EXECUTIVE SUMMARY

Economic, social, human and environmental impacts on recovering degraded pastures in Brazil

This report was written by the Public Policy Group (GPP) of University of São Paulo (USP) as part of the TEEB Agriculture & Food Project (TEEBAgriFood), an initiative of the United Nations Environment Program in partnership with the Ministry of Agriculture and Livestock, financed by the European Union and executed by the GPP.

THIS DOCUMENT presents the economic, social, human and environmental impacts of implementing the goal of recovering 30 million hectares of degraded pastures in Brazil by 2030, as set out in the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-carbon Emission Economy in Agriculture 2020-2030 (ABC+ Plan).

Based on the TEEBAgriFood approach[1], the study adopted four different methodological approaches (economic modeling, spatial modeling, biophysical modeling and multi-criteria analysis)[2] and considered two policy projection scenarios which are compared with a baseline - or business-asusual (BAU) scenario - that is, a projection that considers not applying the policy. The first is the **Recovery of Degraded Pastures (RDP)** through conventional agronomic practices, such as fertilization and chemical soil correction, for example. The second scenario is based on conventional RDP associated with **Crop-Livestock Integration (CLI),** an indirect form of pasture Recovery that relies on the use of temporary crops in consortium or rotation with forage plants. Among many benefits, pasture Recovery increases livestock productivity which has repercussions on other economic, social, human and environmental indicators. Improving pasture quality after adopting RDP (scenario 1), for example, would provide an increase ranging from 1.5% to 4.9% per year in average livestock productivity.

PROJECTED SCENARIOS

SCENARIO 1
RDP
30 MILLION hectares to be recovered using conventional methods

SCENARIO 2
RDP+CLI
24 MILLION hectares to be recovered using conventional methods and **6 MILLION** with CLI

TO UNDERSTAND THE METHODOLOGY PLEASE SEE THE ANNEX ON PAGE 14

[1] See more at: https://teebweb.org/our-work/agrifood/understanding-teebagrifood/evaluation-framework/
[2] More details about the methodology can be found at: impactodarpd.gppesalq.agr.br

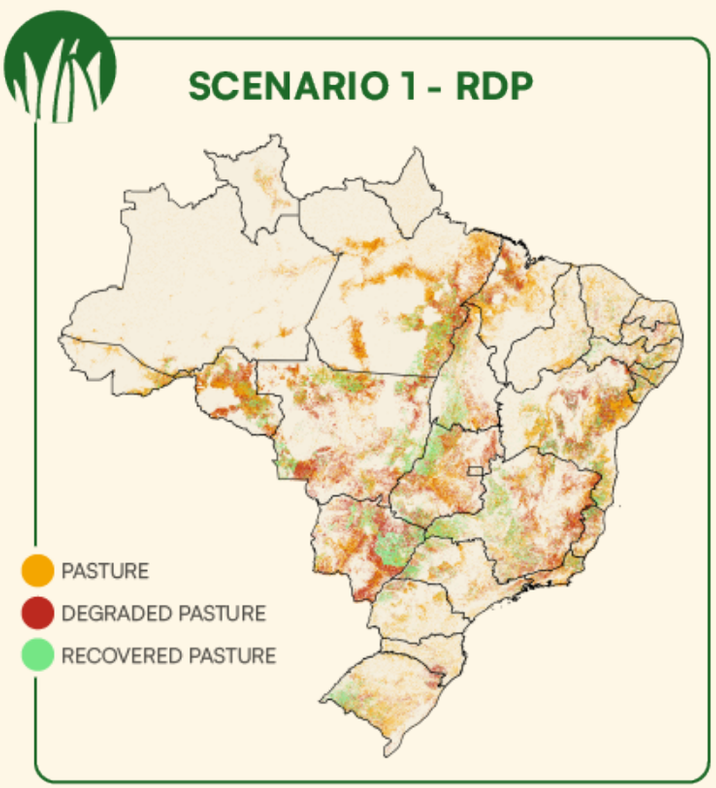
Degraded pastures in Brazil and where they can be recovered

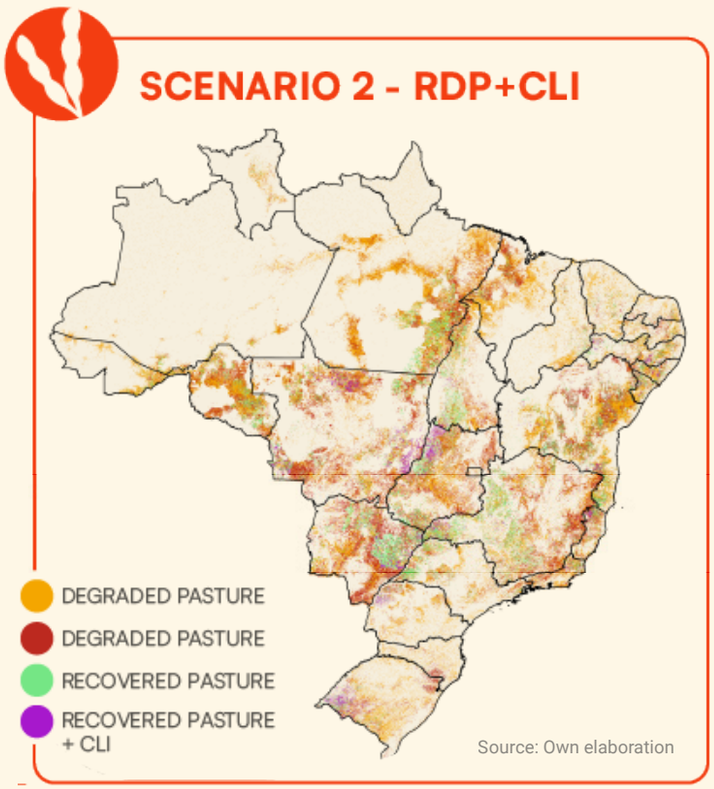
THE AREA OF DEGRADED PASTURES IN BRAZIL, in the 2030 baseline, would be around 80.5 million hectares, concentrated mainly in the states of Mato Grosso, Minas Gerais and Mato Grosso do Sul[3].

When RDP is adopted, the largest portion of the recovered areas - equivalent to 10 million hectares - would be on rural properties with more than 1,000 hectares, concentrated mainly in the states of Mato Grosso and Mato Grosso do Sul. Just over 5 million hectares would be recovered on smaller properties of less than 50 hectares, mainly in the states of Piaui, Bahia and Minas Gerais. A similar dynamic would occur with the implementation of Crop-Livestock Integration: of the 6 million hectares of pasture expected to be recovered with this technology, a large part (2 million hectares) would be concentrated in rural properties with more than 1,000 hectares in Mato Grosso.

DEGRADED PASTURE INSIDE PROPERTIES

	Absent (Mha)	Intermediate (Mha)	Severe (Mha)	Total (Mha)	Degraded pasture
0-50ha	8.03	8.58	3.44	20.05	16%
50-100ha	5.02	5.27	2.14	12.43	10%
100-500ha	12.23	13.96	7.09	33.27	27%
500-1000ha	4.86	6.28	3.86	15.00	13%
>1000ha	10.31	15.51	11.40	37.21	35%
TOTAL	40.44	49.60	27.93	117.97	100%





[3] See data sources in the Annex on page 14.

Economic impacts

IN BOTH SCENARIOS - for both RDP and RDP + CLI - **beef cattle and dairy cattle productions would grow** by 38.9% and 15.2%, respectively, compared to the 2030 baseline. In the second scenario (RDP + CLI), given an increase in agricultural planting areas, the projection is that implementing the policy would lead to a 23.3% increase in soybean production compared to the baseline in 2030.

Productivity gains and investments made in the Recovery of degraded pastures should transform the sector, replacing a portion of the production factors (land and labor) with capital. Not only does beef cattle farming become more capital-intensive, but other activities and sectors are also impacted by this change. In the case of the application of only RDP (Scenario 1), other livestock activities, such as pigs and poultry, would grow by more than 10% compared to the baseline in 2030. As for scenario 2 (RDP + CLI), there would be significant growth in soybean and corn production, but lower growth than the first scenario for swine and poultry.

Regarding the macroeconomic scenario, the increase in productivity in beef cattle farming would lead to an increase in **real GDP and real household consumption**. Additionally, in both scenarios, there is a tendency for a **decline in exports** (except for livestock and some agricultural products), resulting from a balance of the reallocation of production factors and expanded internal consumption, with the changes that have occurred. Just by adopting the RDP, it is estimated that accumulated real GDP in 2030 would increase by 1.3%, or US$ 33.8 billion (BRL 165 billion)[3]. When including CLI, this value would be equivalent to US$ 41.5 (BRL 202.4 billion)[4] compared to the baseline in 2030, due to the production of corn and soybeans. It is important to note that the values of the **cumulative increase in GDP represent a return more than 11 times the amount invested in RDP practices**, estimated at around US$ 2.7 billion (BRL 13 billion).[5]

INCREASE IN GDP

US$ 33.8 billion (BRL 165 billion) cumulative increase (Scenario 1)

US$ 41.5 billion (BRL 202.4 billion) cumulative increase (Scenario 2)

11 times the invested amount (US$ 2.7 billion) is the scale of the return

MORE FOOD PRODUCED

38.9% increase in beef cattle production

15.2% increase in dairy cattle production

23.3% increase in soybean production (Scenario 2)

DECLINE IN EXPORTS

Except for livestock and some agricultural products, there would be a decline in exports due to the reallocation of production factors and expanded internal consumption.

[3] Calculation based on prices from 2023, adjusted by the IGPM (General Market Price Index) of 06/2023.

[4] Calculation based on prices from 2023, adjusted by the IGPM (General Market Price Index) of 06/2023.

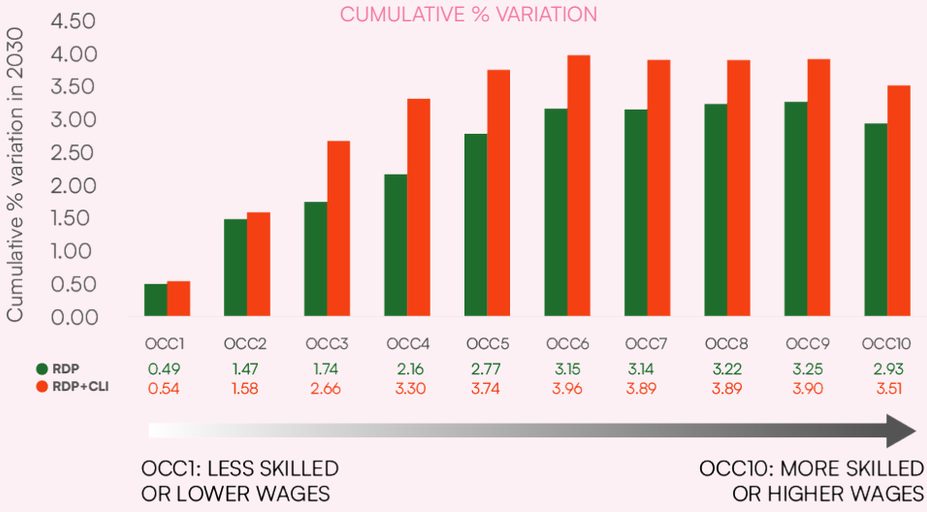
[5] Investments represent exclusively the acquisition of machinery, equipment, sheds, tractors, and other capital goods. Intermediate consumption of goods and services is already accounted for in the model's structure through its input-output relationships, as performed in the National Accounts System. In addition, Intermediate Consumption is considered in the calculation of GDP by the Expenditure Approach. Thus, investments were estimated based on average per-hectare values practiced in the ABC Program* - Recovery of Degraded Pastures, from 2015 to 2021 for each region of the model, resulting in US$ 2.7 billion, as mentioned. Considering the average values of the ABC Program, the required financing resources would be in the order of US$ 26.8 billion (BRL 131 billion), totaling investment and operating resources of US$ 29.5 billion (BRL 144 billion). *The ABC Program is the credit line of the ABC Plan (Low-carbon Agriculture)

Social and humans impacts

THE TRANSFORMATION OF LIVESTOCK into a more capital--intensive sector impacts the labor market and workers' salaries. With the adoption of RDP, for instance, **beef and dairy cattle farming would reduce labor demand** by 6.9% and 30.0%, respectively, compared to the 2030 baseline. In the scenario where there is RDP + CLI, the reductions would be 9.2% and 30.34%, respectively, for beef and dairy cattle farming. Regarding the real wages of families, the increase in economic activity would also lead to an **expansion of family wages**. In the case of applying RDP, this increase would be 2.2%, considering the average of all income groups. With the inclusion of CLI, it would be 2.77% accumulated by 2030.

However, as the beef cattle and agriculture sectors generally have a higher demand for less qualified labor, usually provided by lower--income families, these families would experience lower gains in real wages. In other words, despite an increase in real wages for all workers in both scenarios (RDP and RDP + CLI), **those with lower qualifications would be less favored by such growth**. In the case of RDP adoption, the lower-skilled workers would benefit from an increase of 0.49% in wages, and with CLI, the variation would be 0.54%. Meanwhile, higher-skilled workers would experience an increase of 2.93% (in the case of RDP) and 3.51% (in the case of RDP + CLI).

Wages by qualification in 2030



INCREASE IN THE REAL WAGE OF HOUSEHOLDS

2.2% cumulative increase (Scenario 1)

2.7% cumulative increase (Scenario 2)

Less qualified workers would be less favored:

SCENARIO 1

0.49% increase for less qualified workers

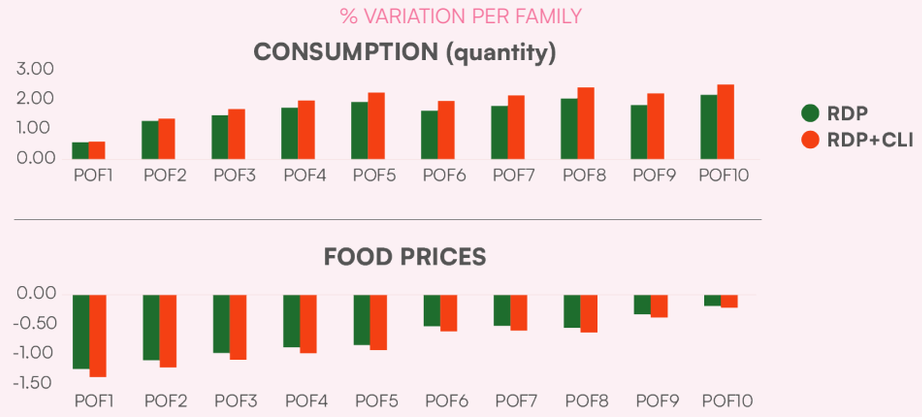
2.93% increase for more qualified workers

SCENARIO 2

0.54% increase for less qualified workers

3.51% increase for more qualified workers

Food consumption and price in 2030



FALL IN FOOD PRICES

2.35% reduction (Scenario 1)

2.56% reduction (Scenario 2)

GREATER FOOD CONSUMPTION

In all family classes, food consumption would increase and prices would decrease compared to the business-as-usual scenario

LESS LABOR DEMAND

SCENARIO 1

6.9% reduction in demand for beef cattle farming

30.0% reduction in demand for dairy cattle farming

SCENARIO 2

9.2% reduction in demand for beef cattle farming

30.3% reduction in demand for dairy cattle farming

In terms of real household consumption, both scenarios would result in an expansion, except for the poorest families. In the case of RDP alone, this decrease would be 0.04%; in the case of RDP + CLI, the decrease would be 0.08% for lower-income families. The explanation for the reduction in the real consumption of these families lies precisely in income, as they would experience lower gains in real wages, as mentioned earlier. On the other hand, **all classes of households, would have an increase in food consumption at lower relative prices** than those observed in the business-as-usual scenario, improving food security indices. These results are related to the increase in agricultural and livestock production, which increases the supply of these products and reduces their relative prices, especially milk and meat. The reductions in the general food price index in 2030 would be, respectively, 2.35% (RDP only) and 2.56% (RDP and CLI). It is important to highlight that lower-income families would get food prices between 1.24% and 1.38% cheaper, resulting in an approximately 0.6% increase in food consumption. Even though food is only part of the family consumption basket, it has a greater weight in the consumption of lower-income families, leading to a greater fall in prices in the consumption basket of these families (-1.17% in the case of RDP adoption and -1.29% when CLI is also included) compared to higher-income families (-0.18% in the case of RDP adoption and -0.21% when CLI is also included).

The change in the productive landscape and labor market, the unequal distribution of wage gains and real consumption - as lower-income families are less benefited - highlight the **need for complementary policies to ABC+ Plan**. It is essential to implement public policies simultaneously that allow less qualified workers to have opportunities for requalification and relocation in other sectors of the economy, in order to ensure that the transition of Brazilian livestock farming is not only environmentally sustainable but also socially fair.

Environmental impacts

THE INCREASE IN LIVESTOCK PRODUCTION AND PRODUCTIVITY as well as the consequent reduction in product prices resulting from the Recovery of degraded pastures, would impact the sector's profitability and lead to a **reduction in demand for pasture areas**. On a national scale, the Recovery of 30 million hectares of pastures would decrease the pressure for the opening of new areas, **avoiding the deforestation** of 6.2 million hectares of native vegetation[6], in the case of RDP, and 7.2 million hectares[7] in the scenario where RDP + CLI is applied. These values are equivalent, respectively, to 1.2% and 1.4% of a "land-saving" effect for the RDP and RDP + CLI scenarios. That is, the increase in production per unit of area translates into a lower need to open new areas. Despite this trend at the national level, it is possible to observe a "rebound effect" in some states (Amapá, Ceará, Distrito Federal, Mato Grosso, Piauí, Paraná, and Rio de Janeiro), where livestock intensification would result in an expansion of agricultural and livestock production areas over native vegetation.

Furthermore, **despite the "land-saving" effect provided by the policy at national level, this would not be enough to bring deforestation to zero in the simulated scenarios**. In other words, there would still be a loss of native vegetation in both the BAU scenario (39.2 Mha) and the RDP (32.5 Mha) and RDP+ CLI (31.9 Mha) scenarios.

The release of productive resources from livestock farming and the consequent impacts on other activity sectors would, in both scenarios, **decrease the intensity of greenhouse gas emissions**[8]. In the case of RDP adoption, emission intensity would, respectively, decrease by 0.42% and 0.68% for meat and dairy livestock farming. The drop in emissions intensity (per unit of product, that is, for each kilo of meat or liter of milk) occurs even in a scenario in which the sector would increase its emissions by 38.36% and 14.46% for meat and dairy farming, respectively, compared to the 2030 baseline. This increase is explained by the overall increase in sector production.

LESS DEFORESTATION

6.2 mi hectares of preserved native vegetation (Scenario 1)

7.2 mi hectares of preserved native vegetation (Scenario 2)

Deforestation in both scenarios would be less than in the business-as-usual scenario (BAU), but it would still exist.

REDUCTION OF GREENHOUSE GAS EMISSIONS

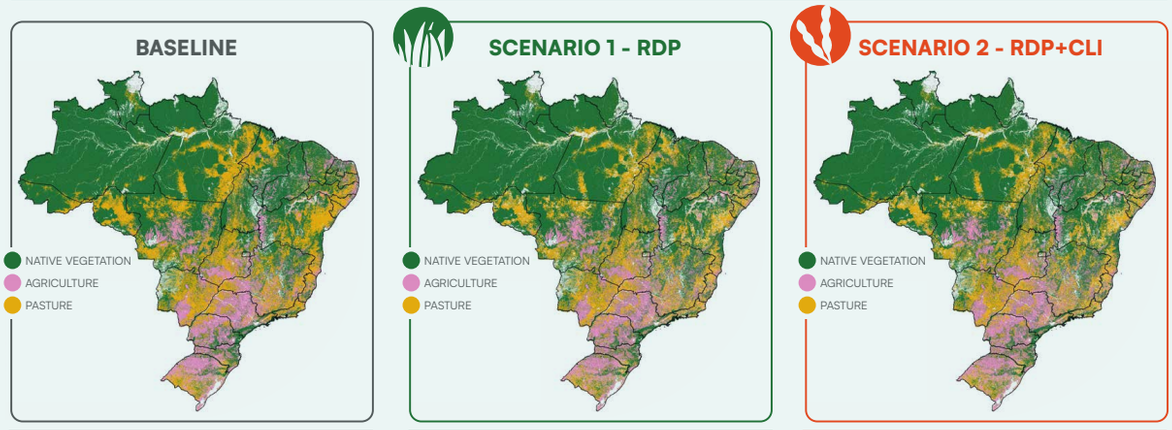
28.8% reduction for meat cattle farming*

14.6% reduction for dairy cattle farming*

*Considering soil carbon fixation

[6] Specifically, 5.1 million hectares would come from the reduction of pasture areas, and 1.1 million hectares would come from the reduction of agricultural areas.
[7] Specifically, 6.2 million hectares would come from the reduction of pasture areas, and 1 million hectares would come from the reduction of agricultural areas.
[8] Greenhouse gas emissions per unit of product.

Land use in 2030



USE	AREA (Mha)
Native vegetation	508.4
Agriculture	108.9
Pasture (total)	176.9
TOTAL	794.2

USE	AREA (Mha)
Native vegetation	514.6
Agriculture	107.8
Pasture (total)	171.8
TOTAL	794.2

USE	AREA (Mha)
Native vegetation	515.6
Agriculture	107.9
Pasture (total)	170.7
TOTAL	794.2

Source: Own elaboration

PERCENTAGE VARIATION CO2 EQUIVALENT

	Total emissions	Total emissions (with C in the soil)	Emission intensity	Emission intensity (with C in the soil)
Beef cattle husbandry	38.4	-1.04	-0.42	-28.78
Dairy cattle husbandry	14.5	-1.59	-0.68	-14.60
TOTAL	9.9	-1.3	-	-

38.9%
production increase in beef cattle husbandry

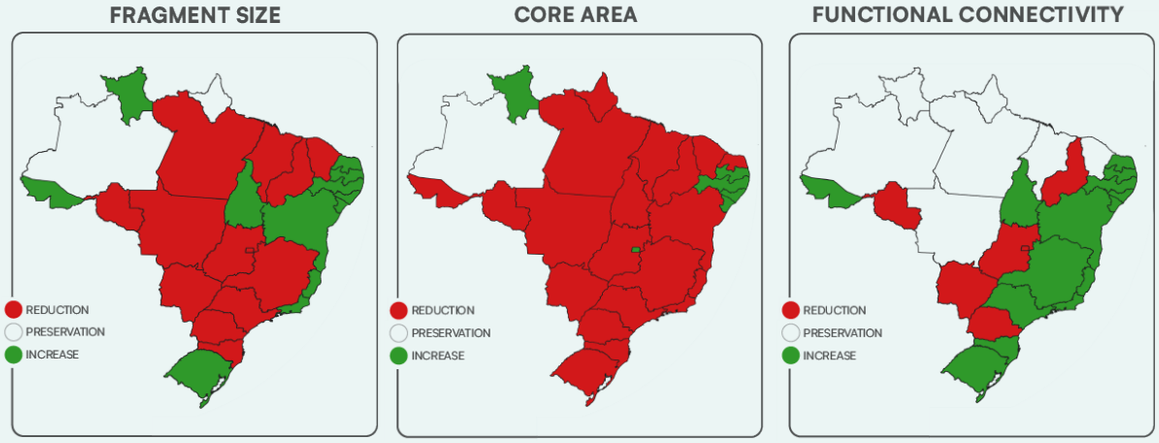
15.2%
production increase in dairy cattle husbandry

In addition to the above calculation, which considers only the data provided by the national greenhouse gas emissions inventory, an alternative accounting method can be employed that considers the fixation of organic carbon in the soil as a benefit of well-managed and recovered pastures. In this second calculation method, even with higher livestock production, RDP could result in **sufficient organic carbon fixation in the soil to maintain the emissions** resulting from the level of activity and input use relative to the 2030 baseline.

This means that soil carbon fixation would be able to reverse the potential growth of 11.2% in emissions that would be observed without the inclusion of soil carbon fixation parameters in the estimation of emissions. In the case of meat farming, there would be a mitigation of 1% of emissions, while in dairy farming, there would be a mitigation of 1.6%. Considering carbon fixation, there would also be a reduction in emissions by 28.8% and 14.6% for meat and dairy farming, respectively. Therefore, by this calculation method, **there is both a reduction in total emissions and their intensity for the livestock farming sector**. It is worth noting that carbon fixation is limited by a temporal horizon, after which the soil's carbon sequestration capacity stabilizes.

The Recovery of degraded pastures has the potential to protect soils from erosion. **Better vegetation coverage in pasture areas, with organic matter and nutrients in the soil, helps to prevent erosion**. In this sense, both the RDP adoption scenario and the RDP + CLI scenario would contribute to the reduction of erosion rates, with a more positive impact more positive impact regarding soil conservation in the first scenario (RDP) compared to the second (RDP + CLI). In gene-

Quality indicators



ral, the average reductions in soil loss for the Brazilian territory would be 2.26% for the RDP scenario and 1.94% for the RDP + CLI scenario.

Another important effect of implementing the ABC+ Plan is related to habitat maintenance, which provide crucial ecosystem services and helps to conserve biodiversity. In this case, in addition to the area of native vegetation cover, parameters such as the size of fragments capable of conserving biodiversity, the core area[9] of fragments, and their functional connectivity[10] were measured. These last two measures are relevant as they indicate whether there will be a greater or lesser composition of species diversity or more or less favorable conditions for species inhabiting these fragments.

After implementing the ABC+ Plan, both in the RDP and RDP + CLI scenarios, there would be an **increase in native vegetation coverage in states with the largest cattle herds** (e.g., Goiás, Pará, Mato Grosso do Sul, Rondônia). However, **there would be no improvement in fragment sizes, core areas, and functional connectivity, indicating quantitative but not qualitative evolution for habitat maintenance**. This means that even with the "land-saving" effect mentioned earlier, in general, this does not translate into gains for biodiversity in terms of habitat quality. Only the states of Roraima, Alagoas, Paraíba, Pernambuco, and Sergipe would have both quantitative and qualitative improvements in this sense. Thus, **complementary public policies should be implemented to restore vegetation**, in order to guarantee the functional connectivity of remaining native vegetation through ecological corridors and the maintenance of core areas to reduce edge effects[11].

REDUCTION OF SOIL EROSION

2.26% average reduction in soil loss for the Brazilian territory (Scenario 1)

1.94% average reduction in soil loss for the Brazilian territory (Scenario 2)

NO IMPROVEMENT IN HABITAT QUALITY

Even with a larger area of native vegetation compared to the baseline, there would be no improvement in fragment sizes, core areas, and functional connectivity. In other words, there is quantitative improvement but not qualitative improvement for habitat maintenance.

[9] The core area is characterized by being more continuous, less disturbed, and generally containing environmental conditions favorable to the species that inhabit it.

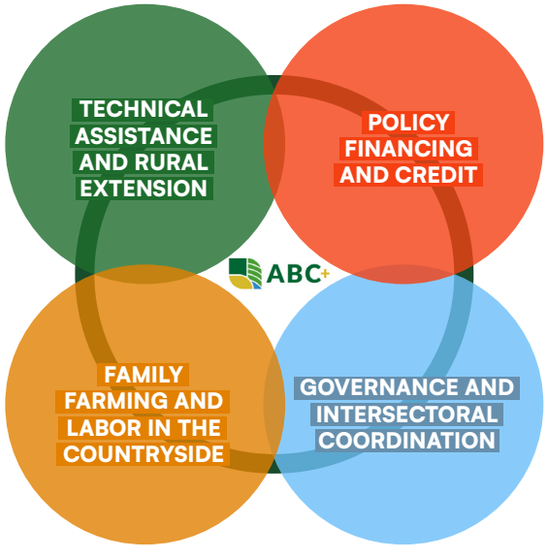
[10] Functional connectivity refers to the ability of landscape elements, such as habitats or natural areas, to allow the flow of organisms, nutrients, and essential ecological processes between them.

[11] Edge effect is a change in the structure, composition, or quantity of species on the marginal part of a vegetation fragment.

Recommendations for the ABC+ Plan

THIS EXECUTIVE SUMMARY NOT ONLY PRESENTS the analysis results of the impacts and dependencies on the economic, social, human, and environmental capitals of the ABC+ Plan, but also makes suggestions and recommendations for achieving the goal of recovering 30 million hectares of degraded pastures. It also explores the potential synergies between the generated benefits and identifies possible trade-offs, considering the agricultural sector, society, and nature. These recommendations are based on the results of the four methodological approaches and literature review, as well as contributions from key players in academia, civil society, government, and the private sector, collected at different moments throughout the study.

The recommendations are organized into proposals for four main themes: **(1) Technical Assistance and Rural Extension**, **(2) Policy Financing and Credit**, **(3) Family Farming and Labor in the Countryside** and **(4) Governance and Intersectoral Coordination**. It is important to note that the thematic division was adopted to simplify the content presentation. However, the different themes are interconnected and often require a joint effort to allow the achievement of the goal in a sustainable and fair manner. For instance, reinforcing technical assistance and rural extension is not enough without actions that facilitate access to financing via the ABC+ Plan's rural credit, and vice versa. Moreover, governance must take into account the interdependence between the issues, which means an intersectoral, coordinated, and multilevel effort to maximize the positive effects and act on the identified bottlenecks, ensuring that the goal is achieved.



GLOSSARY

RenovAgro: RenovAgro is the new name for the ABC Program and is intended to finance sustainable production practices such as the Recovery of degraded areas and pastures, the implementation of integrated crop-livestock-forest systems, the adoption of conservation practices, as well as the management and protection of natural resources. It embraces the idea that all rural credit should be low-carbon.

Integrated Landscape Approach (ILA): It is one of the ABC+ Plan's guiding principles to address the adverse impacts of climate change. It advocates the efficient use of areas suitable for agriculture and livestock production while encouraging landscape valuation so as to guarantee the conservation of soil, water, and biodiversity qualities, and the appreciation of local specificities and regional cultures.

SPS_{ABC}: These are sustainable production systems, practices, products, and processes on which the ABC+ Plan is based. They include the RDP and the integrated systems such as CLI (subject of this study). Furthermore, the ABC+ Plan also recommends No-Till Farming (PD), Integrated Farming System (SI), Planted Forests (FP), Bioinputs (BI), Irrigation Systems (SI), Animal Manure Management (MRPA), and Intensive Termination (TI).

PROPOSAL 1
Strengthening Technical Assistance and Rural Extension

TECHNICAL ASSISTANCE AND RURAL EXTENSION (ATER) is essential for the effective transition to low-carbon agriculture in Brazil. Supported by capacity-building actions, it is considered the main transformative instrument of the first cycle of the ABC Plan (2010-2020) by the Federal Government[12].

MAIN RECOMMENDATIONS

• Strengthen the services provided network of public ATER in order to improve its service and increase the number of producers assisted by: (i) ensuring budgetary stability for the Technical Assistance and Rural Extension Companies (EMATERS) and their operating resources, allowing for an increase in the number of extension workers and improved working conditions; (ii) innovation of ATER by strengthening both public ATER and partnerships with the private sector for staff capacity building and greater outreach of specialized services; (iii) planning in a regionalized way under the coordination of state agencies to establish and strengthen local agreements

• Updating the profiles of extension workers so they are ready to face up to the new paradigms of sustainable production and low-carbon agriculture, as well as adopting a systemic and dynamic approach to the rural landscape that goes beyond cultivated areas, ensuring the maintenance of ecosystem services. This requires: (i) changes in the training process for university graduates and technicians in agricultural sciences; (ii) strengthening and expanding Agronomic Residency in ATER; (iii) systematizing and providing knowledge on Integrated Landscape Approach (ILA), Sustainable Production Systems, Practices, Products and Processes, known as SPSABC, and other content related to low-carbon agriculture for technicians and extension workers; (iv) integration between research and rural extension in a coordinated way and through cooperation between institutions; (v training extension workers to draw up financing projects to access RenovAgro and the National Program to Strengthen Family Farming PRONAF ABC+.

[12] Sectoral Plan for Climate Change Adaptation and Low-carbon Emission in Agriculture (2020-2030): strategic vision for a new cycle. Available at: https://www.gov.br/agricultura/pt-br/assuntos/sustentabilidade/agricultura-de-baixa-emissao-de-carbono/publicacoes/abc-portugues.pdf

PROPOSAL 2
Financing of the ABC+ Plan and credit uptake by producers

AN IMPORTANT ECONOMIC OUTCOME of this study is that the ABC+ Plan can bring a payback between 11.6 and 13.9 times for every BRL invested in the policy, benefiting the economy and the society. Part of this could be allocated to implementing the policy itself, strengthening low-carbon agriculture. At the same time, it is crucial to ensure resources in the public budget so that the Plan can be fully implemented.

MAIN RECOMMENDATIONS

• Guarantee the budget needed to implement the ABC+ Plan in a combination of public resources and part of the investment return in the policy itself.

• Create an official data system for monitoring the implementation of ABC+ (RPD) in the field, providing updated statistics, and considering metrics and variables of different natures to monitor the variation in the extent and condition of pastures. A promising example is the UN's System of Environmental Economic Accounting (SEEA) to generate internationally comparable statistics and accounts, capable of supporting public authorities, the industry, the third sector, and other relevant actors.

• Reduce bureaucracy for small producers to access ABC+ credit and explore the possibility of using blended finance instruments, allowing part of the funding to be provided as a grant under supervision.

• Incorporate an economic and managerial vision of rural properties based on financial education for livestock farmers, and teaching property management in a more systemic approach. A first step would be to train bank managers to work with extension workers so that they can provide guidance to producers, facilitating their access to credit (RenovAgro and PRONAF ABC+).

• Provide accessible specialized technical assistance for the development of low-carbon projects for family farmers.

• Decentralize resources through partnerships between the National Development Bank (BNDES) and regional public banks, such as Banco do Nordeste or Banco da Amazônia, allowing low-carbon livestock credit to gain in reach and scope.

PROPOSAL 3
Establish specific mechanisms for small-scale farming and less skilled rural workers

THIS STUDY INDICATED that just over 5 million hectares of degraded pastures could potentially be restored by 2030 on rural properties of less than 50 hectares, mainly in Piauí, Bahia, and Minas Gerais. It is therefore necessary for the ABC+ Plan to establish specific mechanisms to assist smaller production units such as those in family farming. Additionally, the study points out that the recovery of degraded pastures and crop-livestock integration have the potential to reduce labor demand, especially from less skilled workers who are often engaged in less intensive livestock farming, leading to lower income gains for lower-income families. These factors may contribute to an increase in inequality in rural areas, affecting workers and families primarily involved in the livestock sector.

MAIN RECOMMENDATIONS

• Design the implementation plan for recovering degraded pastures considering the characteristics of family farming, seeking to mitigate risks for these producers while providing technical assistance and facilitating access to technologies and credit. Part of the positive return from the investment in the ABC+ Plan can be allocated to policies to mitigate potential inequalities.

• Adopt complementary public policies aimed at improving the qualification of workers engaged in livestock farming, helping them to remain in the labor market with better pay as well as evaluating the implementation of relocation policies to other economy sectors, preferably in rural areas, minimizing the negative effects of migration to urban areas.

• Stablish other social policies to minimize potential inequalities in rural areas resulting from the intensification of livestock activities through RPD, such as food and nutritional security policies. Furthermore, in order to prevent subsidized credit from becoming another element favoring land concentration, it is necessary to promote the ability of smaller producers to remain on their properties, which implies a more coordinated approach to support instruments beyond credit, such as Bolsa Verde (Green Grant) and other instruments of the food security, health, and education network in rural areas.

• Embrace climate change adaptation measures for more vulnerable and undercapitalized rural producers to reduce inequalities.

PROPOSAL 4
Ensure good governance and coordinate cross-sectoral policies

A KEY FACTOR to implement the goals of the ABC+ Plan are the State Management Groups, made up of institutions linked to the agricultural sector which are responsible for the respective State Action Plans (PAE). The state-level approach makes it possible to adjust the Plan's implementation to the different realities and scenarios in each state. The governance of the ABC+ Plan can also be improved by combining it with other policies and programs.

MAIN RECOMMENDATIONS

• Guarantee human, financial and material resources to encourage the continuation or re-establishment of the State Management Groups.

• Integrate the ABC+ Plan with other policies to tackle inequalities, promote social inclusion, control deforestation, and conserve biodiversity, as well as command and control instruments and economic mechanisms to value the Landscape ILA (agricultural certification, credit lines linked to the issuance of green bonds, the Green Agribusiness Receivables Certificate (Green CRAs, in Portuguese), the carbon market and Payment for Environmental Services (PES).

• Integrate the ABC+ Plan with other existing environmental policies, such as the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm) and the Action Plan for the Prevention and Control of Deforestation and Fires in the Cerrado (PPCerrado). ILA also encourages the environmental regularization of rural properties, helping to ensure that they comply with the Law on the Protection of Native Vegetation[13]. Other integrated systems, such as Agrosilvopastoral Systems and Agroforestry Systems, are SPS_{ABC} that can be implemented as part of the recovery of properties' Legal Reserves.

• Map out priority areas for the restoration of native vegetation, considering the establishment of ecological corridors and fragment configurations that encourage the maintenance of biodiversity.

• Design the Crop Plan (Plano Safra) in line with the ABC+ Plan's goals, providing credit lines, incentives, and agricultural policies for rural producers[14].

• Organize territorial arrangements that leverage governance spaces at different government levels, as well as establish public-private partnerships to more efficiently manage potential externalities of Low-Carbon Agriculture[15].

[13] Law 12,651/2012, known as the New Forest Code.
[14] A study published in 2020 demonstrated that only 2% of the Agricultural Plan was allocated to low-carbon agriculture, indicating significant potential for redirecting investments toward decarbonizing Brazilian agriculture. See: https://tinyurl.com/2p3yzvn7
[15] A policy based on territorial planning at the national level can also contribute to preventing the commoditization from encroaching on smaller-scale agriculture areas that produce food.

SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS OF THE ABC+ PLAN'S DEGRADED PASTURE RECOVERY TARGETS IN BRAZIL

How to measure the impacts of recovering degraded pastures in Brazil?

THE METHODOLOGICAL CHALLENGE faced by TEEB Agriculture & Food Project lied in collecting information which enabled an assessment of the ways natural, human, social, and produced capital are transformed by the recovery of degrades pastures in Brazil and the impacts caused by these transformations.

To tackle this challenge, the project was developed in methodological fronts based on a comprehensive spatial analysis of different future scenarios to discuss the economic, social, and environmental impacts of recovering 30 million hectares of degrades pastures – a goal of Plan ABC+ for 2030.

WHAT TO EVALUATE
THE DIMENSIONS

For this study, the methodological background of TEEBAgriFood was translated into three dimensions: **economic**, **social-human** and **environmental**. They correspond to three guiding questions related to different elements of the Evaluation Framework.

TEEBAGRIFOOD'S EVALUATION FRAMEWORK

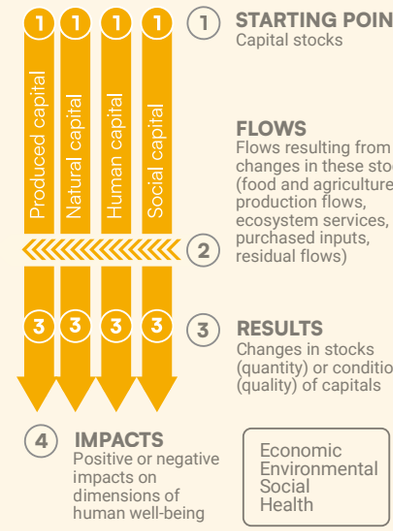
TEEBAgriFood adopts an Evaluation Framework as a methodology to understand the interactions between society, nature, and the economy. This enables an analysis of the effects of a policy on a baseline scenario, based on the observation of results, impacts, and dependencies of flows between the capitals and chains of the value chain.

Produced capital includes the manufactured goods, financial assets, and intellectual capital (technology, software, patents, etc.) used for the production of goods and services.

Natural capital includes the limited stocks of physical and biological resources on Earth and their limited capacity of providing ecosystem services.

Human capital comprises the abilities, knowledge, and skills embodied in individuals which enable the provision of individual, social, and economic well-being.

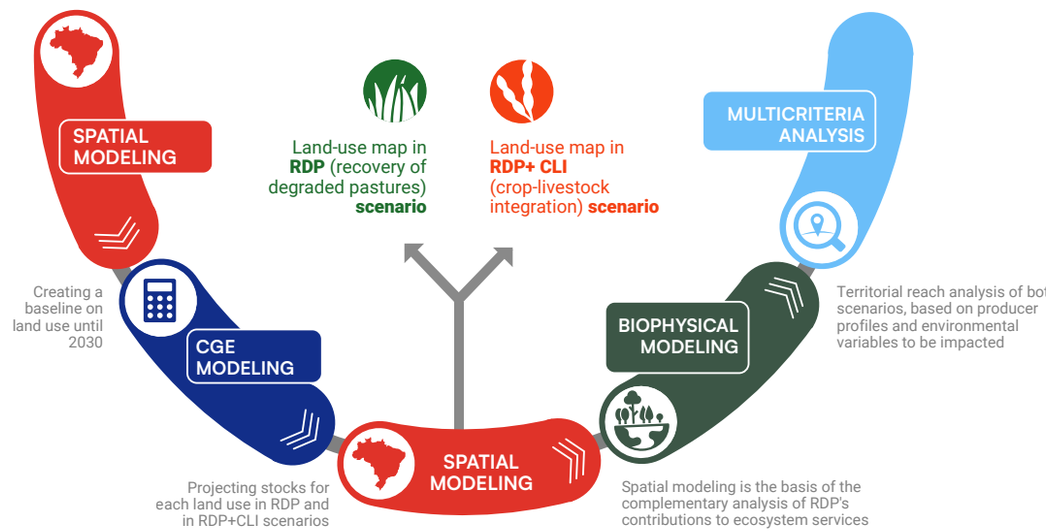
Social capital describes networks connecting individual, including institutions, norms, values, and notions for cooperation which allow the production and allocation of capital.



HOW TO EVALUATE
THE METHODOLOGICAL FRONTS

Impact evaluation considered two scenarios for Plan ABC+: one in which conventional recovery of degrades pastures (**RDP**) is implemented and one in which RDP is implemented and crop-livestock integration (CLI) is applied to a share of the areas (**RDP+CLI**).

The project used four interconnected methodologies to analyze the different impacts of the recovery of degraded pastures on the three dimensions.



1 CGE MODELING

This front deployed a Computable General Equilibrium (CGE) Model which represents the Brazilian economy (TERM-BR) to analyze the impacts of RDP in two scenarios compared to a baseline (that is, how the economy would behave until 2030 based on the trends of the last few years).

DATABASES: PNAD, POF, PAM, PPM, Censo Agropecuário 2017, RAIS, Contas Nacionais, MIP, Comex Stat.

2 SPATIAL MODELING

Used to: build the CGE Modeling baseline (a reference for comparison); spatialize land-use data generated on EGC; support the analysis about the contributions of RDP technology to the provision of ecosystem services; and perform the multicriteria analysis.

DATABASES: Mapbiomas (Collection 7), LAPIG.

3 BIOPHYSICAL MODELING

This includes analyses of aspects of biodiversity other than native vegetation area, such as functional connectivity (the ability to enable the occurrence and maintenance of ecological processes), and about critical erosion processes.

DATABASES: Collected in phase 1 by TERM-BR and evaluated with RUSLE and LSMetrics methods.

4 MULTICRITERIA ANALYSIS

This front aims at explaining the probable territorial impacts of RDP, according to producer profiles. This analysis was based on information about infrastructure, the suitability of the physical environment, and access to rural credit.

DATABASES: Qualidade de Pastagem de 2020 (LAPIG, 2021), Malha Fundiária (Freitas et al., 2018); Indicador de Aptidão (Safanelli et al., 2023), Indicador de Infraestrutura (GPP & MDR, 2020), Crédito Rural (SICOR, 2023).

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