



ESALQ

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LOW-CARBON AGRICULTURE PLAN: Policy for Climate Mitigation and Adaptation in Brazil



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Low-Carbon Agriculture Plan (ABC+ Plan)

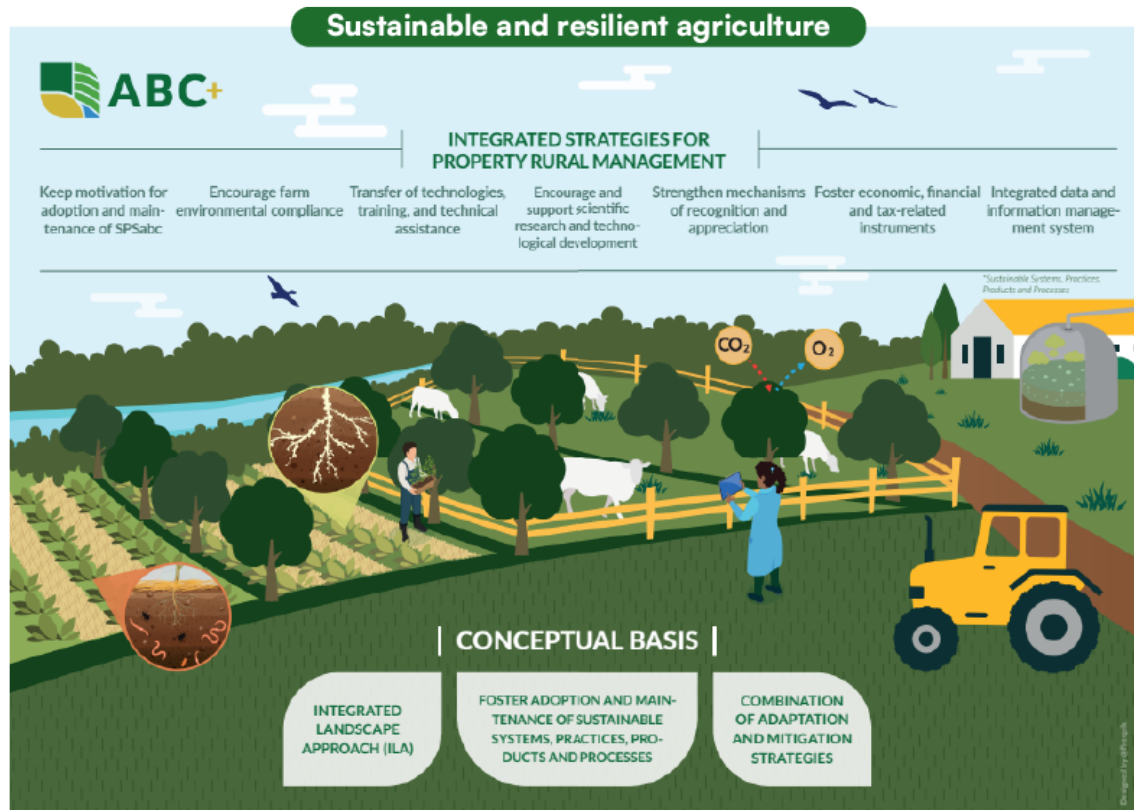


ABC+

BRAZILIAN AGRICULTURAL POLICY FOR CLIMATE ADAPTATION AND LOW CARBON EMISSION

2020-2030

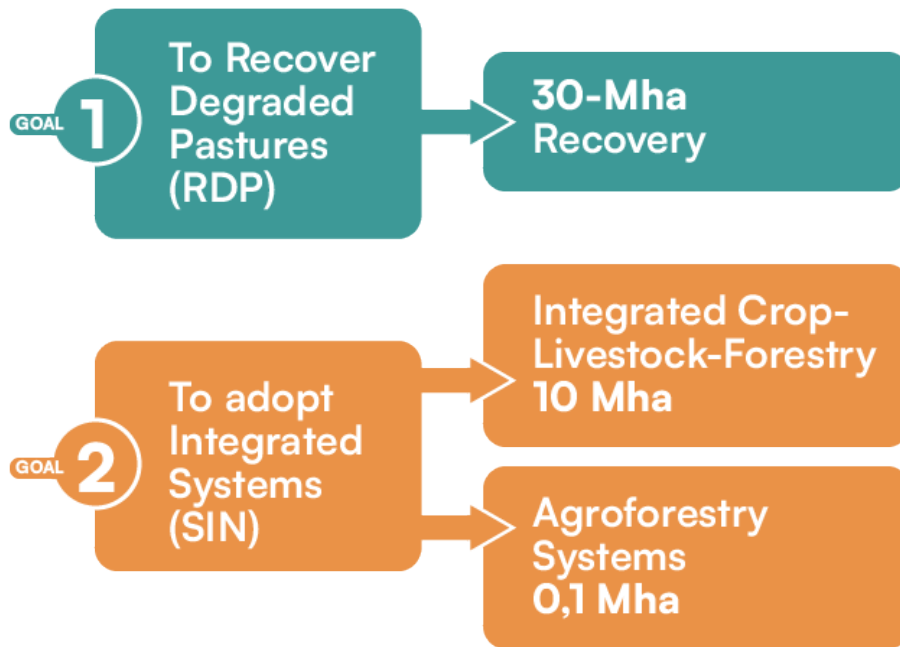
MINISTRY OF
AGRICULTURE
AND LIVESTOCK



Low-Carbon Agriculture Plan: Goals



BRAZILIAN
AGRICULTURAL
POLICY FOR CLIMATE
ADAPTATION AND
LOW CARBON EMISSION
2020-2030



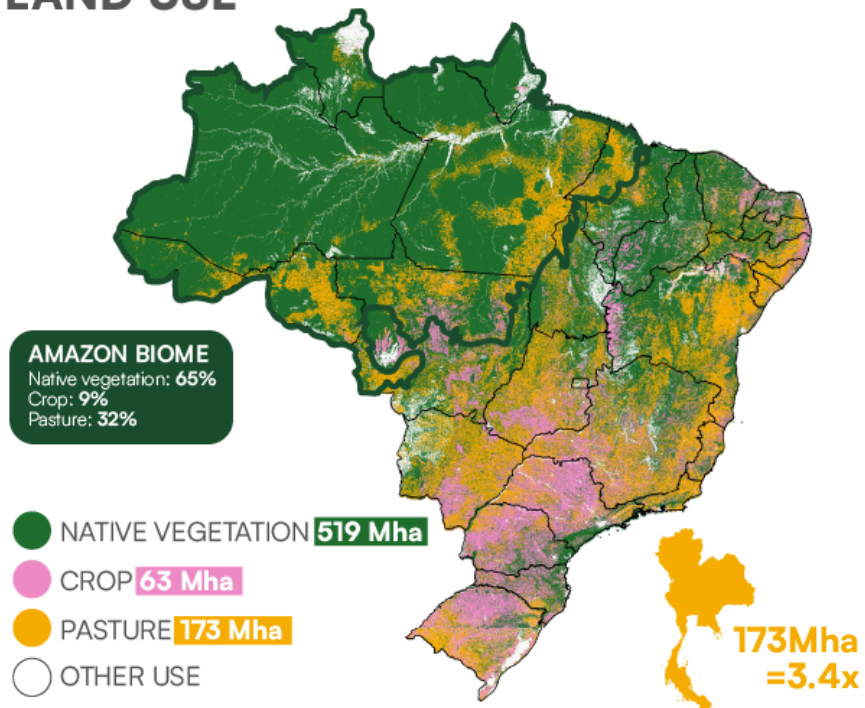
MINISTRY OF
AGRICULTURE
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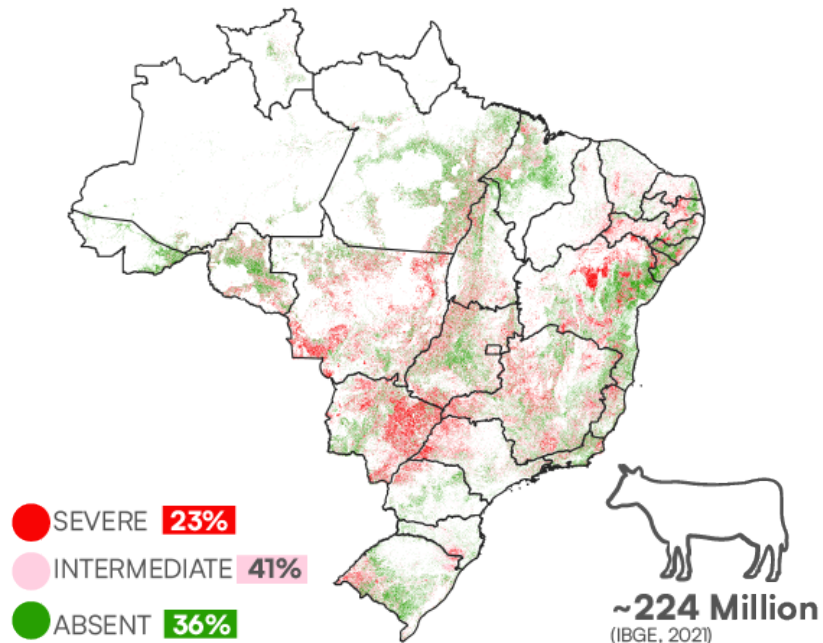
Land Use & Degraded Pastures in Brazil



LAND USE



DEGRADED VERSUS NON-DEGRADED PASTURES



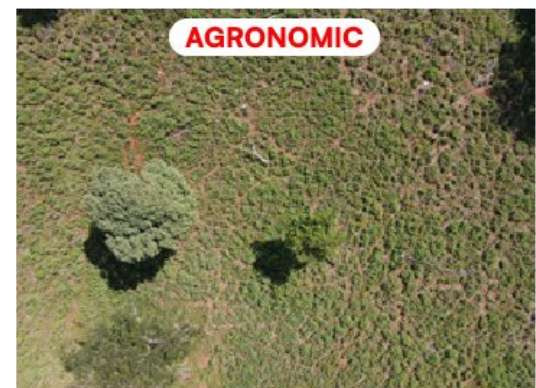
Quality of Pastures in Brazil

(Drone Images)

NON-DEGRADED



DEGRADED



TEEB for Agriculture & Food Project

IMPACTS OF THE RECOVERY OF DEGRADED PASTURE IN BRAZIL

ABC+ 2030 GOALS



What are the **economic, social, and environmental impacts** of the recovery of 30 Mha of degraded pastures in Brazil?



SCENARIO 1
Conventional
Recovery of
Degraded
Pastures (RDP)

SCENARIO 2
Conventional
RDP + RDP with
Crop-Livestock
Integration (CLI)



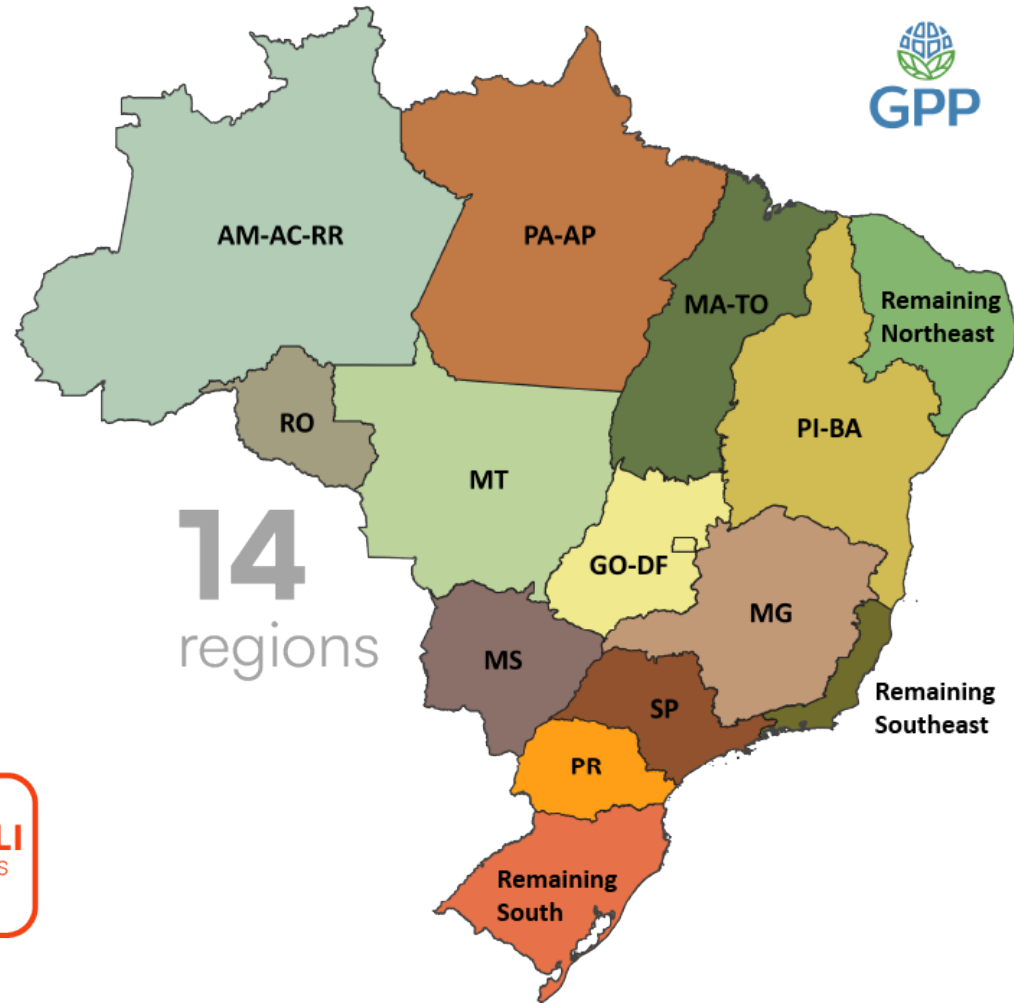
MAIN RESULTS



HOW WERE THE IMPACTS OF THE RECOVERY OF DEGRADED PASTURES ASSESSED?



Strategy for RDP simulation



BASELINE

Reference point based on macroeconomic variables and land use (spatial modeling)



POLICY SIMULATION

With productivity shocks in animal husbandry and investment shocks for implementing RPD

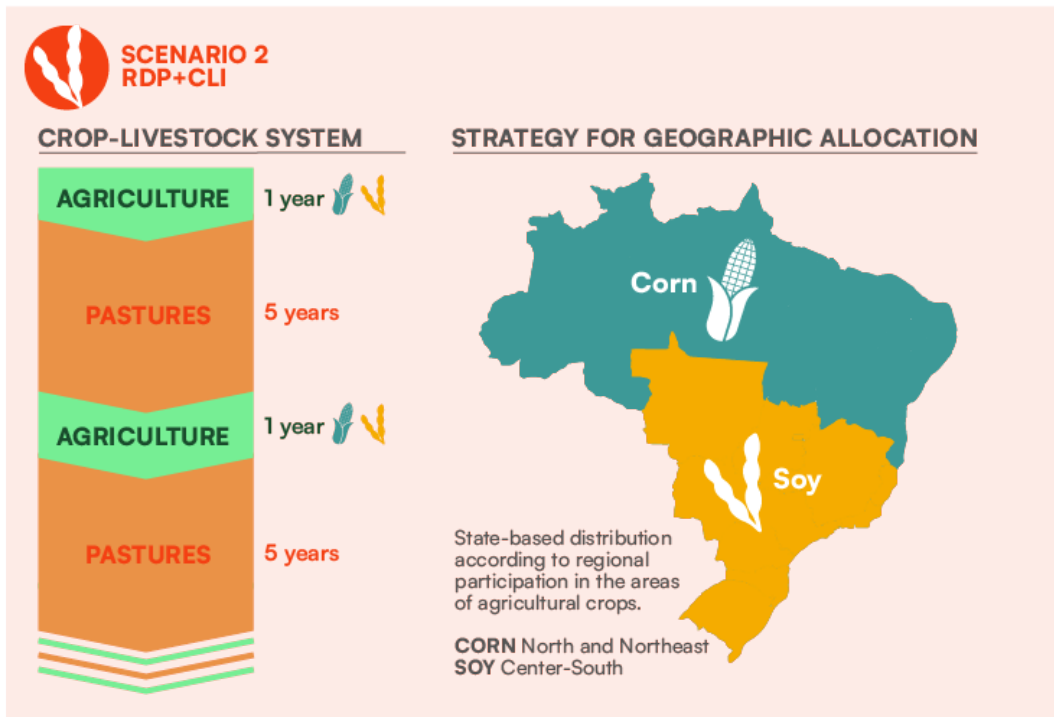
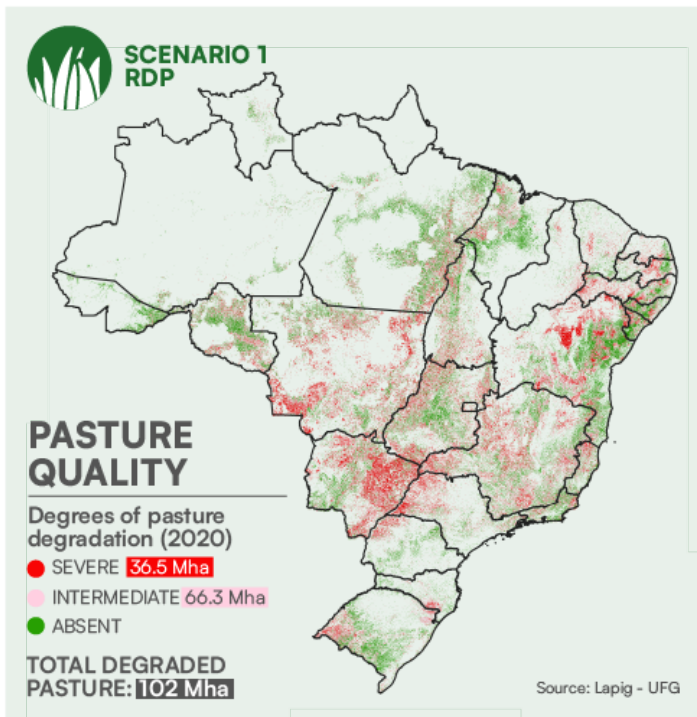


SCENARIO 1 - RDP
conventional RDP
(30 MHa - ABC+)



SCENARIO 2 - RDP+CLI
adoption of integrated systems
for recovery

Pasture recovery scenarios



WHAT ARE THE IMPACTS ON THE BRAZILIAN ECONOMY?



Macroeconomic results

Over 11-time return on investment



MACROECONOMIC AGGREGATES

Δ RDP ACCUMULATED PERCENTAGE

Δ RDP+CLI ACCUMULATED PERCENTAGE

Real GDP	1.30	1.62
Real wages	2.20	2.77
Food price index	-2.35	-2.56
Household consumption	1.82	2.21
Real investment	3.78	4.61
Exports (volume)	-3.01	-2.87
Imports (volume)	3.76	5.12

RETURNS ON GDP



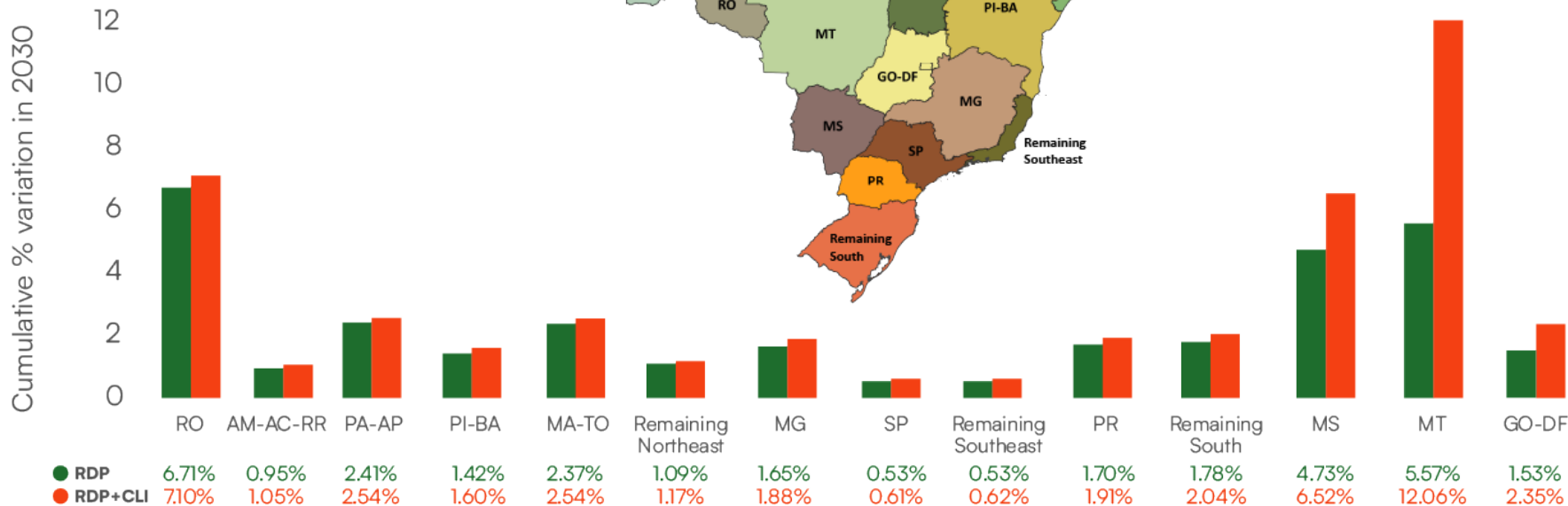
165 billion BRL
cumulative increase (with RDP)



202 billion BRL
cumulative increase (with RDP+CLI)

GDP

GDP grows in all of Brazil's regions



ANIMAL HUSBANDRY'S PARTICIPATION IN PRODUCTION VALUES

RO **6.7%** MT **4.7%** MS **4.3%** | PA-AP **2.8%** | SP **<0.5%**

General household consumption

Real consumption increases and prices drop for most



CONSUMPTION (quantity)



General household consumption

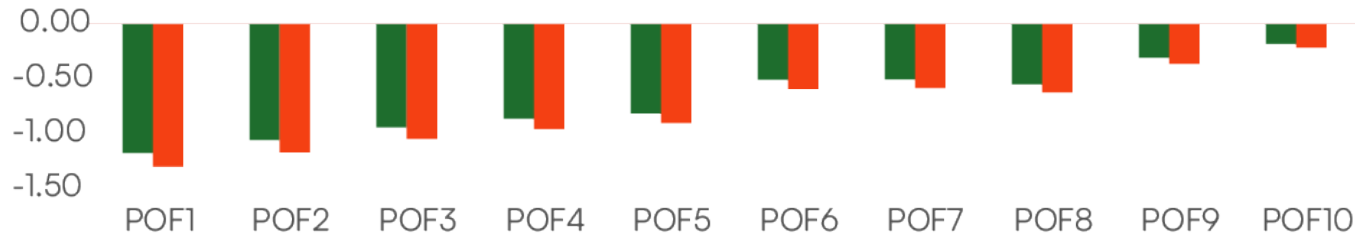
Real consumption increases and prices drop for most



CONSUMPTION (quantity)



PRICES

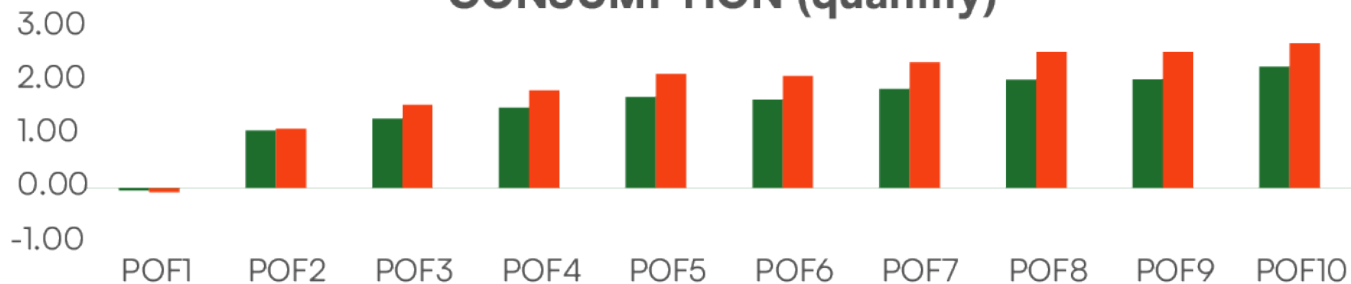


General household consumption

Real consumption increases and prices drop for most



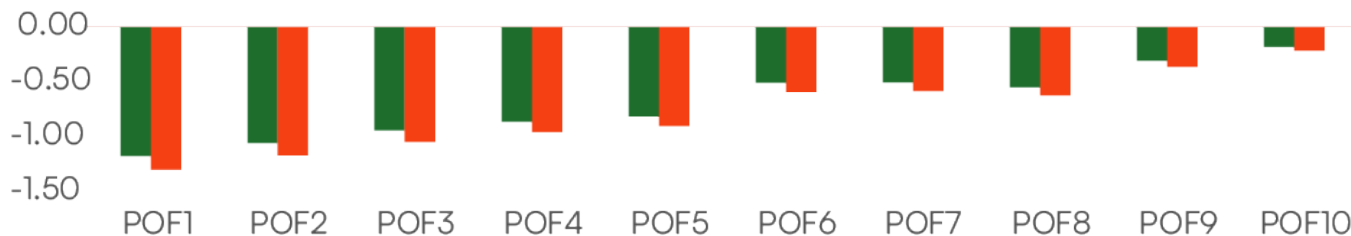
CONSUMPTION (quantity)



● RDP
● RDP+CLI

In Consumer Expenditure Survey (POF) 1, real consumption decreases in regions AM-AC-RR, PA-AP, PI-BA, MA-TO, Remaining Northeast, and MG. In GO-DF, this would only happen in Scenario 1.

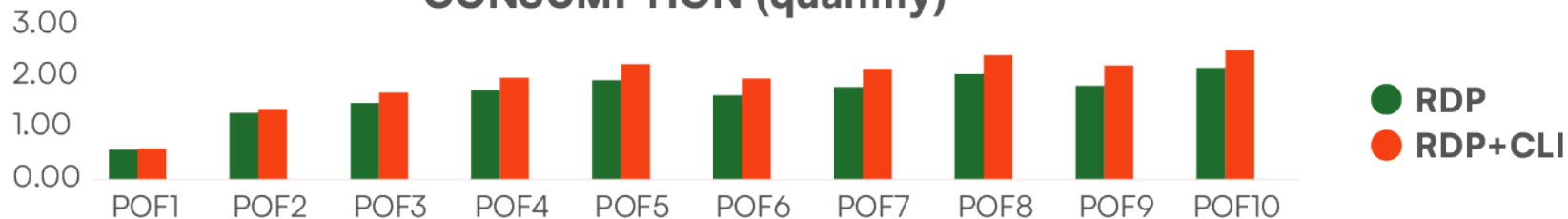
PRICES



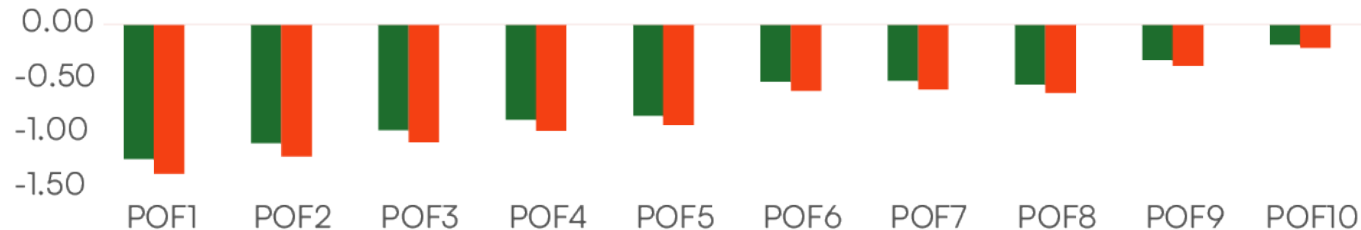
Household food expenditure

Expenditure also rises whereas prices drop

CONSUMPTION (quantity)



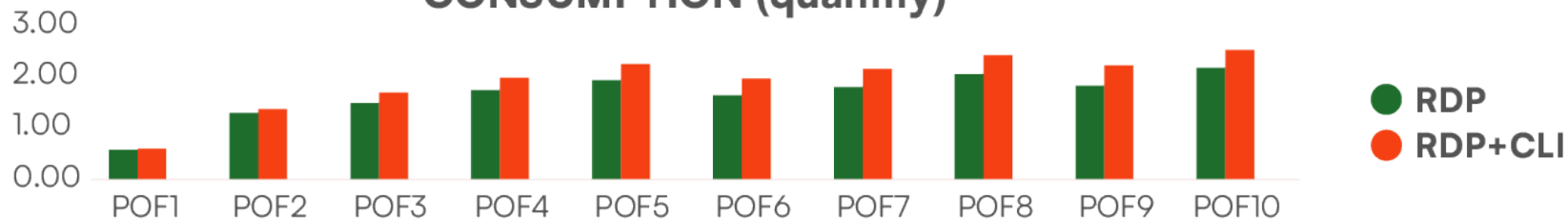
FOOD PRICES



Household food expenditure

Expenditure also rises whereas prices drop

CONSUMPTION (quantity)

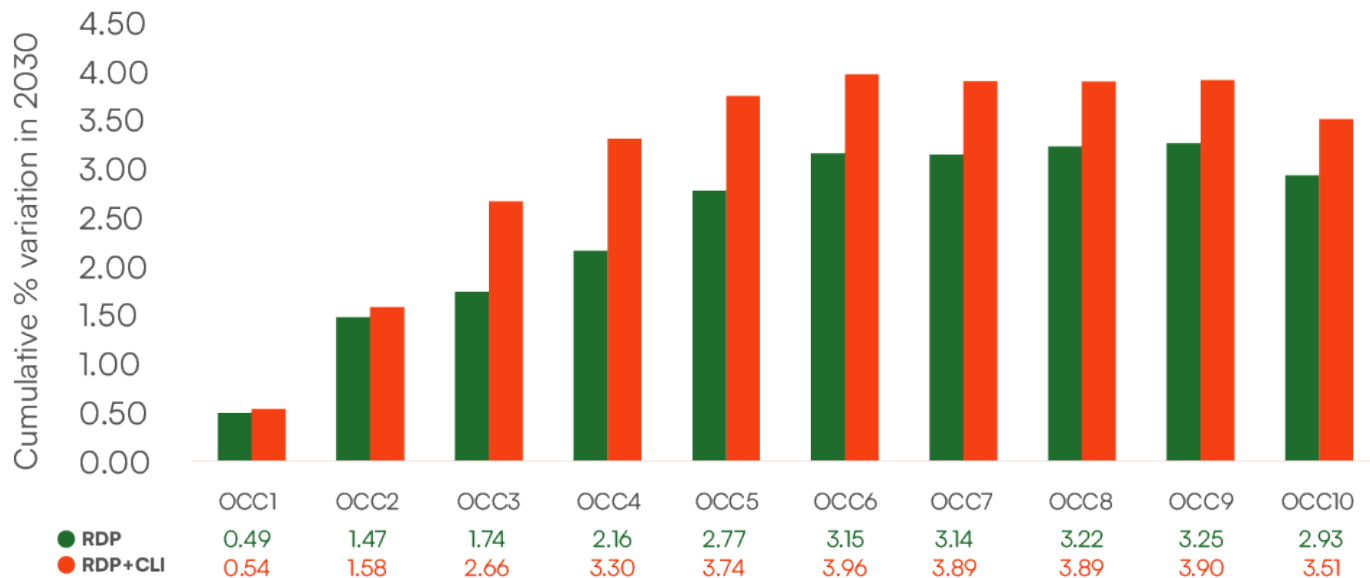


FOOD PRICES



Job market

Wages increase, especially among more skilled workers



*Animal husbandry
deploys less skilled
labour*

OCC1: LESS SKILLED
OR LOWER WAGES

OCC10: MORE SKILLED
OR HIGHER WAGES

Greenhouse gas emissions

Good-quality pastures sequester carbon



PERCENTAGE Δ - CO₂ EQUIVALENT

	BEEF CATTLE HUSBANDRY	DAIRY CATTLE HUSBANDRY	TOTAL
Total emissions	38.4	14.5	9.9
Total emissions (with C in the soil)	-1.04	-1.59	-1.3
Emission intensity	-0.42	-0.68	-
Emission intensity (with C in the soil)	-28.78	-14.60	-

Carbon fixation in the soil and in high-quality pastures is able to compensate the increase in emissions due to the expansion of husbandry



38.9%
production
increase

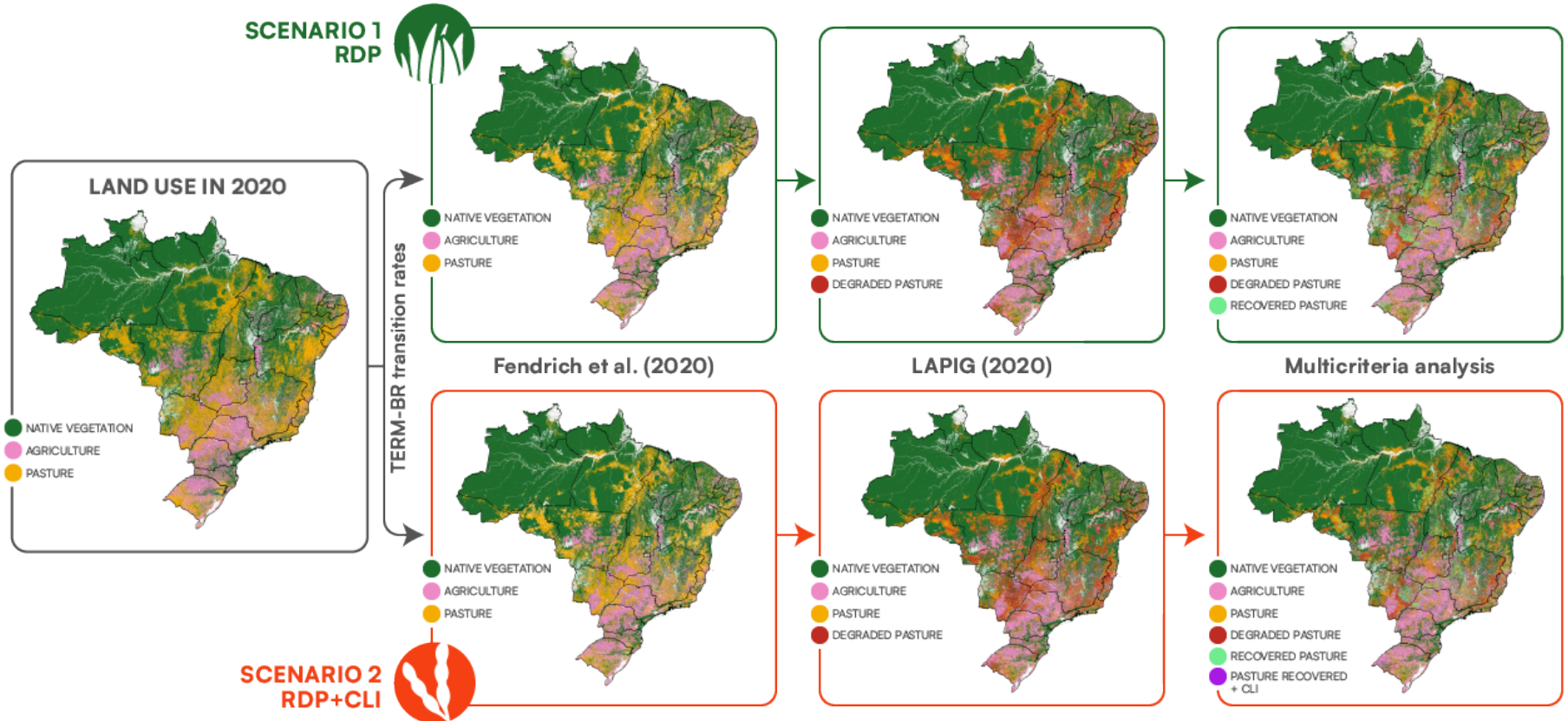


15.2%
production
increase

SPATIAL MODELING

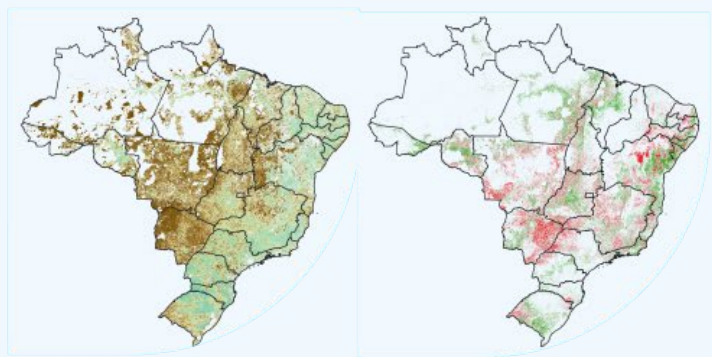


Stages of spatial modeling



RDP and CLI allocation criteria

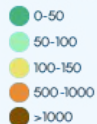
1 % OF PASTURES DEGRADED* BY PROPERTY SIZE RANGE IN REGIONS



PROPERTY SIZE

IMAFLORA (2021)

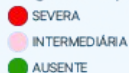
Size in hectares



PASTURE QUALITY

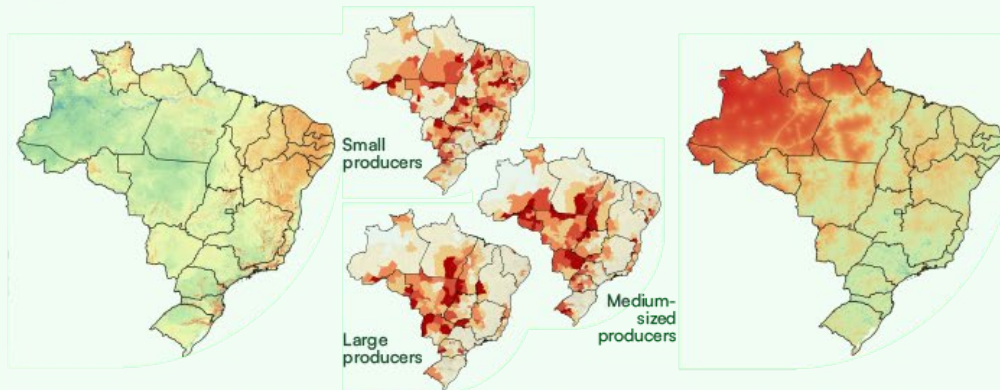
LAPIG (2020)

Degrees of pasture degradation



*Pasture recovery goal = pasture area by property size to be recovered in each region

2 PROPERTY RANKING



AGRICULTURAL SUITABILITY

SAFANELLI ET. AL (2023)

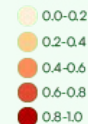
Agricultural suitability index



RURAL CREDIT

GPP (2023)

Rural credit index



INFRASTRUCTURE

ATLAS IRRIGAÇÃO (2021)

Infrastructure index



Degraded pasture inside properties



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

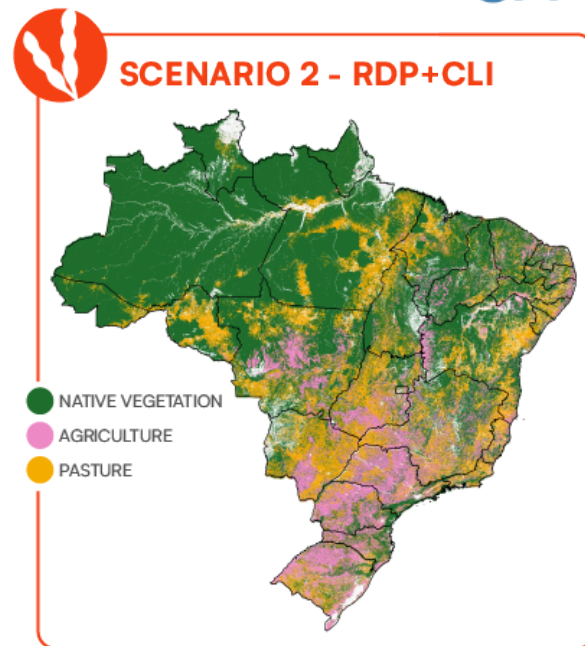
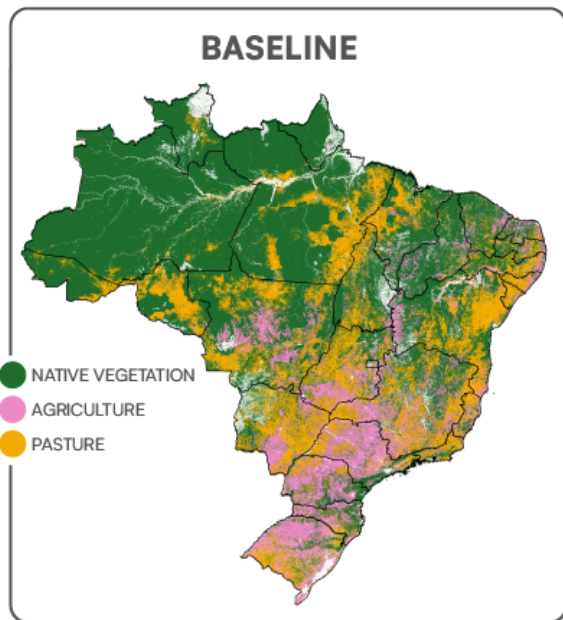
77.5 Mha
of degraded pastures



WHAT ARE THE POTENTIAL IMPACTS ON LAND USE AND SOIL EROSION?



2030 results

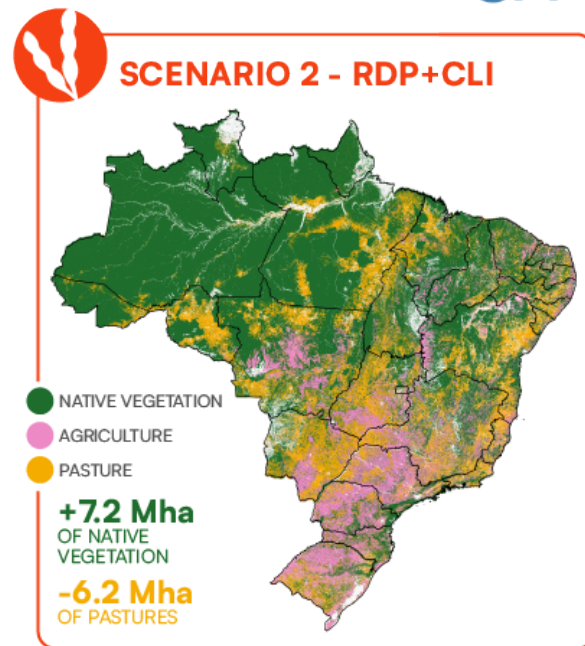
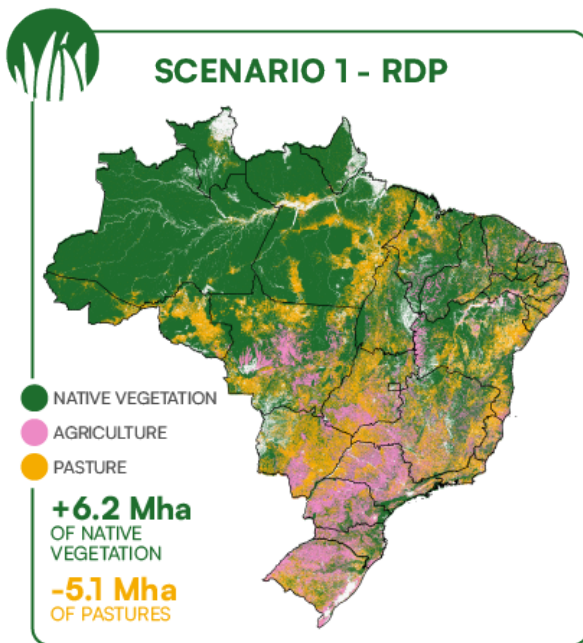
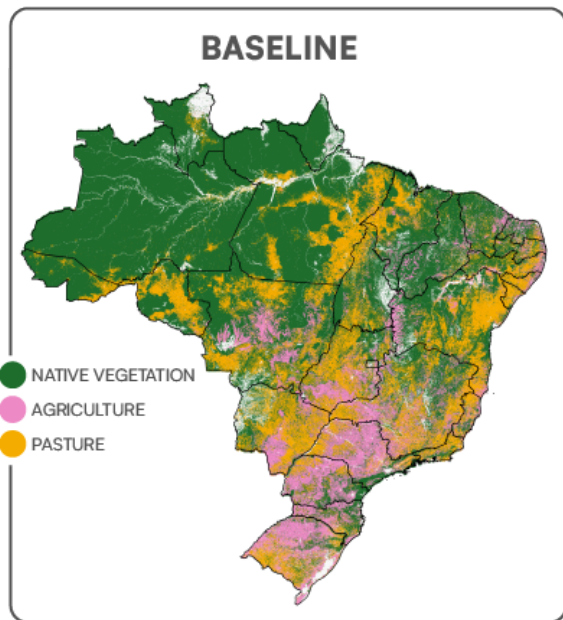


USE	AREA (Mha)
Native vegetation	508.4
Agriculture	108.9
Pasture (total)	176.9
TOTAL	794.2

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

2030 results



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

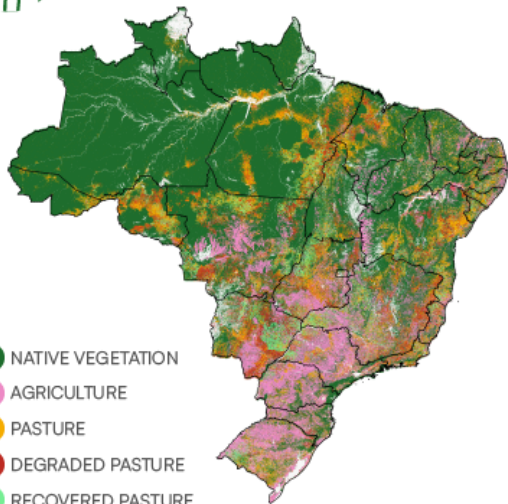
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USE	AREA (Mha)
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2030 results



SCENARIO 1 - RDP



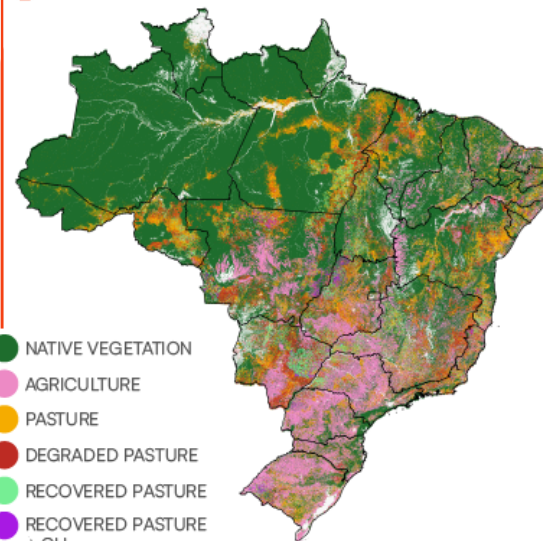
- NATIVE VEGETATION
- AGRICULTURE
- PASTURE
- DEGRADED PASTURE
- RECOVERED PASTURE

USE	AREA (Mha)
Native vegetation	514.6
Agriculture	1078
Non-degraded pasture	90.6
Degraded pasture	51.2
Recovered pasture	30.0
TOTAL	794.2

USE	AREA (Mha)
Vegetação nativa	515.6
Agricultura	107.9
Non-degraded pasture	89.7
Degraded pasture	51.0
Recovered pasture	24.0
CLI	6.0
TOTAL	794.2



SCENARIO 2 - RDP+CLI

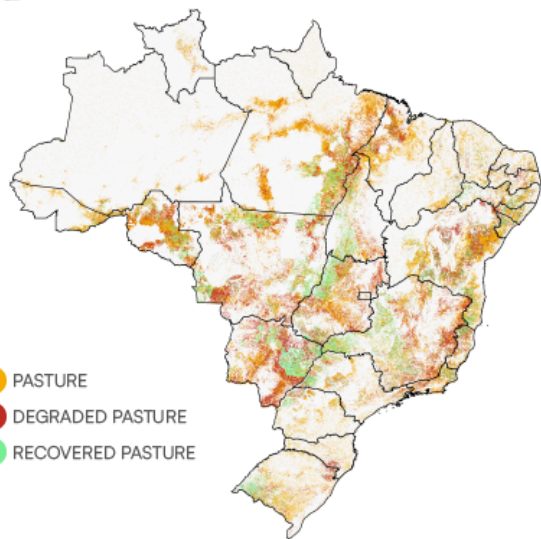


- NATIVE VEGETATION
- AGRICULTURE
- PASTURE
- DEGRADED PASTURE
- RECOVERED PASTURE
- RECOVERED PASTURE + CLI

2030 results



SCENARIO 1 - RDP



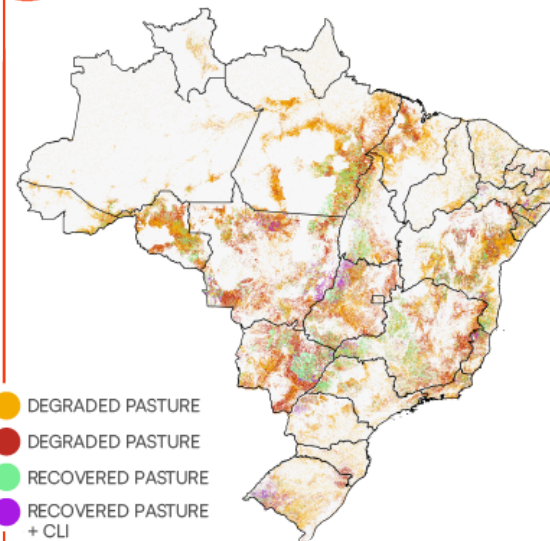
- PASTURE
- DEGRADED PASTURE
- RECOVERED PASTURE

USE	AREA (Mha)
Non-degraded pasture	90.6
Degraded pasture	51.2
Recovered pasture	30.0
TOTAL	171.8

USE	AREA (Mha)
Non-degraded pasture	89.7
Degraded pasture	51.0
Recovered pasture	24.0
CLI	6.0
TOTAL	170.7



SCENARIO 2 - RDP+CLI

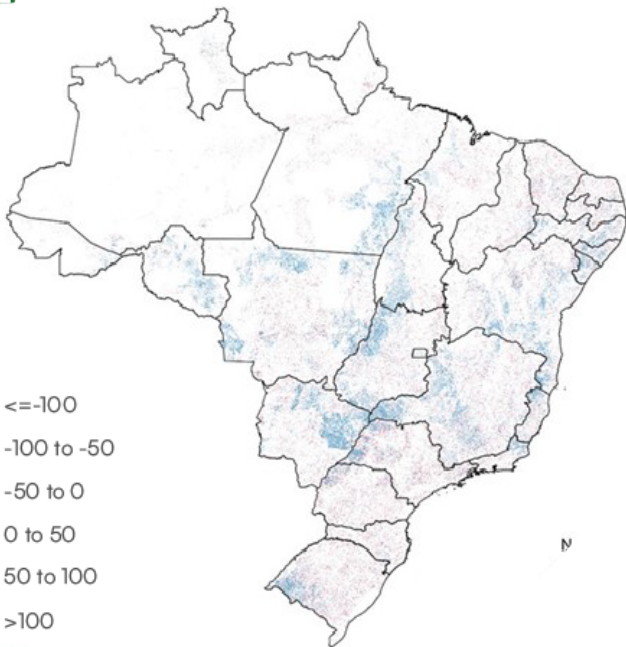


- DEGRADED PASTURE
- DEGRADED PASTURE
- RECOVERED PASTURE
- RECOVERED PASTURE + CLI

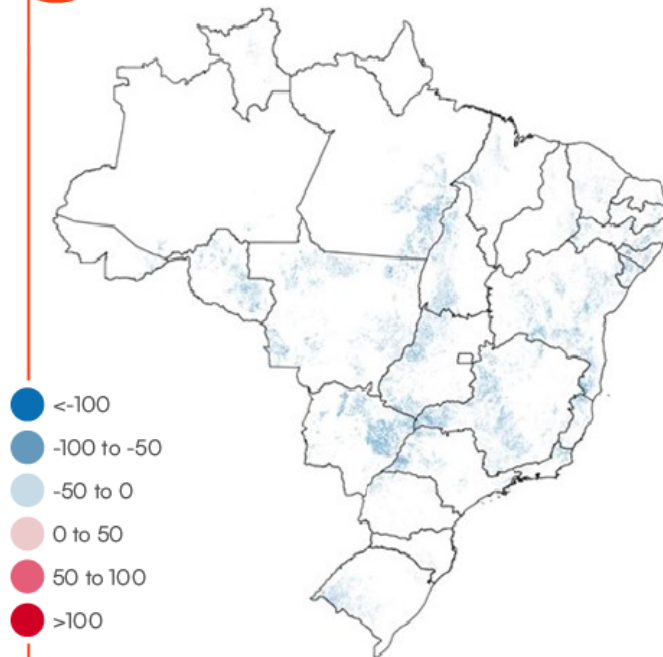
Impact on soil erosion



SCENARIO 1 - RDP



SCENARIO 2 - RDP+CLI

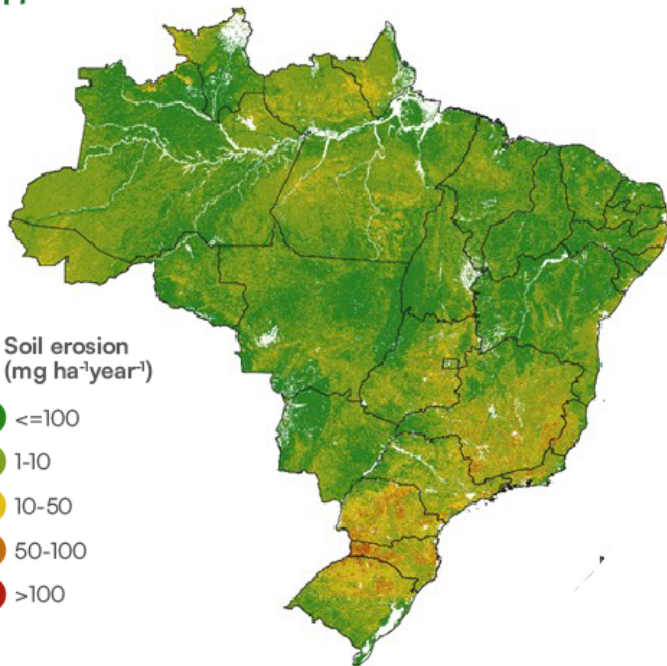


Soil erosion reduction rates are slightly better in Scenario 1 than in Scenario 2.

Impact on soil erosion



SCENARIO 1 - RDP



Soil erosion
(mg ha⁻¹year⁻¹)



AMAZON

Erosion BAU (Mg.ha.year): **3.05**
Erosion Scen 1 (Mg.ha.year): **2.96**
Scen 1/BAU: **-3.04%**
Erosion Scen 2 (Mg.ha.year): **2.96**
Scen 2/BAU: **-2.83%**

PANTANAL

Erosion BAU (Mg.ha.year): **0.43**
Erosion Scen 1 (Mg.ha.year): **0.46**
Scen 1/BAU: **7.46%**
Erosion Scen 2 (Mg.ha.year): **0.46**
Scen 2/BAU: **7.60%**

PAMPA

Erosion BAU (Mg.ha.year): **8.21**
Erosion Scen 1 (Mg.ha.year): **7.43**
Scen 1/BAU: **-9.49%**
Erosion Scen 2 (Mg.ha.year): **7.51**
Scen 2/BAU: **-8.53%**

CERRADO

Erosion BAU (Mg.ha.year): **4.62**
Erosion Scen 1 (Mg.ha.year): **4.65**
Scen 1/BAU: **0.51%**
Erosion Scen 1 (Mg.ha.year): **4.67**
Scen 2/BAU: **0.93%**

CAATINGA

Erosion BAU (Mg.ha.year): **1.60**
Erosion Scen 1 (Mg.ha.year): **1.58**
Scen 1/BAU: **-1.37%**
Erosion Scen 2 (Mg.ha.year): **1.58**
Scen 2/BAU: **-1.10%**

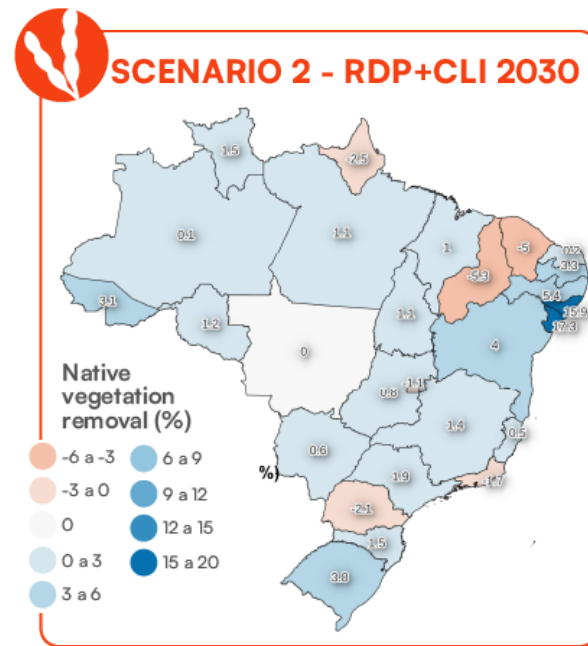
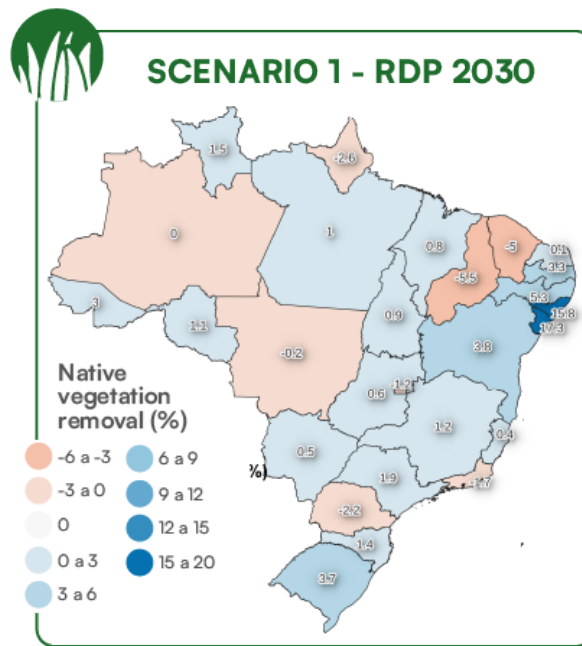
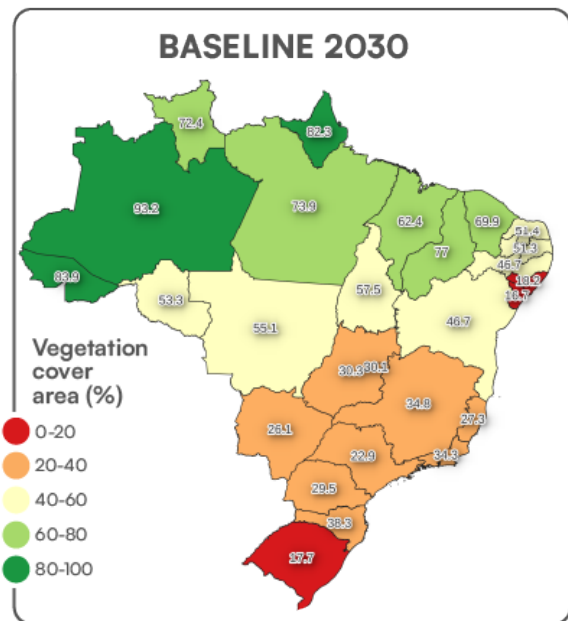
ATLANTIC FOREST

Erosion BAU (Mg.ha.year): **16.79**
Erosion Scen 1 (Mg.ha.year): **16.23**
Scen 1/BAU: **-3.35%**
Erosion Scen 2 (Mg.ha.year): **16.28**
Scen 2/BAU: **-3.06%**

WHAT ARE THE IMPACTS ON HABITAT PRESERVATION (LANDSCAPE ANALYSIS)?



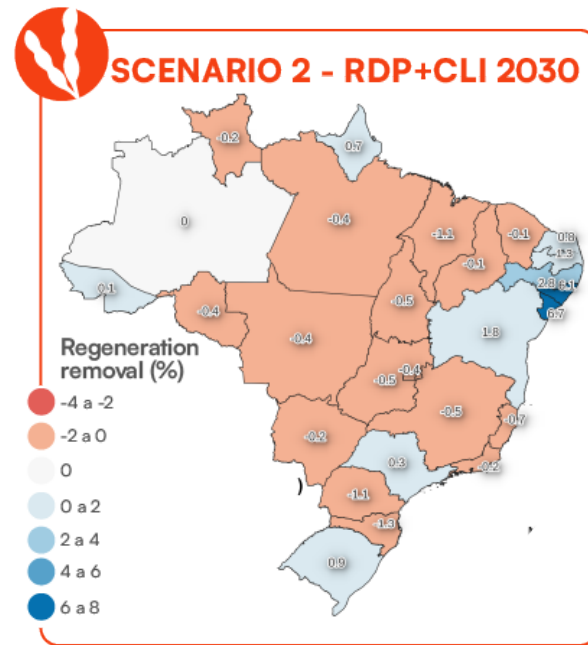
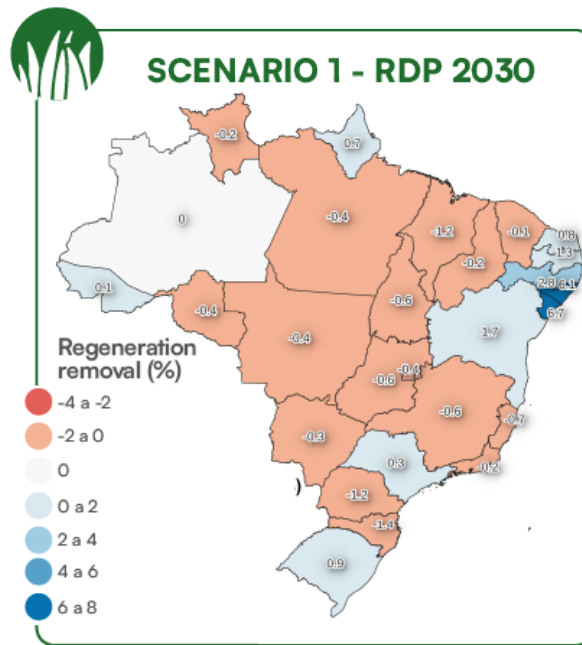
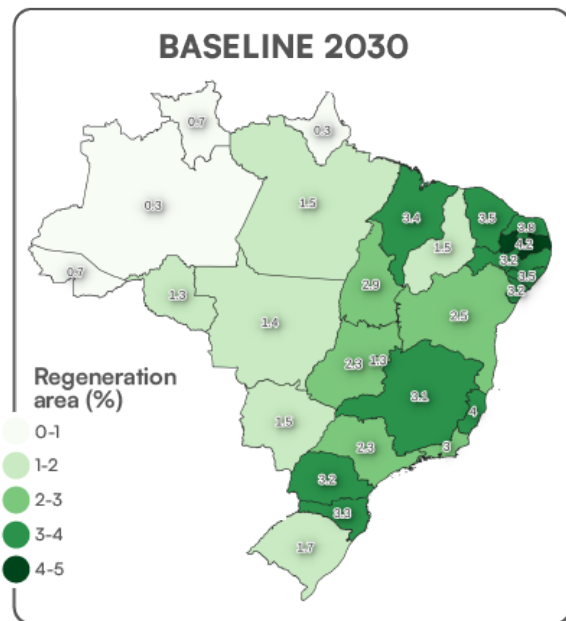
Quantity indicators: native vegetation area



AL, SE, MS, ES, SP, PR, and RS did not reach the 30% native vegetation cover threshold, which in theory would ensure the loss of species and the preservation of ecological integrity (Banks-Leite et al., 2014; CDB, 2022).

There would be a general increase in the vegetation %, except for MT, AP, PI, CE, RJ, PR, and DF (bigger in Scenario 2). This % increase was enough to lift the states of AL and SE above the 30% threshold. However, DF would be downgraded.

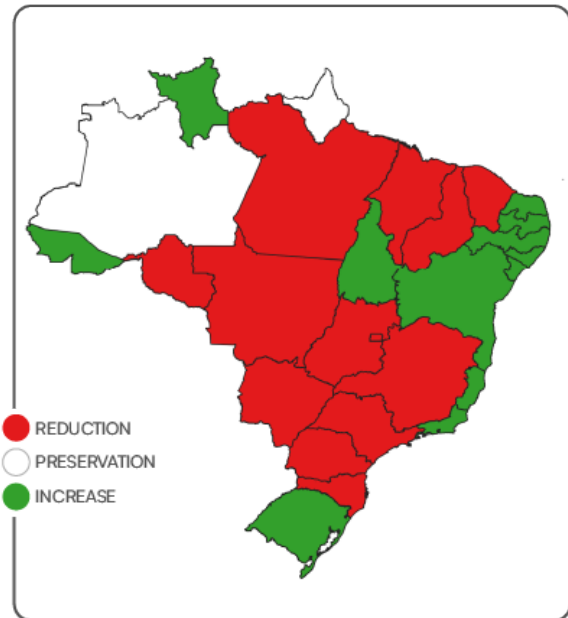
Quantity indicators: regeneration area



There would be a general decrease in the % of remnant areas formed by natural regeneration processes (previous removals now under recovery), showing an increase in native vegetation due to the deforestation prevented.

Quality indicators

FRAGMENT SIZE



CORE AREA



FUNCTIONAL CONNECTIVITY





Grupo de Políticas Públicas

USP - ESALQ

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