family farming.				
Goal	Indicator	Deadline	Key Actor	Partners
2.1.2.1. Design and implement the Socio-environmental Development Program for Rural Family Production (Proambiente).	a) Number of phases completed for program development. b) Program under implementation in priority territories.	2027	SNPCT – MMA	MDA, Sustainable Work Program - MTE
Strategic Objective 3. Expand research, knowledge production, training, and technical assistance for sustainable production activities.				
Expected Result 3.1. Research, training, capacity building, and knowledge for use and conservation expanded and disseminated.				
Action Line 3.1.1. Produce knowledge, disseminate information, raise awareness, train, and capacitate different social actors on the importance of conservation, adoption of productive practices, and sustainable consumption to reduce native vegetation suppression and fires.				
Goal	Indicator	Deadline	Key Actor	Partners
3.1.1.1. Survey and publish informational panels on bioeconomy initiatives in the Pampa.	Panels published	2025	SFB	
3.1.1.2. Develop and implement the Training Program in Technical Assistance and Rural Extension with a focus on agroecological transition to face climate change.	a) Number of phases completed for program development b) Program under implementation in priority territories.	2027	SNPCT – MMA	Universities, State Government
3.1.1.3. Implement the National Forest Inventory in the Pampa biome.	Percentage of the biome area with IFN field data collection	2026	SFB - MMA	Universities, State Government

3.1.1.4. Support the Pampa biome sub--network of the Biodiversity Research Program.	Subnetwork supported	2027	MCTI	Universities, State Government
3.1.1.5. Expand applied research, the production of technical-scientific and traditional knowledge, and strengthen training and technical assistance in sustainable practices for the productive activities of traditional communities in the Pampa, focusing on bioeconomy, sustainable management, and strengthening of sociobiodiversity.	a) Number of research projects carried out/year focusing on sustainable productive practices and natural resource management in Pampa communities. b) Number of publications and educational materials produced/year based on scientific and traditional knowledge about sustainable productive activities. c) Number of training sessions and capacity-building events held with local communities promoting sustainable management and production techniques. d) Number of families or communities assisted/year with technical support from CNPT to implement sustainable productive activities.	2027	ICMBio	
3.1.1.6. Implement a fisheries research and monitoring system to support sustainable fishing activity in the biome.	Search system implemented	2027	MPA	MMA, MCTI
3.1.1.7. Conduct the National Biodiversity Monitoring Program in federal Conservation Units, supporting knowledge production on biome conservation.	UCs in the Pampa with the Monitora Program in operation	2027	ICMBio	
Axis II - Environmental Monitoring and Control				
Strategic Objective 4. Strengthen the performance of federal institutions and ensure accountability for environmental crimes and administrative infractions related to illegal suppression, fires, and environmental degradation.				
Expected Result 4.1. High level of resolution and administrative, civil, and criminal accountability for illegal deforestation and forest degradation achieved.				
Action Line 4.1.1. Ensure accountability for crimes and administrative infractions related to illegal suppression, fires, and environmental degradation.				
Goal	Indicator	Deadline	Key Actor	Partners
4.1.1.1. Monitor, through intensive patrolling, federal highways and areas of interest to the Federal Administration.	Number of actions carried out per year	2027	PRF- MJSP	Ibama, ICMBio and other environmental enforcement agencies
4.1.1.2. Provide support through personnel deployment upon request by other agencies.	Number of actions supported/year	2027	PRF- MJSP	Ibama, ICMBio and other environmental enforcement agencies

4.1.1.3. Initiate 40 administrative proceedings per year to investigate administrative infractions against flora in the Pampa.	Number of proceedings initiated per year	2025	Ibama	
4.1.1.4. File 10 public civil actions (ACP) per year to seek compensation for damage to Pampa flora.	Number of proceedings initiated per year	2026	AGU	Ibama
4.1.1.5. Carry out at least one national-level enforcement activity (as a priority Conservation Unit) in federal Conservation Units of the Pampa by 2027.	Enforcement activities carried out in federal Conservation Units	2027	ICMBio	PM, PRF, PF, Ibama
4.1.1.6. Carry out at least two regional-level enforcement activities (as a priority Conservation Unit) in federal Conservation Units of the Pampa by 2027.	Enforcement activities carried out in federal Conservation Units	2027	ICMBio	PM, PRF, PF, Ibama
4.1.1.7. Carry out at least 30 local-level enforcement activities in federal Conservation Units of the Pampa by 2027.	Enforcement activities carried out in federal Conservation Units	2027	ICMBio	PM, PRF, PF, Ibama
4.1.1.8. Initiate 400 administrative proceedings per year to investigate administrative infractions against flora in the Pampa.	Number of proceedings initiated per year	2027	Ibama	
Expected Result 4.2. Human, technological, and logistical resources expanded for the effective fight against environmental crimes and infractions.				
Action Line 4.2.1. Strengthen human, technological, and logistical resources to increase the effectiveness of combating environmental crimes and infractions.				
Goal	Indicator	Deadline	Key Actor	Partners
4.2.1.1. Support the implementation of license plate recognition equipment to assist in the enforcement of native timber transportation on federal highways.	Number of federal highways with equipment installed per year	2027	DNIT	MT, Ibama, MMA
4.2.1.2. Adjust maintenance, environmental management, and concession contracts to include specific technological and logistical resources to support environmental monitoring and control in the biome.	Number of federal highways covered/ year	2027	DNIT	MT, Ibama, MMA
4.2.1.3. Hire 200 environmental analysts through public examination to work on combating deforestation and fires by 2027.	Number of environmental analysts hired per year.	2027	Ibama	MMA, MGI
Strategic Objective 5. Improve the capacity for control, prevention, analysis, and monitoring of deforestation, degradation, and productive chains.				
Expected Result 5.1. Monitoring capacity of deforestation and degradation in the biome expanded.				
Action Line 5.1.1. Strengthen and integrate prevention and control actions for native vegetation suppression provided for in the National Action Plans for the Conservation of Threatened Species (PAN) as a strategy for the conservation of threatened species.				

Goal	Indicator	Deadline	Key Actor	Partners
5.1.1.1. 80% of integrated and implemented actions.	Percentage of PAN actions implemented and integrated	2027	ICMBio	MMA, Ibama, Research and Education Institutions, NGOs, GEMA, Civil Society
Action Line 5.1.2. Implement monitoring mechanisms and establish parameters and procedures to measure the impact of suppression and degradation of native vegetation on air, soil, and water resources.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.2.1. Include in road maintenance contracts, in DNIT's environmental management contracts, and in concession contracts, monitoring actions for suppression and fire control within the right-of-way of highways and railways crossing the biome.	Number of contracts adjusted per year	2027	DNIT	MT, MMA
Action Line 5.1.3. Strengthen community monitoring initiatives for native vegetation suppression and fires and provide security mechanisms for the actors involved.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.3.1. Training in fire prevention and combat.	Number of training events	2027	ICMBio	Prevfogo - Ibama
5.1.3.2. Train and equip communities to fight fires.	Number of communities trained	2027	ICMBio	Prevfogo - Ibama, Traditional Communities Network
5.1.3.3. Reforest the surroundings of communities with native species.	a) Number of seedlings produced and planted b) Number of communities served	2027	ICMBio	Prevfogo - Ibama, Traditional Communities Network
Action Line 5.1.4. Strengthen governance and institutional cooperation for monitoring, including through a joint communication protocol on suppression and fire events, enabling risk identification (prevention) and a more coordinated and efficient response.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.4.1. Establish, among internal agents and companies contracted to carry out works and/or maintenance, communication protocols for suppression and fire events.	Number of communication protocols implemented	2027	MT	MMA
Action Line 5.1.5. Implement/develop air pollution monitoring, inventories, and the State Air Emission Control Plan in the Pampa, as well as promote awareness campaigns against fires.				
Goal	Indicator	Deadline	Key Actor	Partners
5.1.5.1. Enforce vehicle emissions through overt patrols on federal highways and areas of federal interest.	Number of enforcement operations per year	2027	PRF - MJSP	

5.1.5.2. Implement air pollution monitoring in the Pampa biome.	Percentage of the biome with air pollution monitoring	2027	SQA - MMA	OEMA, Civil Society
5.1.5.3. Support the preparation of the inventory and the State Air Emission Control Plan in the Pampa Biome.	Percentage of the inventory and State Air Emission Control Plan prepared	2027	SQA - MMA	OEMA, Universities and Civil Society
Strategic Objective 6. Implement Integrated Fire Management to prevent and combat fires in native vegetation.				
Expected Result 6.1. Capacity for prevention, preparedness, and response to fires improved.				
Action Line 6.1.1. Implement and equip the Federal Brigades Program, aiming to reduce the number of fires in native vegetation in priority federal areas.				
Goal	Indicator	Deadline	Key Actor	Partners
6.1.1.1. Increase the number of brigade members hired in federal UCs	20% increase in the number of brigade members hired	2027	ICMBio	Prevfogo – Ibama
Action Line 6.1.2. Implement the National Policy for Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners
6.1.2.1. Preparation and implementation of Integrated Fire Management Plans for federal UCs.	100% of federal Conservation Units with brigades hired and an IFMP prepared and approved	2027	ICMBio	
6.1.2.2. Establish a specialization course in Integrated Fire Management at Acadebio, with the aim of training specialists to act in the prevention and control of fires in native vegetation and in the implementation of the National Policy for Integrated Fire Management.	Number of classes opened and completed for the Integrated Fire Management specialization.	2027	ICMBio	MMA, Prevfogo – Ibama
6.1.2.3. Strengthen practices for prevention and control of forest fires in military areas.	a) Number of containment zones established and monitored in the highest-risk areas b) % reduction in fire events detected in critical areas over time c) Annual total reduction of fires in monitored areas	2027	MD	Censipam, Ibama, ICMBio
6.1.2.4 Equip and train Defense Agencies for prevention and control of fires in areas under their jurisdiction.	a) Average response time of brigades and battalions after detecting hotspots by the Fire Panel b) Number of alerts issued by the Fire Panel and actions taken as a result of these alerts c) % of fire events controlled before becoming large wildfires	2027	MD	Censipam, Ibama, ICMBio
Action Line 6.1.3. Support awareness campaigns and training related to deforestation and fire prevention and control.				
Goal	Indicator	Deadline	Key Actor	Partners

6.1.3.1. Carry out environmental education activities through lectures on native vegetation suppression and fires for users of federal highways and areas of federal interest.	Number of participants in lectures on native vegetation suppression and fires per year	2027	PRF- MJSP	Ibama, ICMBio and other environmental enforcement agencies
Strategic Objective 7. Improve systems and integrate data on authorization for native vegetation suppression, embargoes, and state and municipal notices of infraction into federal systems				
Expected Result 7.1. Authorizations for vegetation suppression, embargoes, and infraction notices integrated into federal systems.				
Action Line 7.1.1. Integrate the data on Vegetation Suppression Authorizations (ASVs) and Alternative Land Use Authorizations (UASs) under the responsibility of federal, state and municipal agencies into the federal systems.				
Goal	Indicator	Deadline	Key Actor	Partners
7.1.1.1. Integrate ASV data into the Electronic Transport Document (DT-e) of the Ministry of Labor.	a) Number of ASVs integrated into DT-e	2027	MTE	Ibama, MMA
7.1.1.2. Integrate state databases into Sinaflor/Ibama.	State of Rio Grande do Sul with integrated databases per year	2026	Ibama	MMA
Action Line 7.1.2. Improve and make available a platform to integrate data on environmental infractions and embargoes under the responsibility of federative entities into a federal system.				
Goal	Indicator	Deadline	Key Actor	Partners
7.1.2.1. Integrate state databases of notices of infraction and embargoes into the federal database.	State of Rio Grande do Sul with integrated databases per year	2026	Ibama	SECD – MMA
Strategic Objective 8. Strengthen federal coordination to promote actions to control native vegetation suppression and fires and to implement the Native Vegetation Protection Law.				
Expected Result 8.1. State and municipal initiatives for prevention and control of native vegetation suppression and fires aligned with the Federal Plans for Deforestation and Fire Prevention and Control (PPCDs) in the biomes.				
Action Line 8.1.1. Support the preparation and updating of the State Plan and the Municipal Plans for Deforestation and Fire Prevention and Control (PPCDQs) and other strategic actions				
Goal	Indicator	Deadline	Key Actor	Partners
8.1.1.1. Engage and support the government of the state of Rio Grande do Sul in preparing the PPCDQ.	PPCDQ prepared	2027	SECD – MMA	OEMA
Action Line 8.1.2. Promote coordination with state and municipal agencies involved in the prevention and response to fires for the implementation of Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners

8.1.2.1. Engage the participation of the state of Rio Grande do Sul and municipalities located in the Pampa biome in the federal Ciman.	a) State engagement b) Number of municipalities participating in the Ciman per year	2027	Ibama	SECD – MMA
Expected Result 8.2. Sicar improved to support the state in implementing the Native Vegetation Protection Law				
Action Line 8.2.1. Improve the environmental regularization process through the analysis of properties in the CAR conducted by states, support for implementation of PRAs and other mechanisms under the Native Vegetation Protection Law.				
Goal	Indicator	Deadline	Key Actor	Partners
8.2.1.1. Provide solutions for promoting and monitoring the environmental regularization of rural properties located in the Pampa.	Number of solutions provided	2027	SFB – MMA	MGI
Axis III - Land and Territorial Planning				
Strategic Objective 9. Ensure the designation of public land parcels for protection, conservation, and sustainable use of natural resources, especially for Indigenous Peoples, quilombola communities, other traditional peoples and communities, and family farmers.				
Expected Result 9.1. Federal and state land parcels designated, land tenure databases with improved controls, and land tenure insecurity reduced.				
Action Line 9.1.1. Allocate federal public lands for protection, conservation, and sustainable use of natural resources, recognition of land rights, and prevention and control of native vegetation suppression.				
Goal	Indicator	Deadline	Key Actor	Partners
9.1.1.1. Recognize and protect the territories of artisanal fishers under the Artisanal Fishing Peoples Program established by Decree No. 11626, 2 August 2023.	Number of territories recognized and protected.	2027	MPA	MMA, Incra – MDA
9.1.1.2. Implement the Sustainable Use Authorization Term (TAUS), established by Ordinance No. 89 of April 15, 2010, and, when applicable, the Real Right of Use Concession (CDRU), crucial for protecting the land rights of traditional communities, including artisanal fishing.	Number of TAUS and CDRUs implemented	2027	MPA	MMA, Incra – MDA

9.1.1.3. Identify Priority Areas for Biodiversity Conservation.	Number of areas identified	2026	SBio - MMA	ICMBio, universities, and civil society
Line of Action 9.1.2. Encourage and strengthen the creation of interinstitutional bodies and programs for land conflict management.				
Goal	Indicator	Deadline	Key Actor	Partners
9.1.2.1. Establish protocols for free, prior, and informed consultation, in accordance with the principles established by Convention No. 169 of the International Labour Organization (ILO), for resolving land tenure issues related to traditional communities, including fishing communities.	Number of protocols established per year	2027	MPA	MMA, Incra - MDA
Strategic Objective 10. Expand and strengthen the management of protected areas.				
Expected Result 10.1. Protected areas created, consolidated, and with strengthened management.				
Action Line 10.1.1. Create and consolidate Conservation Units focusing on critical areas of native vegetation suppression.				
Goal	Indicator	Deadline	Key Actor	Partners
10.1.1.1. Proposal of 200,000 hectares in Conservation Units.	Area of Conservation Units created	2027	SBio – MMA	ICMBio, OEMA, GEF
10.1.1.2. 80% of conservation units with established and active advisory/ deliberative councils.	Number or proportion of Conservation Units with established and active advisory or deliberative councils	2027	ICMBio	Civil society, community representatives.
10.1.1.3. Four instruments for rights compatibility developed or made permanent in overlapping or dual-affectation areas between federal conservation units and territories of traditional peoples and communities.	Number of rights compatibility instruments developed or made permanent, or with negotiations or development initiated.	2027	ICMBio	Civil society, community representatives, research institutions.
10.1.1.4. Prepare a technical study aimed at creating a state Conservation Unit in the Guaritas de Caçapava region.	Study completed	2027	SBio – MMA	OEMA, OSC
10.1.1.5. Prepare a technical study of the Management Plan for the State Biological Reserve of Ibirapuitã - Terrestrial GEF.	Study completed	2027	SBio – MMA	OEMA, OSC

Action Line 10.1.2. Strengthen, recognize, and implement territorial governance and management instruments for protected area connectivity, such as mosaics, ecological corridors, biosphere reserves, Ramsar sites, RPPNs, restoration plans, and others.				
Goal	Indicator	Deadline	Key Actor	Partners
10.1.2.1. Submit two processes for recognition of mosaics of protected areas.	Processes completed and submitted	2026	ICMBio	SBio - MMA, OEMA, MIR, Funai, MPI, GSIPR, Network of Protected Area Mosaics
10.1.2.2. Prepare a technical study for the creation of the Pampa Biosphere Reserve.	Study completed	2027	SBio – MMA	OEMA, OSC
10.1.2.3. Prepare a study for the creation and implementation of Long-Distance Trails in the Pampa biome, aiming at connectivity and financial sustainability of Conservation Units.	Study completed	2027	SBio – MMA	OEMA, OSC
10.1.2.4. Hold a meeting, within the scope of the Permanent Forum of Leaders of the National System of Nature Conservation Units, on PPPampa goals, including topics such as mapping and training aimed at restoration and strengthening public visitation and management councils.	Meeting held	2026	SBio – MMA	Fórum SNUC
Action Line 10.1.3. Strengthen and integrate habitat connectivity actions provided in the National Action Plans for the Conservation of Endangered Species (PAN) as a strategy for species conservation.				
Goal	Indicator	Deadline	Key Actor	Partners
10.1.3.1. At least 80% of actions integrated and implemented.	% of PAN actions implemented and integrated	2027	ICMBio	SBio - MMA, Ibama, Teaching and Research Institutions, NGOs, OEMA, Civil Society
Expected Result 10.2. Indigenous Lands, Quilombola Territories, and Territories of Traditional Peoples and Communities identified, delimited, demarcated, approved, regularized, and with improved management.				
Action Line 10.2.1. Identify, delimit, demarcate, approve, and regularize Indigenous Lands and Quilombola Territories to ensure recognition of their territories.				
Goal	Indicator	Deadline	Key Actor	Partners
10.2.1.1. Prepare a normative instrument to regulate the identification, recognition, and regularization of the territories of traditional peoples and communities.	Normative instrument prepared	2027	SETEQ – MDA	SNPCT – MMA, GSIPR, MME
Action Line 10.2.2. Prepare and implement Territorial and Environmental Management Plans (PGTAs) for Indigenous Lands, Quilombola Territories, and territories of other traditional peoples and communities, with technological and economic support and technical assistance for carrying out sustainable activities.				

Goal	Indicator	Deadline	Key Actor	Partners
10.2.2.1. Develop the National Sustainable Development Plan for Traditional Peoples and Communities.	a) Number of phases completed for plan development. b) Plan published. c) Plan under implementation.	2027	SNPCT – MMA	CNPCT
10.2.2.2. Promote the development of 100 Territorial and Environmental Management Plans (PGTA) for Indigenous Lands, Quilombola Territories, and territories of traditional peoples and communities in accordance with the Indigenous and Quilombola Territorial and Environmental Management Policy.	Number of Territorial and Environmental Management Plans prepared per year	2027	MDA	MGI, RFB
Strategic Objective 11. Coordinate and/or align the planning of major projects and infrastructure developments in the region with the goal of achieving zero deforestation by 2030.				
Expected Result 11.1. Improved planning and decision-making processes for the implementation of major infrastructure and development projects, in line with Brazil's environmental and development goals.				
Action Line 11.1.1. Regulate, develop, and implement instruments (Technical, Economic, and Environmental Feasibility Studies - EVTEA, Strategic Environmental Assessment - AAE, etc.) to, preventively, contribute to environmental and territorial governance and planning to control native vegetation suppression; promote restoration actions for cleared areas; avoid or mitigate impacts and ensure the rights of affected populations; and promote mitigation actions for GHG emissions resulting from land use change in the area of influence of major enterprises and regional infrastructure and development projects.				
Goal	Indicator	Deadline	Key Actor	Partners
11.1.1.1. Identify enterprises and infrastructure works with significant impact related to native vegetation suppression and GHG emissions in the Pampa.	Number of enterprises identified/year	2027	SECD – MMA	MMA, MPO, MF, MGI, RFB, MT
11.1.1.2. Establish an interinstitutional working group to present a proposal for regulation, development, and implementation of environmental and territorial governance instruments related to major enterprises and infrastructure and development works in the Pampa.	Working group established	2026	SECD – MMA	MMA, MPO, MF, MGI, RFB, MME, MT
11.1.1.3. Reduce native vegetation suppression and GHG emissions resulting from land use change in the area of influence of major enterprises and infrastructure projects.	Number of actions carried out in the areas of influence of major enterprises and infrastructure projects	2027	SECD – MMA	Ibama, ICMBio, MT and MF, OEMA
11.1.1.4. Align National Sectoral Plans with national deforestation reduction targets.	% of National Sectoral Plans aligned.	2027	MT	MF, MMA, Ibama and ICMBio
11.1.1.5. Increase the recovery of degraded areas in the area of influence of major enterprises and infrastructure projects.	Number of hectares of degraded areas recovered/year	2027	SECD-MMA	Ibama, ICMBio, MME, MT, MF, MT, ANTT, ANM, MDIC.MIDR, DNIT, INFRA S.A, and OEMA

11.1.1.6. Implement integrated planning instruments for major enterprises and infrastructure projects.	Number of enterprises with integrated planning instruments	2027	SECD-MMA	Ibama, ICMBio, MME, MT, MF, MT, ANTT, ANM, MDIC.MIDR, DNIT, INFRA S.A, and OEMA
11.1.1.7. Reduce the social and environmental impact of enterprises in the territories of traditional communities.	Number of enterprises with proposed and implemented actions/year	2027	SECD-MMA	Ibama, ICMBio, MME, MT, MF, MT, MME, ANTT, ANM.MDIC, MIDR, DNIT, INFRA S.A, and OEMA
Strategic Objective 12. Conduct territorial planning and implement existing legal instruments to ensure the role of native vegetation in maintaining and restoring water regimes and water quality.				
Expected Result 12.1. Instruments provided in the Native Vegetation Protection Law (Law No. 12651/2012) implemented.				
Action Line 12.1.1. Develop a proposal for priority areas for Legal Reserve compensation, focusing on spring restoration, aquifer recharge zones, wetlands, creation of ecological corridors, and conservation or restoration of vegetation, soil, ecosystems, and endangered species.				
Goal	Indicator	Deadline	Key Actor	Partners
12.1.1.1. Establish criteria for defining priority areas for recovery (within Proveg), to be compiled and agreed upon in a prioritization protocol that can be replicated or adapted at the state and municipal levels, considering the specificities of each land use typology.	Prioritization protocol for restoration areas prepared	2025	SBio - MMA	MPI, Funai, Incra, ICMBio, Biome Networks and Collectives, IIS, Planaflor
1.2.1.1.2. Define priority areas for Legal Reserve compensation, including criteria and restrictions for CRA allocation, and pre-approval criteria for compensation and/or restoration projects in priority areas (regulation of Art. 66.7, Law No. 12651 / 2012).	Number of maps of priority areas for recovery prepared	2027	SBio - MMA	State
Axis IV - Regulatory and economic instruments				
Strategic Objective 13. Create, improve, and implement regulatory and economic instruments for controlling native vegetation suppression and fires and conserving biodiversity.				
Expected Result 13.1. Funds or mechanisms established and expanded to support policies to control native vegetation suppression and fires.				
Action Line 13.1.1. Establish coordination and interfund governance actions and special projects (Climate Fund, FNMA, FNDF, FNRB, FNE, FDD, etc.) to enable the implementation of programs and projects resulting from the plan's action lines.				
Goal	Indicator	Deadline	Key Actor	Partners
13.1.1.1. Draw up a proposal for an action plan for interfund coordination, governance, and special projects.	Proposal presented and approved	2027	SFB - MMA	MF, Secex - MMA, SECD - MMA

Expected Result 13.2. Incentive instruments for mitigation and adaptation activities implemented.				
Action Line 13.2.1. Implement initiatives for building a green and sustainable taxonomy.				
Goal	Indicator	Deadline	Key Actor	Partners
13.2.1.1. Develop a proposal for a Sustainable Taxonomy in partnership with government stakeholders, covering activities that integrate the climate change mitigation and adaptation strategy, to guide public and private activities.	Taxonomy proposal developed and approved.	2027	MF	MDIC, MGI, RFB, MPOR, SBC – MMA
Expected Result 13.3. Tax incentives, subsidies, and financing for productive activities and sustainable biodiversity businesses created and implemented				
Action Line 13.3.1. Propose standards and promote tax incentives for the bioeconomy and subsidies for sociobioeconomy products from sustainable and biodiverse production systems, livestock, sustainable extractivism, and agroforestry systems, especially from indigenous lands, territories of traditional peoples and communities, and family farming.				
Goal	Indicator	Deadline	Key Actor	Partners
13.3.1.1. Execute the transfer of credit benefits to beneficiaries from Quilombola, Indigenous, and traditional peoples and communities.	Number of beneficiaries served per year.	2027	MDA	MPI, Seteq, MDA
13.3.1.2. Present a draft regulatory instrument to promote tax incentives for the bioeconomy and subsidies for sociobioeconomy products.	Draft regulatory instrument presented.	2026	SBC – MMA	MPI, MDA, Mapa
Expected Result 13.4. Rural credit improved.				
Action Line 13.4.1. Strengthen, simplify, and revise rules for access to credit in the National Program for Strengthening Family Farming (PRONAF) for financing the sustainable use of natural resources, agroforestry, sustainable extractivism, and socio-biodiversity chains.				
Goal	Indicator	Deadline	Key Actor	Partners
13.4.1.1. Provide financial support to pasture and degraded area recovery projects.	Number of beneficiaries supported per year.	2026	Mapa	MMA
Expected Result 13.5. ENREDD+ aligned with current climate change mitigation challenges through forest policies.				
Action Line 13.5.1. Revise and implement the National REDD+ Strategy (ENREDD+).				
Goal	Indicator	Deadline	Key Actor	Partners
13.5.1.1. Revise and implement the National REDD+ Strategy (ENREDD+).	State of Rio Grande do Sul eligible for REDD+ funding	2027	SECD – MMA	
Expected Result 13.6. Environmental compensation instruments implemented				
Action Line 13.6.1. Review the decree regulating the Environmental Reserve Quota to guarantee the environmental integrity of the instrument.				

Goal	Indicator	Deadline	Key Actor	Partners
13.6.1.1. Review regulation of Environmental Reserve Quota.	Decree revised		SFB - MMA	OEMA, private sector
Expected Result 13.7. Technical assistance, sustainable use in federal conservation units, and community and family forest management strengthened.				
Action Line 13.7.1. Regulate existing normative instruments to encourage the sustainable use of resources in conservation units, considering aspects related to technical assistance, community forest management, the National Climate Change Policy, and ENREDD+.				
Goal	Indicator	Deadline	Key Actor	Partners
13.7.1.1. Develop and implement regulatory standards that encourage the sustainable use of natural resources in conservation units, especially in areas where traditional communities operate, integrating the principles of the National Climate Change Policy and ENREDD+.	a) Number of developed and innovative regulatory standards focused on the sustainable use of natural resources in conservation units. b) Percentage of traditional communities trained in community forest management practices and climate change mitigation policies.	2027	ICMBio	Funai - MJ, Incra - MDA, MMA, CNPCT, NGOs
Expected Result 13.8. Bills or other relevant legal acts for the prevention and control of native vegetation suppression and fires presented.				
Action Line 13.8.1. Improve infra-legal regulation related to Integrated Fire Management.				
Goal	Indicator	Deadline	Key Actor	Partners
13.8.1.1. Establish and improve norms, resolutions, and other infra-legal acts on Integrated Fire Management.	Number of legal acts established or improved.	2026	SECD – MMA	
13.8.1.2. Present a proposal for regulatory changes with adjustments to the environmental parameters of the Rural Environmental Registry to enhance control, monitoring, and combat of native vegetation suppression and fires.	Regulatory proposal submitted.	2026	SECD – MMA	MGI
Action Line 13.8.2. Revise provisions of the Environmental Crimes Law, the Native Vegetation Protection Law, and Decree No. 6514/2008 to increase penalties related to environmental crimes against flora, including fires.				
Goal	Indicator	Deadline	Key Actor	Partners
13.8.2.1. Propose legal and infralegal changes to increase penalties and sanctions related to environmental crimes and infractions against flora and fires.	Number of proposals submitted.	2027	SECD – MMA	Ibama, ICMBio
Expected Result 13.9. Law No. 14119/2021 regulated and new economic instruments and mechanisms for Payment for Environmental Services (PES) created or revised.				
Action Line 13.9.1. Implement the Bolsa Verde Program (Environmental Conservation Support Program) as a mechanism to encourage sustainable use and support local socio-economic development projects, with an emphasis on the collective management of territories and their traditional systems in protected areas.				

Goal	Indicator	Deadline	Key Actor	Partners
13.9.1.1. Promote sustainable fishing and the inclusion of artisanal fishers in social and economic support programs, such as Bolsa Verde and Pronaf.	Number of people assisted per year.	2027	MPA	MMA, MDA
Action Line 13.9.2. Implement incentives for sustainable activities and penalties for predatory practices aimed at conserving native vegetation and water resources, including for sustainable irrigation, such as those already developed in other contexts, like the Water Producer Program, supported by MIDR and implemented by the National Water and Basic Sanitation Agency.				
Goal	Indicator	Deadline	Key Actor	Partners
13.9.2.1. Regulate the Federal PES Program for priority assistance to family farming, indigenous peoples and traditional peoples and communities	Regulation approved.	2026	SBC – MMA	MPI, Funai, MDA
Expected Result 13.10. Brazilian Emissions Reduction Market (MBRE) regulated.				
Action Line 13.10.1. Regulate the carbon market in Brazil, defining rules and operational standards, considering the specificities of the biome.				
Goal	Indicator	Deadline	Key Actor	Partners
13.10.1.1. Propose a normative instrument with a view to regulating the Brazilian emissions reduction market.	Regulatory instrument proposed.	2027	SMC – MMA	MF
Expected Result 13.11. Land regularization of Quilombola Territories and territories of traditional peoples and communities strengthened.				
Action Line 13.11.1. Improve the regulatory process for regularizing Quilombola Territories and those of traditional peoples and communities.				
Goal	Indicator	Deadline	Key Actor	Partners
13.11.1.1. Draw up a normative instrument to regulate the identification, recognition, and regularization of territories collectively occupied and used by traditional peoples and communities.	Regulatory instrument developed and approved.	2027	MDA	SNPCT – MMA
Expected Result 13.12. Regulatory standardization for issuing and integrating Authorizations for Native Vegetation Suppression (ASVs) and Authorizations for Alternative Land Use (UASs).				
Action Line 13.12.1. Establish a regulatory instrument to standardize the criteria for issuing and integrating ASVs and UASs data issued by state and municipal agencies into Sinaflor (MMA), as well as define criteria for publicizing the information.				
Goal	Indicator	Deadline	Key Actor	Partners
13.12.1.1. Establish a Conama Resolution on minimum criteria for issuing ASVs and UASs.	Conama Resolution published.	2026	SECD-MMA	Ibama, State

Cerro da Guarda, municipality of Herval, RS. Photo: Fábio Piccin Torchelsen

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