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The Cerrado and public policies in environment and health for the protection of sociobiodiversity

Cerrado e políticas públicas em ambiente e saúde voltadas à proteção da sociobiodiversidade

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ABSTRACT This article describes and contextualizes federal public policies related to the conservation and sustainable use of socio-biodiversity in the Cerrado, with emphasis on those associated with human health and sociobiodiversity. A systematic review of official documents from the federal government available on public websites was conducted. The mapping identified only a small number of public policies specifically focused on the sociobiodiversity of this biome. Given the involvement of multiple variables—such as the biophysical characteristics of diverse ecosystems and the historical difficulties faced by traditional peoples and communities in securing land titles and applying their knowledge of sustainable management systems—the conditions for developing non-conventional policies are more complex, requiring cross-sector coordination and intersectoral action among public institutions. Based on these assumptions, the guiding hypothesis of the research is that the trajectory of environmental and health policies has required distinct institutional strengthening processes, weakening the originally proposed integrative intention. On the other hand, the state apparatus fails to reach key social groups essential to sociobiodiversity, resulting in institutional inertia in the implementation of existing public policies for the Cerrado and near paralysis in the creation of new ones.

KEYWORDS Cerrado. Sociobiodiversity. Environment and health. Public policies.

RESUMO *Este artigo descreve e contextualiza as políticas públicas federais relacionadas à conservação e ao uso sustentável da biodiversidade no Cerrado, com destaque para aquelas associadas à saúde humana e à sociobiodiversidade. Foi realizada uma revisão sistemática de documentos oficiais do governo federal, disponibilizados em sites públicos. O mapeamento identificou poucas políticas públicas especificamente voltadas à sociobiodiversidade desse bioma. Por envolver muitas variáveis, como as características biofísicas dos diversos ecossistemas e as dificuldades históricas que povos e comunidades tradicionais enfrentam para titular seus territórios e neles aplicarem seu conhecimento sobre sistemas de manejo sustentável, as condições para a construção de políticas não convencionais são mais complexas, exigindo transversalidade e intersetorialidade entre os entes públicos. Com base nesses pressupostos, a hipótese norteadora do artigo é que a trajetória das políticas de ambiente e saúde requereu fortalecimentos institucionais próprios, arrefecendo a intenção integradora originalmente proposta. Por outro lado, a máquina estatal não alcança segmentos sociais determinantes para a sociobiodiversidade, caracterizando uma inércia institucional na implementação das políticas públicas para o Cerrado e uma quase paralisia na criação de novas.*

PALAVRAS-CHAVE *Cerrado. Sociobiodiversidade. Meio ambiente e saúde. Políticas públicas.*

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Introduction

This article examines and contextualizes public policies concerning biodiversity conservation, its sustainable use (sociobiodiversity), and human health in the Cerrado biome. The study collected and systematized information drawn from official documents and texts, producing a mapping intended to underpin future critical analyses of how effectively these policies have been implemented, as well as their impacts and tangible outcomes, taking into account the gaps between stated commitments and the actions effectively carried out.

Based on a detailed mapping of federal public policies, including government programs and plans, the analysis prioritizes those that specifically address issues related to sociobiodiversity and health. The text follows a chronological approach, briefly outlining the political and institutional contexts in which these policies were formulated and underscoring their implications for the current state of sociobiodiversity conservation in the Brazilian Cerrado.

The mapping revealed that only a small number of public policies are explicitly focused on the sociobiodiversity of the Cerrado. Because this agenda involves multiple factors—such as the biophysical diversity of ecosystems and the historical obstacles faced by traditional peoples and communities in securing land rights and applying their knowledge of sustainable management systems—the development of non-conventional policies is more complex and requires cross-cutting, intersectoral coordination among public bodies. For example, land-tenure regularization policies that grant territorial titles to quilombola communities can strengthen sociobiodiversity by enabling access to rural credit and markets. Therefore, this study provides a starting point for understanding public policies directly or indirectly linked to sociobiodiversity and highlights the need for future research to evaluate their effectiveness and real impacts.

The dual stigmatization of the Cerrado: a sacrifice zone and the frontier approach

The dominant agricultural model in the Cerrado has led to rapid soil degradation, largely because it has failed to recognize the right of traditional peoples and communities to the social use of land or to value their traditional knowledge of conservation. Driven by governments and by national and foreign political and economic elites[1], the Cerrado has been doubly stigmatized: as a 'sacrifice zone', in the name of an economic development model claimed to benefit the country[2] while preserving the Amazon—a forest biome deeply embedded in the popular imagination—and as an 'internal frontier' of agribusiness, ensuring its future expansion.

According to Sassen[3], the frontier perspective is situated within the context of globalization and transnational dynamics, seeking to disturb traditional notions of national borders, territory, and sovereignty. Borders, in this view, are not merely fixed physical or legal lines but, above all, dynamic spaces of interaction, conflict, and the reconfiguration of power, where state and non-state actors (such as corporations, migrants, and digital networks) negotiate and contest boundaries. For Sassen[3], among other variables, the frontier is understood as a process composed of constantly evolving social and political practices, shaped by migratory flows, global capital, and technologies, and traversed by both internal and transnational logics (such as value chains and financial markets) that challenge the sovereignty of nation-states.

This dual stigmatization of the Cerrado has led to the erasure of its original social, cultural, and biological representations and, consequently, of its sociobiodiversity. Applying these categories to the Cerrado context makes it possible to understand both the flexibility of institutions and legal instruments—which, even today, facilitate *'grilagem'* (land grabbing) and illegal deforestation—and other forms of private appropriation of environmental assets (land, water, and forests), access to which

favors political and economic elites as well as the groups responsible for the logistical infrastructure (transport, storage, and stockpiling) that underpins agribusiness, supported by rural credit embedded in the sector's main economic policy, the Plano Safra (Harvest Plan), which is almost exclusively directed toward this segment.

The creation of a new geographic region called MATOPIBA (acronym formed from the states of Maranhão, Tocantins, Piauí, and Bahia) by Federal Decree No. 8,447 of May 6, 2015[4] is emblematic of the dominant perception that the Cerrado constitutes a 'void'. Labeled the 'last frontier' of agricultural expansion in the biome, the region has become a symbol of predatory agribusiness. Intensive, mechanized, large-scale agricultural production geared towards export has deepened the global phenomenon of land grabbing, which refers to the appropriation of extensive portions of land through purchase or lease by foreign actors or large corporations, often illegally, displacing local communities and degrading the environment. These areas quickly begin to attract investment from speculative funds as well as pension funds seeking long-term assets, driven by the rising value of agricultural commodities, thereby completing the process of financialization of environmental assets[5,6].

The predominance of a preservationist view of nature, which for decades shaped socio-environmental debates in Brazil, contributed to constructing the image of 'void' by ignoring the historical contribution of traditional populations to the protection of the Cerrado's rich biodiversity, keeping them excluded from public policies[7]. An excessive focus on protecting forest ecosystems obscured the rapid agricultural conversion of non-forest ecosystems, such as grasslands and savannas, which once covered vast areas of the country, hosted unique biodiversity, and provided essential ecosystem services. As noted by Overbeck et al.[8], neglecting the conservation of Brazil's non-forest ecosystems—such as the Pampa and the Cerrado—has accelerated the loss of native vegetation compared to predominantly forested biomes. Only belatedly was it recognized as crucial to extend conservation and sustainable use policies to the Cerrado's forest formations, such as the *Cerradão* (a transitional vegetation type between savanna and forest). Because it harbors significant biodiversity, the *Cerradão* provides some of the main products of the Cerrado's rich sociobiodiversity, including *baru, mangaba, pequi, araticum-do-cerrado, aroeira-branca, jenipapo,* and *macaúba*—native Cerrado fruits and plant species traditionally used for food and fiber as well as culinary specialties by local communities[9].

The collective health perspective

When considering the Cerrado's distinctive economic and environmental characteristics, as well as the weak institutional capacity for its protection, the effects of an intensive and predatory agricultural model on the populations' living conditions remain poorly studied by official institutions, largely due to a lack of statistical data. Collective health, which understands health as going beyond biological factors and as a process shaped by social and historical conditions[10], has sought to advance knowledge and critical analysis of the impacts of Cerrado degradation on the health of its inhabitants, especially traditional peoples and communities. There is, for example, a growing body of research on the harmful effects of intensive pesticide use in the region, linking it to cases of spontaneous abortions, acute poisoning, congenital malformations, and childhood cancers[11,12], as well as to health problems associated with loss of or restricted access to land and water resources[2].

However, when compared with scientific production on other biomes, or with the already extensive literature on environment and health, the Cerrado still occupies a relatively marginal place. In contrast, the documentary review revealed a substantial body of reports and studies produced by non-governmental organizations and social movements in the Cerrado on the harmful effects of

the dominant development model on the life and health of local populations. This disparity highlights a dichotomy of knowledge on how real population problems are addressed and reflects the limited presence of the State, which fails to implement health policies tailored to the specificities of the biome. Within the field of collective health, analyses linking health to the productive system are still relatively recent, distinguishing themselves from the more traditional approach of public health[13]. Largely grounded in the perspective of the social determination of health, these studies seek to understand the health impacts of the agro-mining-water-energy-fossil-business system, while critically challenging this model and advocating its transformation.

This is a crucial point for analyzing public health policies in the Cerrado, because the pace of environmental destruction driven by agribusiness appears impossible to match through the incremental implementation of policies, no matter how appropriate their design and objectives may be. The health sector and the Unified Health System (SUS) reflect the contradictions of the capitalist structure, which at times co-opts them for its own purposes and at other times limits their expansion—a well-established diagnosis in the field[14-16]. At the same time, the environmental domain now reflects Brazil's position as a hub of a model based on resource extraction, concentration, and financialization, supported by a set of public policies that sustain and promote agrarian capital, involving national producers linked to international input providers and processing industries. In this context, national policies aimed at addressing health damage and promoting sustainability reveal a limited capacity for effective action.

Material and methods

A systematic review was conducted of official federal government documents available on public websites (JUSBRASIL, the Federal Senate, the Presidency, the Chamber of Deputies, and all Ministry websites), covering policies, plans, and programs. The selected period was 2018 to 2024, while also including earlier documents considered relevant for contextualizing the recent period. This timeframe encompasses the period immediately preceding the dismantling of environmental and social policies under Jair Bolsonaro's administration, as well as the subsequent process of rebuilding these policies following Luis Inácio Lula da Silva's victory in the 2022 presidential election. The aim was to identify national public policies through laws, regulations, and guidelines, as well as analyses and official positions on sociobiodiversity in the Cerrado. The search used the following descriptors: "Cerrado", "Cerrado and health", "Cerrado and environment", "Cerrado and biodiversity", "Cerrado and traditional populations", "climate change", "agroecology", "sociobiodiversity", "human rights", and "sanitation".

The documents were organized thematically according to the priority areas addressed: environment, health, biodiversity, socio-environment, socioeconomics, sociobiodiversity, food security, agroecology, human rights, territorial rights, agriculture, climate change, climate adaptation, and gender. The document analysis followed established guidelines for documentary analysis[17,18], including reading, selection, interpretation, and examination of the chosen themes.

Results and discussion

Main policies aimed at environmental conservation in the Cerrado

The institutionalization of the agribusiness production system in the Cerrado, as it is known today, was a gradual process, but its initial milestone dates back to the 1970s, under the military dictatorship, with the

creation of the Cerrado Development Program (POLOCENTRO) in 1975. The program aimed to modernize and expand agriculture and livestock production in Brazil's Central-West region and in western Minas Gerais, transforming areas considered 'unproductive' into large-scale agricultural production hubs focused on grains and animal protein.

The program mobilized financial resources and infrastructure, while the Brazilian Agricultural Research Corporation (EMBRAPA) provided the technological foundation. It was followed by the Japan-Brazil Cooperation Program for the Agricultural Development of the Cerrados (PRODECER) and the Agricultural Development Program (PRODEAGRO), both aimed at supporting agricultural production through the refinement of a productive model conceived and replicated by the Green Revolution, which responded to the expansionist ambitions of large landowners from southern Brazil ('gaúchos')[19]. Ignoring the biome's rich sociobiodiversity, this model was characterized by the continuous expansion of monoculture led by large agribusiness companies, whose technological base relied on mechanization and the intensive use of chemical inputs and, more recently, the incorporation of biotechnology, digital management, and artificial intelligence. The channeling of substantial credit to the sector at very low interest rates, even considering inflationary conditions, ensured the rapid spread and consolidation of this model[20].

The first official document to map 'Priority areas for conservation, sustainable use, and benefit sharing in Brazilian biomes', published in 2004[21], devoted relatively little attention to the Cerrado. This was likely because the biome accounted for only 10% of the 900 areas identified as priorities for biodiversity conservation in Brazil, which were largely concentrated in the Amazon (43%) and the Atlantic Forest (20%). On the positive side, the document aligns with the guidelines of the Convention on Biological Diversity[22] and supports the inclusion of Brazilian biomes in the Biosphere Reserve map of UNESCO's Man and the Biosphere (MAB) Programme[23]. Within this framework, the Brazilian Cerrado Biosphere Reserve stands out for incorporating not only natural landscapes but also water resources. In 1999, the Cerrado was recognized as a biodiversity hotspot—a designation that conveys both recognition and a warning about the biome's severe level of degradation, currently estimated at around 50% loss of original vegetation, according to MapBiomas[24].

In 1994, the Project for the Conservation and Sustainable Use of Brazilian Biological Diversity (PROBIO) was launched, providing the first comprehensive survey of remaining native vegetation across Brazil's six biomes. The initiative aimed to generate evidence and recommend policy instruments to support the formulation of public policies and the sustainable use of the country's biodiversity. It marked the first major publication of the Ministry of the Environment (MMA)—then known as the Ministry of the Environment and the Legal Amazon[25]—and explicitly acknowledged the role of traditional populations in shaping and safeguarding the biodiversity of the Cerrado, stating that:

> The Cerrado's natural landscape—expressed through a wide range of vegetation types that harbor endemic species, traditional knowledge, distinctive cultures, and striking scenery—is rapidly being converted into soybean and cotton monocultures and cattle pasture[26(11)].

The issue, however, was confined to a single sentence in the introduction and does not reappear throughout the document's 118 pages—a striking omission, given that the same document gestures toward the possibility of the country benefiting from the ecosystem services it provides to the world by highlighting the importance of studies on ecological–economic valuation. After all, the sustained and reliable provision of ecosystem services is only possible under conditions of ecological balance, which in turn depends on the conservation of biodiversity.

The first federal government policy specifically aimed at environmental conservation in the Cerrado was the Sustainable Cerrado Program (PCS), launched in 2005 by Brazil's Ministry of the Environment (MMA) in partnership with the United Nations Development Program (UNDP). In 2010, the program was strengthened through funding leveraged from the Global Environment Facility (GEF), administered by the World Bank, and expanded its scope by acknowledging the rapid agricultural expansion and resulting deforestation, driven by agribusiness. However, the program was discontinued in 2020, during the government of Jair Bolsonaro, eliminating a key instrument for addressing the damage caused by predatory agribusiness and leading to the near dismantling of an already fragile state apparatus specifically dedicated to the environmental protection of the Cerrado[27].

Brazil's environmental policies reached their high point between 2003 and 2010, during the first two Lula administration. This period was marked by a combination of institutional strengthening measures—such as the expansion of the Ministry of the Environment and the creation of the Chico Mendes Institute for Biodiversity Conservation (ICMBio, Law No. 11,516/2007)[28]—the introduction of new command-and-control instruments, notably to curb deforestation (the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon, PPCDAm, launched in 2004)[29], the advancement of key legislation (the National Policy on Climate Change, Law No. 12,187/2009)[30], and Brazil's active engagement in global climate debates, including the ratification of the Kyoto Protocol (2005)[31] and the creation of the Amazon Fund (2008)[32]. Taken together, these federal initiatives—by prioritizing the environmental agenda and integrating them into development policies—fostered the perception that environmental policy had been elevated to a higher level.

At that time, it was not yet evident that the Cerrado had been largely 'spared' as a primary target of these policies. During this period, in Brazil's Central-West region, only the state of Mato Grosso—then the country's largest producer of soybeans, cotton, and cattle—came under sustained pressure, as it led national deforestation rates (25% of the total) and had become the epicenter of socio-environmental conflicts[6]. These pressures resulted in two measures: the Soy Moratorium of 2006, an agreement with the private sector not to market soy produced on areas deforested after 2008 in the Amazonian portion of the state of Mato Grosso, and the Ecological–Economic Zoning (ZEE), formally established by State Law No. 7,350 of 2002, although only implemented in 2010. Its centrality in agribusiness made Mato Grosso the state that received the greatest amount of technical support from Embrapa[33].

A key element in the protection of the Cerrado was the expansion of the protected areas system of Conservation Units (UC). Between 2003 and 2010, the federal government created 84 protected areas nationwide, 32 of which were located in the Cerrado, functioning as barriers to the advance of deforestation. In addition, the Environmental Crimes Law (Law No. 9,605/1998) was more actively enforced, supported by the strengthening of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and the creation of the ICMBio in 2007, responsible for managing federal conservation units. By 2010, 8.2% of the Cerrado's total area was under legal protection (UCs) through strictly protected areas and Indigenous Lands. When protected areas designated for sustainable use are also taken into account, this share increases to approximately 12–13% of the biome[34]. It is important to note that more than 80% of the Cerrado consists of privately owned rural properties, which nonetheless contain 62% of the biome's remaining native vegetation. As a result, most of its biodiversity lies under private control, in the form of Legal Reserves and Permanent Preservation Areas (APP), which do not always follow the principles of the sociobiodiversity economy.

In the geopolitical arena, Brazil has begun to play a more active role in global climate change debates. In 2009, the National Policy on Climate Change was enacted, establishing voluntary emissions-reduction targets, including a commitment to reduce deforestation by 80% by 2020. In addition, the Amazon Fund was created in 2008 by Federal Decree No. 6,527. Financed primarily by Norway, the fund supported conservation and sustainable development projects in the Amazon and allowed up to 20% of its resources to be allocated to other Brazilian biomes. These measures were accompanied by the ratification of international agreements, such as the Kyoto Protocol, consolidating Brazil's position as a relevant actor in global climate negotiations.

Resistance to the expansion of environmental policies adopted between 2003 and 2010 in the Cerrado emerged quickly. At the time, the economy was growing on the back of the commodities boom, with exports reaching 64.6% by the end of 2010[35]. Some of these gains were later undermined, particularly because of political shifts and the weakening of enforcement agencies. An analysis of this period shows that the effectiveness of environmental policy depends not only on command-and-control measures, but also on institutional continuity and political will. The legacy of this decade remains a key reference point in current debates on biodiversity conservation in Brazil.

The Low-Carbon Agriculture (ABC) Cerrado program, implemented under the first phase of the Low-Carbon Agriculture Plan (2010–2020)[36], aimed to finance sustainable technologies on rural properties to reduce greenhouse gas emissions from intensive land use—particularly degraded pastures—while promoting productivity and environmental conservation. The initiative was initially welcomed with enthusiasm by progressive sectors, as it raised expectations of a shift in the orientation of agricultural policy. In practice, however, it fell short of its goals: the credit made available primarily benefited medium- and large-scale producers with access to technical assistance and secure land tenure, while smallholders and family farmers faced significant barriers to participation[37]. Data from the Ministry of Agriculture indicate that less than 8% of the financing was allocated to family farming. The area covered by the program (1.8 million hectares) was insignificant compared to the estimated 30 million hectares[38] of degraded pastures in the Cerrado. The program also failed to meet its training objectives: efforts to build capacity in pasture restoration and rotation benefited mainly medium- and large-scale producers, while smallholders were largely excluded[39].

In the current ABC+ Program[40], covering the period 2021–2030, the targets are more ambitious, but implementation challenges have increased in the face of climate change impacts. Even so, the document does not refer to adaptation policies towards biodiversity conservation. Instead, it focuses on the dissemination of 'new technologies', such as bio-inputs, irrigated systems, and feedlot finishing of cattle, whose conservation benefits remain insufficiently demonstrated. In today's Cerrado context—marked by high land speculation, rising global demand for commodities, and weak governance—the risk that these technologies may actually accelerate environmental degradation is significant.

The target remains the recovery of 30 million hectares of pastures in advanced stages of degradation. Although ecological restoration has become central to climate finance strategies, it is still unclear whether resources will reach smallholders or be directed primarily toward restoring degraded areas on large-scale export-oriented monoculture farms. In the latter case, there is also a risk of a rebound effect: by increasing productivity on already cleared land through pasture recovery, producers may be incentivized to use the resulting income gains or freed-up land to expand their activities into native vegetation areas Additionally, studies warn that one of the most

challenging obstacles to successful restoration will be the expansion and improvement of rural extension services, whose shortcomings were highlighted in evaluations of the first phase[39]. All indications suggest that attempting to fill this gap at this stage will not necessarily lead to effective policy outcomes, even though Embrapa itself has begun to acknowledge—albeit belatedly—its shortcomings in rural extension (Diálogos pelo Clima, an event hosted by Embrapa in May 2025)[41].

Launched in 2010, the Action Plan for the Prevention and Control of Deforestation and Fires in the Cerrado (PPCerrado)[42] marked the official recognition of the need to protect the biome, which until then had been widely regarded as the world's 'agricultural powerhouse', where agribusiness production expanded with virtually no environmental regulation. It is worth recalling that Lula's first two terms coincided with the so-called commodities boom, which elevated agribusiness leaders, such as JBS, to the status of national champions, granting them access to substantial public funding, particularly from the Brazilian National Development Bank (BNDES).

The PPCerrado is part of Brazil's National Climate Change Policy and was responsible for developing land-cover monitoring systems to guide public policymaking and support enforcement actions in the Cerrado biome. In theory, the program helped identify priorities in national environmental policy and served as a reference for the allocation of international funding—most notably through international cooperation projects negotiated by the federal government. These include the Forest Investment Program for the Cerrado (FIP-Cerrado) under the Climate Investment Funds (CIF), administered by the World Bank, with disbursements carried out by the Inter-American Development Bank (IDB). This initiative contributed to the regularization of the Rural Environmental Registry (CAR) for large agricultural producers. One of the FIP's objectives is to implement the National Forest Inventory (IFN) in the Cerrado biome, which will provide 'estimates of forest cover area and different land uses; forest dynamics, fragmentation, health, and vitality; the diversity and abundance of forest species; trees outside forests; estimates of forest stocks (volume and biomass); and above- and below-ground carbon stocks', among other outputs[43]. All indications suggest that these outputs will be used to underpin carbon projects rather than to support the sociobiodiversity-based economy. In other words, by converting ecosystem conservation into spatial data, statistics, and carbon metrics, conservation is transformed into a tradable asset in the market.

The PPCerrado acknowledges that the economic and social arrangements associated with sociobiodiversity products in the biome are not integrated into global trade chains, receiving limited state support and little attention from society. In the absence of regulation and institutional incentives, production is not organized in a way that allows for pricing structures capable of ensuring meaningful market insertion[44]. The document also identifies a key gap in the lack of information on native species with potential to support sociobiodiversity-based value chains and includes this as one of the program's goals, although it has not yet been implemented. Furthermore, although a 20% reduction in deforestation in the Cerrado was recorded between August 2024 and July 2025[44], the program has yet to release any concrete results.

As noted above, the environmental agenda was strengthened during the Workers' Party (PT) administrations (2003–2016), but it consistently coexisted with ambiguities and conflicts typical of democratic regimes built on broad political coalitions, most of whose members leaned conservative. Lula's first term coincided with the consolidation of the rural caucus (*bancada ruralista*) as a major political force in Congress, driven by the peak of the commodities boom[45]. The financial gains from exports helped the federal government fulfill its campaign promise to implement redistributive policies aimed at reducing Brazil's

historically high levels of inequality. In Lula's second term (2007–2011), the federal government incorporated a territorial approach into public policies targeting traditional communities, seeking, among other objectives, to promote sociobiodiversity-based value chains.

Sociobiodiversity, biodiversity, and the territorial approach

The concept of sociobiodiversity, as defined in Interministerial Ordinance No. 239 of 21 July 2009[46]—issued by the Ministry of Agrarian Development (MDA), the Ministry of Social Development (MDS), and the Ministry of the Environment (MMA), which established the National Plan for the Promotion of Sociobiodiversity Value Chains—is straightforward: it refers to the 'interrelation between biological diversity and the diversity of the sociocultural systems', but the products, services, and raw materials that characterize sociobiodiversity value chains are derived from biodiversity resources. As such, the existence and viability of these chains depend on the conservation of biological diversity, as well as on the ability of traditional communities and family farmers to access and use these resources sustainably. Given the critical state of biodiversity loss in the Cerrado—the most deforested biome in the country[47]—the implementation of the National Plan for Native Vegetation Recovery (PLANAVEG) is urgent. It highlights the ecological function of ecosystems beyond mere green cover, emphasizing the importance of ecological corridors[48].

Six years earlier, in 2003, the Ministry of Agrarian Development (MDA) had already established the National Program for the Development of Rural Territories (PRONAT), which preceded the National Policy for the Sustainable Development of Traditional Peoples and Communities (PNPCT, 2007). Together, these initiatives marked a shift in Brazil's agricultural policy paradigm in relation to traditional peoples and communities, promoting their productive inclusion through participatory approaches adapted to local realities. Before PRONAT, rural policies were sector-based and uniform, without taking regional differences into account.

The territorial approach introduced the idea that development should be planned based on the specific characteristics of each territory and its cultural identity, paving the way for policies such as the Food Acquisition Program (PAA), created in 2003, which involves the purchase of food from family farmers and traditional peoples to supply populations in situations of food insecurity, and the National School Feeding Program (PNAE), which provides school meals with products sourced from local family farmers. These remain, to this day, the most consistent instruments for productive inclusion linked to sociobiodiversity-based products. Although there are no comprehensive statistics for these programs across the entire biome Cerrado, localized studies have found that, despite the wide diversity of native fruits, these products are not effectively incorporated into school meals or into the production systems of family farmers[49].

The territorial approach broadened the scope of sociobiodiversity-related policies across the country, but its effectiveness depends on territorial control by Indigenous peoples and traditional populations living in these areas. A significant step forward was taken in June 2024, with the approval by the Committee on Environment and Sustainable Development (CMADS) of the Chamber of Deputies of Bill No. 4,347/2021, which sought to elevate the National Policy on Territorial and Environmental Management of Indigenous Lands (PNGATI) to the status of law, replacing its previous regulation under Decree No. 7,747/2012. In June 2025, the bill advanced in the Senate's Committee on the Amazon and Indigenous and Traditional Peoples. It was expected that, by COP30 in November 2025, the law would have been approved and enacted, which ultimately did not happen. The proposed legislation represents a shift in paradigm from a policy of 'protection' to one

of 'autonomous sustainable management', in which the state recognizes Indigenous peoples as legitimate stewards of their territories. For other traditional populations and communities, however, this goal remains distant.

Driven from 2003 onwards by the creation of the Secretariat for Territorial Development (SDT) within the Ministry of Agrarian Development (MDA), and consolidated in the 2004–2007 Pluriannual Plan (PPA), the Sustainable Rural Territorial Development Plans (PTDRS) emerged from an ongoing process of participatory planning aimed at reconciling economic development, social justice, and environmental conservation. However, the PTDRS were gradually dismantled after 2016, under the Temer administration, and more rapidly during the Bolsonaro government, when ministries and secretariats responsible for territorial policy were extinguished or merged, including the SDT and MDA themselves. Without a dedicated federal coordinating body, the policy lost its institutional anchor. Not coincidentally, this dismantling coincided with the formal establishment of the MATOPIBA region in 2015, which marked a new phase in the financialization of the Cerrado, as previously discussed. More recently, this territorial policy has been revived by the MDA, although its capacity for coordination and intervention has been significantly weakened.

The current situation of existing PTDRS in the Cerrado illustrates the instability of policies directed at the biome. Territories such as Bico do Papagaio (TO/MA), Alto Rio Pardo (MG/BA), and southern Maranhão, which once had participatory plans designed to organize sociobiodiversity value chains, saw their governance structures gradually hollowed out following the institutional dismantling that began in 2016. The abandonment of these integrated planning instruments has left traditional populations even more vulnerable to the advance of predatory agribusiness, highlighting the link between the pace of environmental degradation and the weakness of state responses. As noted by Perafán[50] the territorial approach had been seen as a potential alternative capable of resisting the hegemony of agricultural modernization, but this expectation ultimately did not materialize[51].

Policies to strengthen sociobiodiversity value chains

The Minimum Price Guarantee Policy for Sociobiodiversity Products (PGPM-Bio), established by Law No. 12,512 of 2011, represents one of the most ambitious legal milestones at the intersection of environmental conservation, social justice, and rural development. Designed as a market-stabilization instrument and a mechanism for risk reduction for biodiversity stewards, its trajectory illustrates both the potential of innovative public policies and the structural constraints that limit their effectiveness. Its logic is straightforward: to economically protect those who protect the environment. By setting minimum prices for a basket of sustainably extractive products such as Brazil nuts, *babaçu*, *pequi*, native *açaí*, and natural rubber, the policy aims to cushion seasonal price volatility—common in forest and Cerrado products; guarantee a minimum income for traditional communities and family farmers, reducing pressure toward predatory activities; encourage the maintenance of agroecological and extractivist production systems; and serve as collateral for access to credit, since guaranteed prices reduce lenders' risk. The policy operates through subsidies provided by the National Supply Company (CONAB), which complement low market prices. In theory, this would allow producers to sell to the government at the minimum price during periods of depressed prices, helping to stabilize the market and functioning as a social and environmental safety net[52].

The Family Farming Safra Plan, launched in 2012, is a program aimed at the productive inclusion of rural, forest, and riverine populations, providing opportunities for rural youth and women while ensuring rights for

Indigenous peoples and quilombola communities. In 2025, funding for the National Program for Strengthening Family Agriculture (PRONAF)—the main component of the Safra Plan—amounted to approximately R$ 78.2 billion, representing 88% of the resources announced for the 2025/2026 agricultural cycle. One of the innovations is PRONAF B Agroecology, which offers microcredit of up to R$ 20,000 with an annual interest rate of 0.5% and a 40% repayment bonus (a discount on instalments paid on time). In addition to PRONAF B Quintais Produtivos (productive backyards) for Rural Women, with similar conditions, the Program for the Valorization of Sociobiodiversity and Extractivism - SOCIOBIO MAIS (formely PGPM-Bio) was created, guaranteeing minimum prices for products such as pirarucu fish and natural rubber from the Amazon, as well as *babaçu*, a native species of the Cerrado. CONAB supports the marketing of these products and the development of extractive communities through the Direct Subsidy to Extractivist Producers (SDPE), which consists of a bonus payment when producers prove the sale of extractive products at prices below the minimum level set by the federal government and calculated by CONAB[53].

In June 2025, the Ministry of Agrarian Development launched the National Program for the Strengthening of Sociobiodiversity (PRO-SOCIOBIO), aimed at promoting sustainable development and the conservation of Brazil's biomes through the structuring of sociobiodiversity value chains. The program focuses on products from fields, waters, and forests, while also increasing the supply of healthy food, particularly through agroforestry systems. It provides technical assistance, rural extension services, and credit, as well as support for the opening of new public and private markets and incentives for research and innovation, in partnership with institutions such as the National Agency for Technical Assistance and Rural Extension (ANATER), the National Institute for Colonization and Agrarian Reform (INCRA), the National Supply Company (CONAB), and the German Agency for International Cooperation (GIZ). However, only the Amazon biome was included in the first public call.

Although the MDA's efforts to promote sociobiodiversity are evident in initiatives such as the PRONAF Bioeconomia program, which mobilized R$ 1.86 billion between 2024 and 2025, transparency in the spatial distribution of these resources remains a challenge. There is no consolidated public data specifying what share of this funding was effectively allocated to the Cerrado, which in itself highlights the difficulty of targeting and monitoring policies at the biome level. The lack of detailed public information on the distribution of benefits by biome is, in itself, an indicator of its low policy priority. Available evidence suggests that persistent barriers hinder access: lack of information, insufficient specialized technical assistance, competition with the agribusiness-oriented structure within the Ministry of Agriculture, and, above all, territorial pressure that undermines the very resource base of sociobiodiversity.

Traditional populations and statistical invisibility

By recognizing the ethnic and territorial specificities of Indigenous and quilombola peoples, the 1988 Brazilian Constitution placed these groups at the very core of Brazil's political and administrative framework. However, it was unable to break with the historical invisibility to which they had long been subjected. It was only in the 2000s that infra-constitutional laws were enacted to address the intrinsic relationship between identity and territoriality that distinguishes these groups. Through Decree No. 6,040 of February 7, 2007, the National Policy for the Sustainable Development of Traditional Peoples and Communities (PNPCT) was established, recognizing these populations as rights-bearing subjects who claim the right to specific identities and

who adopt their own forms of organization, closely tied to territory and natural resources. Although the 63 quilombola territories in the Cerrado cover only 500,000 hectares, they are among the best-preserved areas of the biome and have the lowest rates of deforestation[54]. A notable example is the Kalunga Quilombo, which retains 83% of its native vegetation and has been recognized by the United Nations as Indigenous and Community Conserved Areas (ICCAs – also known as Territories of Life).

The invisibility of information on traditional peoples and communities constitutes a form of exclusion that places certain individuals and groups at the margins of public policy, whether because bureaucratic structures are unable to identify them and therefore fail to include them in their systems, or because of a lack of documentation, barriers to access, or flaws in policy design. The absence of a specific National Classification of Economic Activities (CNAE) for sociobiodiversity products, for example, hampers the formalization of producers by preventing their businesses from being properly characterized and registered, while also creating obstacles to accessing financing and participating in bidding processes.

Key health policy initiatives focused on sociobiodiversity in the Cerrado

The notion of sociobiodiversity, regardless of differing definitions, consistently encompasses the interaction between biological and sociocultural diversity, implying recognition of the knowledge produced by traditional communities in their relationship with nature[55,56]. The relationship between sociobiodiversity and health includes the preservation of genetic resources, knowledge of medicinal plants and traditional food systems, therapeutic knowledge, and care practices[6,57,58]—mechanisms that are not only potentially sustainable but also help ensure the well-being and health of traditional communities by preserving their ways of life.

The review conducted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) on biodiversity and ecosystem services in the Americas[59] highlights that 'cultural continuity' among Indigenous peoples and local communities has given rise to a range of biodiversity-based systems, such as polyculture and agroforestry systems, which provide livelihoods, food, and health, and which, through diversification, contribute to increased biodiversity and shape landscapes[60]. The link between sustainability—through the preservation of traditional communities' ways of life—and the challenge to the agribusiness model is reflected in sustainable production initiatives, to which health can make an important contribution. However, policies in this area remain very weak.

Among the national policies that contribute to the preservation of traditional communities and are particularly relevant in the Cerrado is the National Policy for Comprehensive Healthcare for Rural and Forest Populations (PNSIPCF)[61], which was amended in 2014 to include water-based populations (National Policy for Comprehensive Healthcare for Rural, Forest and Waters Populations – PNSIPCFA). The PNSIPCFA results from the recognition—established under the PNPCT—of the specific characteristics of traditional peoples and communities and their vulnerability, reflected in higher levels of poverty and income inequality, as well as health inequities. The Terra Group, a coordinating body within the Ministry of Health (MS) that works in partnership with social movements, is responsible for monitoring the PNSIPCFA. The group was re-established in 2023 after having been dissolved under the Bolsonaro administration. In a recent presentation of this monitoring process, the weaknesses of the policy became evident (MS/Terra Group, 2023). Among them is the social invisibility of these populations, as reflected in official data and information systems that do not adequately reach their territories, thereby preventing the identification of their social conditions as collective populations and, consequently, hindering the development of collective solutions.

These health conditions are related to inequalities in land ownership structures and land tenure regularization, to pressures exerted by agribusiness, and to recent restrictions on family farming policy and the Food Acquisition Program (PAA), which recorded a 74% reduction between 2013 and 2026[2]. The pressure on these populations to maintain income and access to land is marked by violence and conflict, producing what Rigotto et al.[2], drawing on the testimonies of women from a Cerrado community, describe as 'disquiet'—a set of vulnerabilities and risks experienced daily as a result of such insecurity.

Three aspects can be highlighted in the results of the PNSIPCFA to date. Regarding the lack of data, a 2025 technical note from the Ministry of Health (MS) appropriately acknowledges the problem and presents plausible solutions but does not establish targets or timelines for their implementation, which may become yet another factor contributing to the policy's ineffectiveness. In primary care—a highly institutionalized policy area—an extensive body of studies has already identified significant gaps[63,64], which have been addressed through the expansion of Primary Health Units (UBS) and through specific solutions for areas with limited service availability or remote locations. In the case of the Cerrado, the main problems include territorial dispersion and weak territorialization for ensuring adequate coverage, long distances to UBS facilities, and a lack of professionals prepared for rural realities[65]. Moreover, services in the region have not received the same level of attention as other areas.

Another relevant aspect—and perhaps the greatest challenge for the PNSIPCFA—is intersectorality. As demonstrated by studies by Carneiro and colleagues[66], the health of these populations depends on factors related to several fields beyond health, such as water, land use, education, the environment, labor, and others. This is a central issue in all Brazilian social policies, which are able to recognize the breadth of social problems and relate them to a set of conditions external to the policies themselves. However, it is not enough to identify these relationships, include representatives from different sectors, or create intersectoral working groups, despite the importance of these mechanisms. Particularly in decentralized policies such as health and other social policies, intersectorality requires an effort of integrated coordination across distinct levels of government, which is either very weak or non-existent in this case[67], and where progress is still needed. Intersectoral policies require horizontal linkages and mechanisms of cooperation and coordination to achieve common objectives, address gaps, and avoid overlaps in the provision of public goods[68,69]. In the case of local and regional policies, implementation based on locally negotiated solutions will be particularly weak in the absence of appropriate supporting mechanisms. Moreover, the fragmented structure of the state—in institutional, budgetary, and bureaucratic terms—does not facilitate this process. Contradictions in legislation, administrative conflicts between state and governmental agencies, and the role of frontline professionals can all hinder the implementation of national policies at the local level[70,71]. Even so, implementation may help create an enabling environment that fosters support and negotiations in favor of the sociobiodiversity of Cerrado territories[72].

Other policies that face similar implementation challenges, but are equally relevant to sociobiodiversity in the Cerrado, include the National Policy on Integrative and Complementary Practices (PNPIC) and the National Policy on Medicinal Plants and Herbal Medicines (PNPMF).

The National Policy on Integrative and Complementary Practices (PNPIC), established in 2006, recognizes complementary therapies and healing practices already present in society—particularly those rooted in traditional knowledge—and incorporates them into healthcare services, especially within primary care. The PNPIC promotes socio-biodiversity by creating space for more sustainable care

practices. It also foresees investment in research and in the training of professionals working with integrative practices, linking health with education and the environment, and introducing into Brazil's Unified Health System (SUS) a non-hegemonic logic that goes beyond the biomedical model, including the participation of traditional communities. Silva et al.[73] conducted a comprehensive review of 30 years of PNPIC implementation, highlighting its definitive incorporation into the SUS. However, they concluded that its institutionalization remains weak, given the lack of dedicated funding, the shortage of trained professionals, and the fact that it is not a priority within primary healthcare, among other issues.

The National Policy on Medicinal Plants and Herbal Medicines (PNPMF) is another example of a health-sector initiative aimed at socio-biodiversity-based alternatives. Emerging from the PNPIC, the PNPMF was also established in 2006 and introduced a significant dimension of sustainable production grounded in traditional practices, fostering environmentally responsible value chains centered on medicinal plants. Its objective was to strengthen the national industry by supporting local economies and community-based expertise, while encouraging sustainable use and income generation[74]. It also provided for the active involvement of traditional communities in safeguarding genetic resources linked to their cultural practices. According to Mesquita[74], despite its contribution to biodiversity conservation, the policy's implementation has been weak, owing to insufficient infrastructure, limited technical assistance, lack of funding, and excessive bureaucratic barriers. The persistent failure to recognize traditional knowledge about medicinal plants—long excluded by the prevailing medical logic embedded in health policy—has limited the development of plant-based medicines[74]. While the PNPMF has encountered difficulties in being integrated into the SUS, the realization of its national industrial potential has proven even more challenging. For instance, the 2009 National Program on Medicinal Plants and Herbal Medicines, which includes the Farmácia Viva Program, envisaged the incorporation of herbal medicines into the Farmácia Popular system, a provision that was never implemented.

Several socio-biodiversity models could be encouraged within the SUS, such as Local Productive Arrangements (APLs). Gadelha et al.[75] highlight APLs focused on the extraction of medicinal raw-material inputs, as well as on the production and procurement of sustainable goods and services adapted to the specific conditions of different regions. They also point to alternatives such as microcredit schemes, community currencies, and solidarity-economy enterprises, together with purchasing and contracting policies that favor local and regional companies and cooperatives with socio-environmental responsibility. Such initiatives would strengthen partnerships and productive chains, helping to prevent what they describe as 'development leakages'[75].

It becomes clear that the most relevant policies from a socio-biodiversity perspective in health remain highly marginal, both within the organization of healthcare and the SUS, as well as in the promotion of sustainable development initiatives. This marginality is even more pronounced in the case of the Cerrado, given the difficulty of confronting the agro-export model. There is a significant lack of public policy initiatives affecting not only traditional peoples and communities but also socio-biodiversity more broadly.

Final considerations

Health and environmental policies have never been effectively integrated at the federal level in Brazil, despite repeated intentions to do so. A telling example of this disconnect is Decree No. 4,339 of 2002, which set out the guidelines for the National Biodiversity Policy and already emphasized the importance of the relationship between health and the environment in linking

biodiversity to public health, well before more contemporary notions of sociobiodiversity had emerged. These guidelines included provisions on regulating the use of genetically modified products, the need to train health workers on biodiversity-related issues, and the promotion and support of research on the health impacts of environmental change. Paradoxically, as measures to protect biodiversity—and the Cerrado biome in particular—were expanded, they increasingly drifted away from the health sector.

Decree No. 4,703 of May 21, 2003, which guides the implementation of the National Biodiversity Policy through the National Biodiversity Program (PRONABIO) and the National Biodiversity Commission, included the Ministry of Health among its collegiate members; however, issues related to human health were not addressed in the thematic components of PRONABIO. Subsequently, Ordinance No. 361 of September 12, 2003, issued by the Ministry of the Environment, established the Cerrado Working Group within the Secretariat for Biodiversity and Forests, with the aim of supporting policies and actions for the sustainable development of the biome. The working group brought together several ministries and organizations representing local communities and, on the scientific front, the Brazilian Society for the Advancement of Science (SBPC). Notably, the Ministry of Health was not included, even though this working group ultimately gave rise to the Sustainable Cerrado Program.

The underlying assumption is that the parallel expansion of the health and environmental sectors during Lula's first administration required distinct processes of institutional strengthening. In the health sector, priority was given to medical care as a central pillar for realizing the universal right to health. In the environmental field, efforts focused on the creation of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the protection of the Amazon, and Brazil's growing engagement in international debates on climate change.

Ultimately, the integrative intention within the public sphere dissolves when policies are implemented through separate ministries and autonomous agencies, each governed by distinct priorities and budgets. In day-to-day administration, when the state apparatus fails to reach certain groups, bureaucratic barriers tend to persist and, in the end, the creation of new public policies is brought to a standstill.

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Authorship contributions

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