Legal Protection of Land and Land Use as Challenges for Climate Policy in Brazil: Rural Livelihoods, Agricultural Production, and Food Security

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This article analyzes the role of soil protection in the Brazilian legal system as a key factor for climate policy, food security, and livelihoods in rural areas. Despite existing instruments, regulatory fragmentation, institutional setbacks, and the expansion of the agricultural industry hinder effective protection. To solve this problem, a general soil protection law, the strengthening of existing mechanisms, and a just transition are proposed.

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I. Introduction

In recent decades, land has gained increasing prominence in global environmental governance, not only as an essential resource for agricultural production and rural livelihoods but also as a strategic focus of climate policy. This article examines how the Brazilian legal framework addresses the protection of this resource—vital for food security and for tackling climate change—while questioning its normative and institutional effectiveness.

The relevance of the issue arises from frequent tensions between environmental preservation and agricultural expansion, further aggravated by regulatory fragmentation and the erosion of licensing mechanisms. Exploring the intersections of environmental law, public policy, and climate governance is crucial to supporting legal reforms capable of ensuring sustainable land use, advancing socio-environmental justice, and strengthening resilience to ecological crises.

This study addresses a central question: how can Brazil's legal framework for land use be improved so that it responds effectively to contemporary climate and social challenges? The underlying hypothesis is that, despite existing legal foundations, the country lacks a comprehensive and integrated legal instrument dedicated to land governance, which weakens protection and hinders the alignment of environmental justice, rural development, and climate mitigation.

The overarching aim is to analyze the current legal instruments, as well as institutional gaps, in order to propose regulatory pathways capable of consolidating effective land governance. To this end, the article seeks to map the existing legal framework (the Constitution, the National Environmental Policy Act, the Forest Code, and climate legislation); assess legal and regulatory challenges—such as fragmentation and setbacks in licensing; and systematize possible alternatives, including the adoption of a general land law, the strengthening of existing instruments, socio-environmental incentives, and just transition mechanisms.

This work engages with key doctrinal contributions in administrative sanctioning law, particularly those of Rebollo Puig (2005, 2015), who systematizes the limits and safeguards of administrative enforcement; Alejandro Nieto (2012), who conceptualizes administrative sanctioning law as an autonomous sphere essential to regulatory effectiveness; and Marcelo Caetano (1996), who illuminates the principles guiding the socio-environmental function of property and the precautionary principle.

The methodological approach is qualitative, combining documentary analysis of laws, reports, and public policies with a literature review and critical engagement with specialized scholarship.

The article is structured as follows: after this introduction, Part II presents the legal and institutional foundations of land governance; Part III analyzes its climatic and productive functions; Part IV discusses legal and regulatory challenges; and Part V proposes legal-political pathways to strengthen protection and foster a balanced and sustainable transition in land use.

II. Legal and Institutional Foundations

Brazil has a robust legal framework for environmental protection, within which land is recognized as a legal asset essential to sustainability and social well-being. At the constitutional level, Article 225 of the Federal Constitution enshrines the right to an ecologically balanced environment, imposing on both the State and society the duty to safeguard its preservation. Complementing this constitutional

mandate, Act No. 6,938/1981 established the National Environmental Policy as a central instrument for the domestic regulation of environmental protection[4].

Among the most significant legal provisions are the Forest Code (Act No. 12,651/2012), which introduced instruments such as Permanent Preservation Areas, Legal Reserves, and the Rural Environmental Registry (CAR)[5]; and Act No. 9,605/1998, which regulates criminal and administrative sanctions for environmentally harmful conduct, further detailed by Decree No. 6,514/2008, which sets out the administrative procedures for investigating and applying such sanctions[6]. Together, these instruments aim to ensure conservation, adaptation to climate change, and the promotion of food security, in alignment with international guidelines.

These legal and institutional foundations will be examined in greater detail in the subsections that follow. Particular attention will be given to constitutional principles and the National Environmental Policy, the legal framework for land conservation, and climate-related instruments integrated into the agricultural sector, in order to demonstrate their interdependence within the broader context of Brazilian climate policy.

1. Constitutional Principles and the National Environmental Policy (PNMA)

The 1988 Federal Constitution enshrined, in Article 225, the right to an ecologically balanced environment as a fundamental right of all, imposing on both the State and society the duty to defend and preserve it for present and future generations[7]. Within this framework, several guiding principles of land protection stand out—prevention, precaution, the polluter-pays principle, and the socio-environmental function of property—all of which shape the implementation of public policies and inform judicial interpretation[8].

The National Environmental Policy, established by Act No. 6,938/1981, consolidated instruments for the rational use of environmental resources, including land, and created mechanisms for the recovery of degraded areas[9]. These legal and institutional foundations provide the basis for understanding the central role of land in Brazilian environmental and climate policies.

2. Legal Frameworks for Land Conservation

The Brazilian Forest Code (Act No. 12,651/2012) stands as one of the main legal milestones for land protection in Brazil. It requires the maintenance of Permanent Preservation Areas (APPs) and Legal Reserves, and it established the Rural Environmental Registry (CAR) as an instrument for

[4] BRASIL. Lei nº 6.938, de 31 de agosto de 1981. Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação, e dá outras providências. Disponível em: http://www.planalto.gov.br/ccivil_03/leis/L6938.htm. Acesso em: 24 ago. 2025.

[5] BRASIL. Lei nº 12.651, de 25 de maio de 2012. Dispõe sobre a proteção da vegetação nativa e institui normas gerais sobre Áreas de Preservação Permanente, Reserva Legal e Cadastro Ambiental Rural. Disponível em: http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/L12651.htm. Acesso em: 24 ago. 2025.

[6] BRASIL. Decreto nº 6.514, de 22 de julho de 2008. Dispõe sobre as infrações e sanções administrativas ao meio ambiente, estabelece o processo administrativo federal para apuração destas infrações, e dá outras providências. Disponível em: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/decreto/d6514.htm. Acesso em: 24 ago. 2025

[7] BRASIL. Constituição da República Federativa do Brasil de 1988, art. 225.

[8] CAETANO, Marcelo. Princípios fundamentais do direito administrativo. Coimbra: Almedina, 1996, p. 305-320; DEZAN, Sandro. Fundamentos de direito administrativo disciplinar. Curitiba: Juruá, 2024, Item 1.8.

[9] BRASIL. Lei nº 6.938, de 31 de agosto de 1981. Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação.

environmental monitoring and compliance[10]. These legal mechanisms seek to reconcile productive land use with the preservation of native vegetation and the conservation of ecosystem services.

On the enforcement side, the Environmental Crimes Act (Act No. 9,605/1998) defines environmentally harmful conduct and establishes criminal and administrative sanctions applicable to individuals and corporations engaged in land degradation or illegal deforestation[11]. Complementing this, Decree No. 6,514/2008 regulates administrative infractions and sanctioning procedures, specifying penalties such as fines, activity embargoes, and suspension of works that violate environmental legislation[12].

Taken together, this legal framework reflects the interdependence between land protection, biome preservation, and Brazil's fulfillment of its climate commitments.

3. Climate-Integrated Agricultural Policies: ABC Plan, Agroecology, ZARC, and Other Initiatives

The ABC Plan (Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Agriculture) was formally established between 2010 and 2012 as a public policy instrument to promote sustainable production practices in Brazilian agriculture and livestock. Structured around six technological axes—including the restoration of degraded pastures, no-till farming, crop-livestock-forestry integration, biological nitrogen fixation, planted forests, and the treatment of animal waste—the plan aimed to reduce greenhouse gas (GHG) emissions, promote climate adaptation, and strengthen food security[13]. A publication by the Ministry of Agriculture (MAPA) consolidated the results of the first decade of the policy, highlighting progress and challenges and laying the foundation for the **ABC+** Plan, which operates between 2020 and 2030 with a renewed focus on governance and expanded coverage[14].

The Agricultural Zoning for Climate Risk (ZARC) represents another key policy. Regulated by Decree No. 9,841/2019, this joint initiative of MAPA and Brazilian Agricultural Research Corporation (Embrapa) provides support to producers by identifying, for each municipality and crop, the optimal planting period based on climatic, edaphic, and statistical risk data[15]. Studies indicate that its methodology—grounded in historical rainfall series, land retention capacity, and crop phenological cycles—enhances planting decisions and reduces agricultural losses, making it an essential tool for climate governance and for technically and responsible rural planning[16].

In addition to federal initiatives, policies promoting agroecology and payments for environmental services (PES) have been implemented, particularly at the state level and in support of family farming.

[10] BRASIL. Lei nº 12.651, de 25 de maio de 2012. Dispõe sobre a proteção da vegetação nativa e institui o Cadastro Ambiental Rural (CAR)

[11] BRASIL. Lei nº 9.605, de 12 de fevereiro de 1998. Dispõe sobre as sanções penais e administrativas derivadas de condutas lesivas ao meio ambiente.

[12] BRASIL. Decreto nº 6.514, de 22 de julho de 2008. Dispõe sobre as infrações e sanções administrativas ao meio ambiente.

[13] BRASIL, Ministério da Agricultura, Pecuária e Abastecimento. Plano Setorial de Mitigação e Adaptação às Mudanças Climáticas – Plano ABC. Brasília: MAPA, 2012

[14] BRASIL, Ministério da Agricultura, Pecuária e Abastecimento. Plano ABC: Dez anos de sucesso e uma nova forma sustentável de produção agropecuária. Brasília: MAPA, 2023

[15] BRASIL, Decreto nº 9.841, de 18 de junho de 2019, institui o Programa Nacional de Zoneamento Agrícola de Risco Climático (ZARC)

[16] Estudos técnicos sobre metodologia e eficácia do ZARC: Assad, Eduardo Delgado et al. "Zoneamento agrícola de riscos climáticos do Brasil: base teórica, pesquisa e desenvolvimento", Informe Agropecuário, no. 246, 2008; Pesquisa da Embrapa e MAPA sobre aplicação do ZARC na minimização de riscos públicos e privados

These measures seek to strengthen production models that reconcile land and water conservation with farmer autonomy and resilience to climate variability.

The Brazilian legal framework consolidates a strong foundation for land protection, combining Article 225 of the 1988 Constitution, the National Environmental Policy, instruments such as Permanent Preservation Areas (APPs), Legal Reserves, and the Rural Environmental Registry (CAR) under the Brazilian Forest Code, as well as enforcement and compliance norms. This framework is reinforced by agricultural climate strategies such as the ABC/ABC+ Plans and the Agricultural Zoning for Climate Risk (ZARC)—the latter established by Decree No. 9,841/2019 to support field decisions based on climatic and edaphic analyses.

The following section explores the essential role of land in agricultural production, rural livelihoods, and food security, as well as the impacts of climate change—such as on fertility and water availability—alongside practical examples of policies including agroecological incentives and payments for environmental services.

III. Functions of Land in the Climatic and Productive Context

The robust legal framework and public policy instruments analyzed above underscore the recognition of land not only as an environmental asset but also as a cornerstone of sustainable agricultural production and climate governance. In what follows, we examine land as a foundation for agricultural production, food security, and rural livelihoods, as well as the impacts of climate change on its fertility and the effectiveness of public policies—such as agroecology and payments for environmental services—in ensuring its conservation.

1 Land as a Basis for Agricultural Production, Rural Livelihoods, and Food Security

Land provides the foundation for the production of food, fiber, and biofuels, sustaining the livelihoods of rural communities and ensuring food security[17]. It performs critical structural and ecosystem functions—such as water retention, nutrient cycling, and plant anchorage—that are essential to the productivity, efficiency, and resilience of agricultural systems[18]. Moreover, the restoration of degraded pastures through land conservation practices has shown significant potential to recover the productive capacity of these areas, thereby enhancing the sustainability of rural livelihoods[19].

2 Impacts of Climate Change on Fertility, Water Availability, and Soil Erosion

Climate change has been reducing soil moisture across several regions of Brazil, with a nationally estimated decline of 0.5% per year—ranging from losses of up to −4.4% annually in the Caatinga to slight

[17] EMBRAPA. Qualidade do solo tem impacto na produção de alimentos. Brasília, 15 abr. 2024. Disponível em: https://www.embrapa.br/busca-de-noticias/-/noticia/88451423/qualidade-do-solo-tem-impacto-na-producao-de-alimentos. Acesso em: 31 ago. 2025.

[18] EMBRAPA. Solos brasileiros — produção de alimentos, fibras e combustíveis; armazenamento de nutrientes, filtração de água, e funções estruturais. Brasília. Disponível em: https://www.embrapa.br/tema-solos-brasileiros/sobre-o-tema. Acesso em: 31 ago. 2025.

[19] EMBRAPA. Estudo revela desafios e oportunidades na recuperação de pastagens no Sudeste. Brasília, 2 ago. 2024. Disponível em: https://www.embrapa.br/busca-de-noticias/-/noticia/91408502/estudo-revela-desafios-e-oportunidades-na-recuperacao-de-pastagens-no-sudeste. Acesso em: 31 ago. 2025.

recoveries in the Pampa and Pantanal[20]. This pattern highlights the growing risks to soil fertility and the resilience of agricultural systems in the face of climatic instability. The intensification of erosive rainfall events, projected for many areas, is likely to exacerbate soil loss, deplete nutrients, reduce water availability, and increase the vulnerability of smallholders[21]. Moreover, climate models indicate that variables such as temperature and precipitation—and, consequently, rainfall erosivity—will undergo significant changes, requiring land conservation practices adapted to future scenarios[22].

3 National Experiences in Conservation: PES, Regenerative Agriculture, and Agroecological Incentives

Payment for Environmental Services (PES) initiatives have gained momentum in Brazil, particularly after the enactment of Act No. 14,119/2021, which established the National Policy on Payment for Environmental Services (PNPSA). This Act provided the legal framework necessary to strengthen the adoption of PES mechanisms across diverse regions and communities[23]. By 2021, at least 58 PES projects were already underway in the country—focused on carbon, watersheds, and biodiversity—covering millions of hectares[24].

Regenerative agriculture has also emerged as an innovative and holistic response aimed at restoring the soil's ecosystem services. According to the "Sustainable Regenerative Agriculture Standard Protocol (PARS)", this approach seeks to reverse extractive agricultural practices by promoting healthy soils, enhanced biodiversity, carbon sequestration, and improved water efficiency[25].

In parallel, agroecological initiatives—implemented by organizations such as the Center for the Study and Promotion of Group Agriculture (CEPAGRO)—have promoted the transition of family-based and Indigenous rural communities toward more sustainable practices, strengthening production networks, food security, and climate resilience[26].

We therefore conclude that soil constitutes a fundamental pillar of agricultural and livestock production, food security, and climate resilience, supported by instruments such as agroecology, PES, and regenerative agriculture. The next section examines the legal and institutional obstacles that undermine this foundation, focusing on regulatory fragmentation and the absence of a general Land Protection Act; the weakening of environmental licensing, particularly with the conversion of Bill No.

[20] LOPES RIBEIRO, F. et al. The impact of drought on soil moisture trends across Brazil's biomes. Natural Hazards and Earth System Sciences, v. 21, p. 879–897, 2020. Disponível em: https://nhess.copernicus.org/articles/21/879/2021/. Acesso em: 31 ago. 2025.

[21] ALMAGRO, A. et al. Projected climate change impacts in rainfall erosivity over Brazil. Scientific Reports, 2017. Disponível em: https://www.nature.com/articles/s41598-017-08298-y. Acesso em: 31 ago. 2025.

[22] COLMAN, C. B.; OLIVEIRA, P. T. S.; ALMAGRO, A.; SOARES-FILHO, B. S.; RODRIGUES, D. B. B. Effects of climate and land-cover changes on soil erosion in Brazilian Pantanal. Sustainability, v. 11, n. 24, art. 7053, 2019. Disponível em: https://doi.org/10.3390/su11247053. Acesso em: 31 ago. 2025.

[23] BRASIL. Lei nº 14.119, de 13 de janeiro de 2021. Institui a Política Nacional de Pagamento por Serviços Ambientais (PNPSA). Disponível em: https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-292475150. Acesso em: 31 ago. 2025.

[24] EMBRAPA. Pagamento por serviços ambientais no Brasil: diagnósticos e perspectivas. Brasília, out. 2023. Disponível em: https://www.infoteca.cnptia.embrapa.br/infoteca/bitstream/doc/1157743/1/6169.pdf. Acesso em: 31 ago. 2025.

[25] MANGABEIRA, J. A. de C.; LIMA, L. F.; et al. Protocolo Padrão de Agricultura Regenerativa Sustentável no Brasil (PARS). Texto para Discussão, Unicamp – IE; n. 483, jul. 2025. Disponível em: https://www.eco.unicamp.br/images/arquivos/artigos/TD/TD483.pdf. Acesso em: 31 ago. 2025.

[26] CENTRO DE ESTUDOS E PROMOÇÃO DA AGRICULTURA DE GRUPO (CEPAGRO). Perfil institucional e atuação agroecológica. Florianópolis: UFSC, s.d. Disponível em: https://pt.wikipedia.org/wiki/Centro_de_Estudos_e_Promo%C3%A7%C3%A3o_da_Agricultura_de_Grupo_%28CEPAGRO%29. Acesso em: 31 ago. 2025..

2,159/2021 into Act No. 15,190/2025, which reduces technical safeguards and centralizes formerly decentralized powers; and the tensions between agribusiness expansion in the Cerrado and the urgent need to conserve Brazil's biomes.

IV. Legal Challenges and Regulatory Gaps

This section discusses the legal limitations that undermine the effectiveness of soil protection in Brazil. In particular, it highlights the absence of a consolidated general framework, the uncertainties arising from the recent enactment of Act No. 15,190/2025, which introduces new modalities such as the Special Environmental License (LAE), and the growing conflict posed by agricultural expansion in ecologically sensitive biomes such as the Cerrado[27].

1 Regulatory Fragmentation and the Absence of a General Soil Protection Act

The legislative gap that hinders the establishment of a comprehensive Soil Protection Act in Brazil has resulted in persistent regulatory fragmentation. This dispersion is reflected in a multitude of sectoral instruments—such as the Forest Code, climate legislation, agricultural guidelines, and state and municipal regulations—that often operate in isolation and without institutional convergence. Such fragmentation undermines the effectiveness of land governance and prevents the formulation of integrated environmental policies capable of addressing challenges such as erosion, declining soil fertility, and water security on a national scale[28].

2 Institutional Erosion and Setbacks in Environmental Licensing

The enactment of Act No. 15,190/2025, which established the new General Environmental Licensing Act, represents a significant institutional setback. By streamlining procedures through instruments such as the Special Environmental License (LAE) and the License by Adhesion and Commitment (LAC), it weakens regulatory controls, concentrates decision-making, and diminishes both technical and public participation. Experts from the Climate Observatory warn that this framework fosters a "regulatory chaos," creating loopholes for self-licensing and reducing legal safeguards for vulnerable populations, sensitive ecosystems, and traditional territories. In doing so, it signals a more permissive legal environment at a time of escalating climate crisis[29].

3 Tensions Between Intensive Agribusiness and Environmental Conservation

The rapid expansion of agribusiness in the Cerrado has heightened conflicts with environmental conservation, exerting increasing pressure on soils, biodiversity, and local communities. Recent data indicate that the biome has become the epicenter of record-breaking deforestation, with rates of native

[27] BRASIL. Lei nº 15.190, de 8 de agosto de 2025. Institui a Lei Geral do Licenciamento Ambiental, regulamenta o inciso IV do §1º do art. 225 da Constituição Federal, altera dispositivos das Leis nº 9.605/1998, 9.985/2000 e 6.938/1981; revoga partes das Leis nº 7.661/1988 e 11.428/2006. Disponível em: https://www2.camara.leg.br/legin/fed/lei/2025/lei-15190-8-agosto-2025-797833-veto-176090-pl.html. Acesso em: 31 ago. 2025.

[28] GOVERNADOR, G. Fragmentação normativa e licenciamento ambiental no Brasil. Observatório do Clima. Brasília: OC, 2025. Disponível em: https://www.oc.eco.br/nota-tecnica-detalha-desmonte-do-licenciamento-ambiental-no-senado/. Acesso em: 31 ago. 2025.

[29] OBSERVATÓRIO DO CLIMA. PL 2159 é antítese da solução para o licenciamento ambiental, conclui parecer. Brasília, 14 jul. 2025. Disponível em: https://www.oc.eco.br/parecer-mostra-que-pl-2159-e-antitese-da-solucao-para-o-licenciamento-ambiental/. Acesso em: 31 ago. 2025.

vegetation loss now surpassing those of the Amazon[30]. This unregulated advance often disregards legal frameworks such as the Forest Code, resulting in soil degradation, water depletion, and institutional erosion in land-use governance.

We conclude that the legal and institutional challenges—ranging from normative fragmentation and setbacks in environmental licensing to the conflicts driven by agribusiness expansion—pose serious risks to the effective protection of soils in Brazil. The next section will explore legal and policy pathways to strengthen such protection, focusing on innovative normative proposals, improvements to existing instruments, incentives for sustainable agriculture, and mechanisms of just transition capable of balancing production, rural livelihoods, and climate mitigation.

V Legal and Political Pathways to Strengthen Soil Protection in Brazil

The previous chapter demonstrated how normative fragmentation, the weakening of environmental licensing, and conflicts between agribusiness and conservation undermine the legal protection of soil. In Section V, we move forward to outline concrete pathways: legislative proposals, the strengthening of existing instruments, incentives for sustainable agriculture, and mechanisms of just transition capable of reconciling production, rural livelihoods, and climate mitigation.

1 Proposal for a National Soil Protection Act Integrated into Climate Policy

The adoption of a general Soil Protection Act, explicitly linked to Brazil's national climate policy, represents a strategic pathway to overcoming institutional fragmentation. Such legislation would centralize guidelines, integrate federal instruments (such as the Forest Code and the Rural Environmental Registry—CAR), and establish conservation targets tied to the Nationally Determined Contributions (NDCs). Comparable models—although not exclusively focused on soil—can be observed in nationally structured payment for environmental services policies, such as the PNPSA (Act No. 14,119/2021)[31], which seeks to recognize and incentivize preservation efforts by producers and local communities.

2 Strengthening Existing Mechanisms (CAR, APPs, Legal Reserves, and the Recovery of Degraded Areas)

Enhancing already consolidated instruments—such as the Rural Environmental Registry (CAR), Permanent Preservation Areas (APPs), Legal Reserves (RL), and programs for the recovery of degraded areas—constitutes an effective pathway to reinforce soil protection. An analysis by the Climate Policy Initiative shows that, despite progress in CAR enrollment and in the implementation of Environmental Regularization Programs (PRAs), coordination across federal, state, and municipal levels still exhibits gaps that hinder their effectiveness[32]. By contrast, the federal Planaveg 2025–2028 sets ambitious and

[30] PLATFORM BRAZILIANA DE BIODIVERSIDADE E SERVIÇOS ECOSSISTÊMICOS (BPBES). Agronegócio alimenta crise climática, que pode inviabilizar 74% das terras agrícolas na Amazônia e no Cerrado. 17 jul. 2024. Disponível em: https://climainfo.org.br/2024/07/17/agronegocio-alimenta-crise-climatica-que-pode-inviabilizar-74-das-terras-agricolas-na-amazonia-e-no-cerrado/. Acesso em: 31 ago. 2025.

[31] BRASIL. Lei nº 14.119, de 13 de janeiro de 2021. Institui a Política Nacional de Pagamento por Serviços Ambientais (PNPSA). Disponível em: https://www.globalcompliancenews.com/2021/02/20/brazil-national-policy-of-payments-for-environmental-services-is-implemented-082021/. Acesso em: 31 ago. 2025.

[32] LOPES, C. L.; SEGOVIA, M. E.; CHIAVARI, J. Where Does Brazil Stand in the Implementation of the Forest Code? A Snapshot of CAR and PRA in Brazilian States – 2023 Edition. Rio de Janeiro: Climate Policy Initiative/PUC-Rio, 2023. Disponível em:

integrated targets—including restoration within APPs and RLs based on spatial monitoring and coordinated financing—demonstrating how the State can align territorial conservation instruments with broader climate and socio-environmental policies.

3 Tensions Between Intensive Agribusiness and Environmental Conservation

The accelerated expansion of agribusiness in the Cerrado exerts significant pressure on the region's soil, biodiversity, and water systems. Recent estimates indicate that approximately 37.3% of the biome has already been fully converted to anthropogenic uses—such as monocultures and pastures—with this percentage rising even further when extensive grazing areas and charcoal production are taken into account[33]. This expansion places productivist models in direct conflict with environmental protection imperatives, exposing legal gaps in land-use governance and underscoring the need for more integrated and effective regulatory solutions[34].

4 Just Transition: Balancing Production, Rural Livelihoods, and Climate Mitigation

A just transition in the Brazilian agrarian sector requires climate policies that regulate emissions reductions without compromising the livelihoods of rural communities. This entails recognizing the heterogeneity of producers—particularly family farmers, traditional populations, and smallholders—while ensuring access to technical assistance, income security, and inclusion in financing and technological capacity-building mechanisms. The Climate Policy Initiative's just transition proposal emphasizes the need for policies that, while mitigating climate impacts, also promote social justice, equity, and resilience for the most vulnerable rural groups[35].

Aligned with the urgency of climate action, this section has outlined practical and legally robust pathways to strengthen soil protection in Brazil: the establishment of a general Soil Protection Act integrated with climate policy; the enhancement of existing instruments (CAR, APPs, Legal Reserves, and recovery of degraded areas); the promotion of ecological and social justice through incentives for sustainable agriculture; and the application of the just transition principle, reconciling production, rural livelihoods, and mitigation. These initiatives provide a coherent and effective agenda to position soil as a central element of territorially grounded sustainability—essential for ensuring food security, climate resilience, and socio-environmental equity.

VI. Final Considerations

Identificou-se a ausência de uma lei geral consolidada, a fragmentação normativa, os retrocessos institucionais — especialmente a nova Lei Geral do Licenciamento Ambiental — e os conflitos exacerbados entre expansão agropecuária e conservação dos biomas como desafios centrais à proteção efetiva

https://www.climatepolicyinitiative.org/publication/where-does-brazil-stand-with-the-implementation-of-the-forest-code-a-snapshot-of-car-and-pra-in-brazilian-states-2023-edition/. Acesso em: 31 ago. 2025.

[33] CERRADO. Conservation. Disponível em: https://en.wikipedia.org/wiki/Cerrado. Acesso em: 31 ago. 2025.

[34] BRASIL. Ministério do Meio Ambiente e Mudança do Clima. Plano Nacional de Recuperação da Vegetação Nativa – Planaveg 2025-2028 (Sumário Executivo). Brasília: MMA, 2024. Disponível em: https://www.gov.br/mma/pt-br/composicao/sbio/dflo/plano-nacional-de-recuperacao-da-vegetacao-nativa-planaveg/planaveg_sumario-executivo_ing-1.pdf. Acesso em: 31 ago. 2025.

[35] CLIMATE POLICY INITIATIVE. Brazilian agricultural mitigation and adaptation policies: Towards a just transition. 21 ago. 2023. Disponível em: https://www.climatepolicyinitiative.org/publication/brazilian-agricultural-mitigation-and-adaptation-policies-towards-just-transition/. Acesso em: 31 ago. 2025.

do solo. This study has shown that, although soil has received significant legal recognition as an essential resource for agricultural production, food security, and climate policy, its regulatory framework still exhibits structural weaknesses. The lack of a Consolidated General Act, regulatory fragmentation, institutional setbacks—particularly the new General Environmental Licensing Act—and intensified conflicts between agricultural expansion and biome conservation were identified as central challenges to effective soil protection.

The initial hypothesis—that soil lacks a coherent normative framework, thereby weakening its climate and territorial governance—has been confirmed. The study reaffirms that, to ensure effective legal protection of soil, it is essential to establish a general law, strengthen existing mechanisms such as CAR, APPs, and the recovery of degraded areas, implement environmental justice policies that acknowledge the vulnerabilities of smallholders, and adopt just transition measures that balance production, rural livelihoods, and climate mitigation.

Methodological limitations are acknowledged: this study relied on documentary and doctrinal research, without including interviews with institutional actors or comparative analysis between states. Future research could expand empirical investigation at the regional level, explore the dynamics of licensing at the municipal level, or assess the impacts of agricultural policies in specific climatic contexts.

The contribution of this article is clear: it provides an articulated legal and policy pathway to strengthen soil protection as a tool for environmental justice and climate action, offering strategic guidance for policymakers, legislators, and legal practitioners. As Brazil positions itself as a central actor on the international climate agenda, particularly ahead of COP30, consolidating robust land governance is not only relevant but urgent.