Wild pigs *(Sus scrofa)* population management in Brazil: mitigating crop damages

Giovani William Gianetti
Carla Grasiele Zanin Hegel
Joaquim Bento de Souza Ferreira Filho

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Overview

Sus Scrofa

- Non-native
- 80 – 250 kg
- 3 - 12 offspring
- 2 broads per year

Pecari Tajacu

- Native
- 20 kg
- Sounder of 6 to 30 animals

Tayassu Pecari

- Native
- 35 kg
- Sounder of 50 to 100 animals

Rooting

Wallowing

Crops

Fauna

Flora

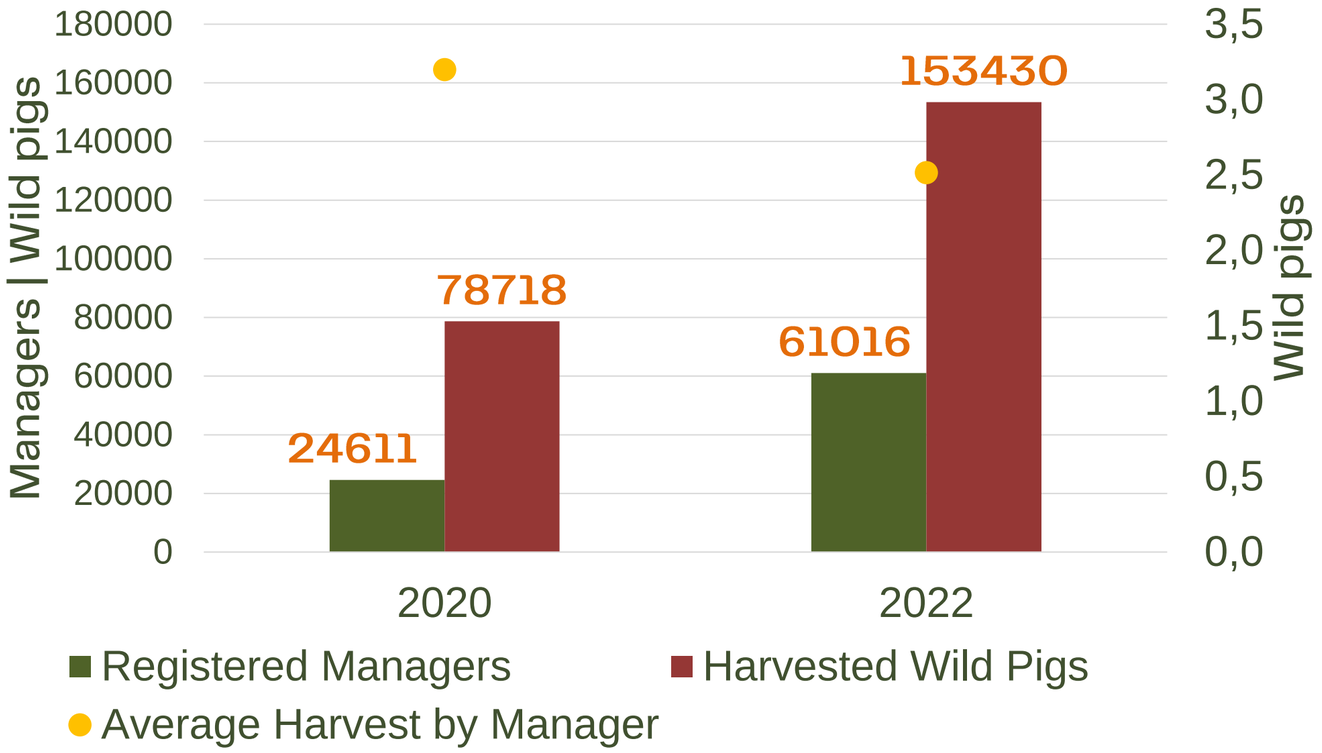
Population Management

Environmental and socioeconomic heterogeneity

2022: 91.1 Mha crops

~79% grains with 259.9 million tons of output

Overview



+148% Registered Managers

+95% Harvested Wild Pigs

-21% Average Harvest by Manager

Harvesting practices

Population dynamics and behavior patterns

Lack of official population estimative

Objective

Evaluate wild pig management in Brazil assessing avoided crop damages impacts on both economic and environmental aspects

- Novel approach through economic modeling in Brazil
- Primary factors usage, economic growth and household welfare
- Land use patterns and greenhouse gas emissions

Methodology

TERM-BR15: main features

Dynamic, inter-regional and bottom-up

27 States aggregated to 14 regions

122 sectors aggregated to 38

10 Households types: by income range

10 Work types: by wage range

Land use module: transition matrix

GHG emissions module: activity + fuel

Calibration 2015

Historical Simulation 2023

Projections 2030

Simulation Strategy

Scenarios

- Minimum damage
  - 50% harvest rate (HR) (to estimate initial population)
  - 3% body weight crop consumption (CC)
- Intermediate damage
  - 33% HR
  - 4% CC
- Maximum damage
  - 25% HR
  - 5% CC

Harvest Rate	IBAMA reports (Hegel, 2021)
Population	Asymptotic growth rates of 9% and 63% depending on management (Bieber and Ruf, 2005)
Diet	Corn 61,7%; sugarcane 15,8% (Pedrosa et al. 2021) Soybeans ~45% (Cervo and Guadagnin, 2020) 4 months each
Consumption	3 – 5% animal's body weight (Bodenchuck, 2008)

Policy Shocks: Population and Crops

Managed Population

0.67 to 1.3 million wild pigs

203 to 678 thousand tons of crop damage

+

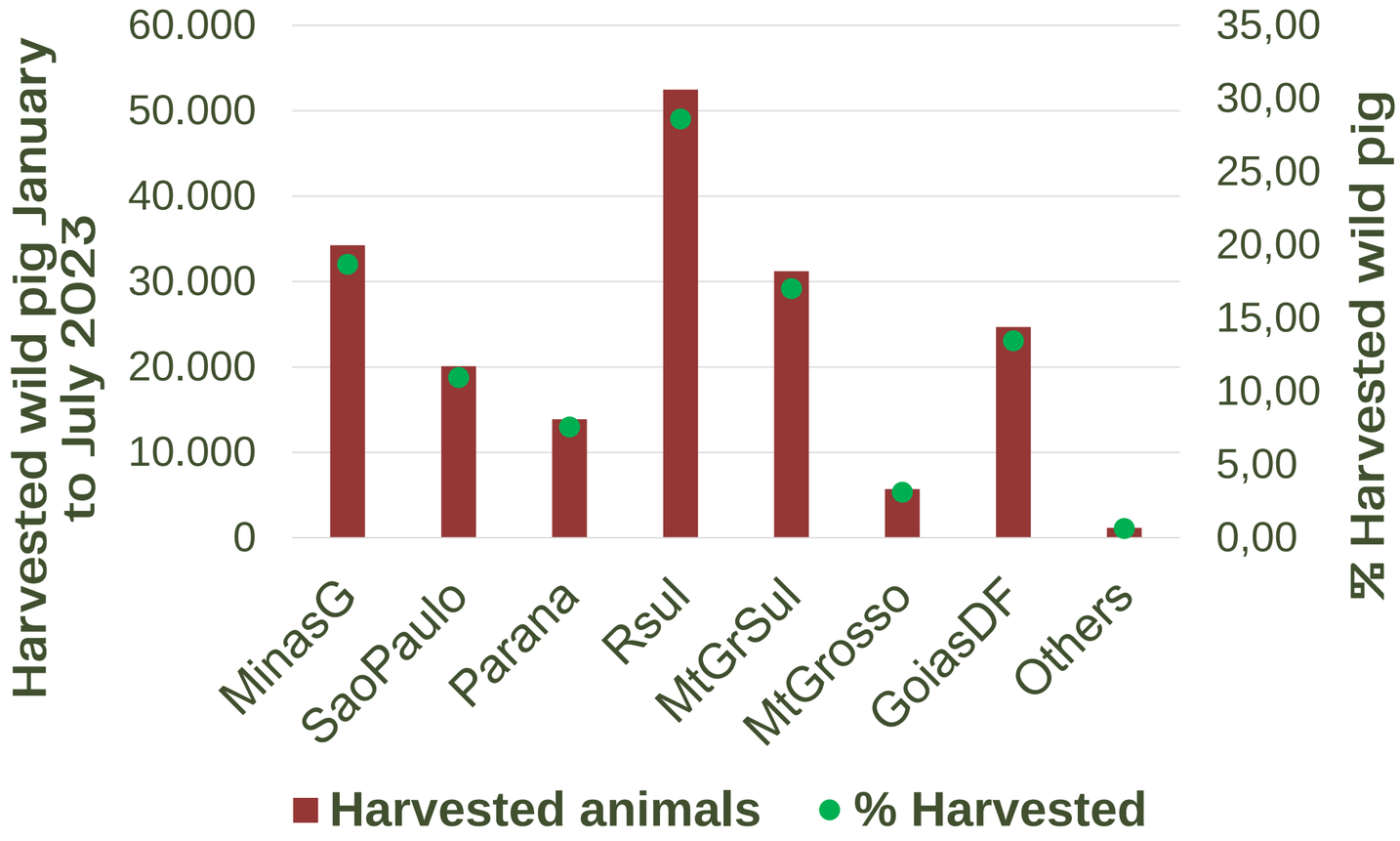
21x

Unmanaged Population

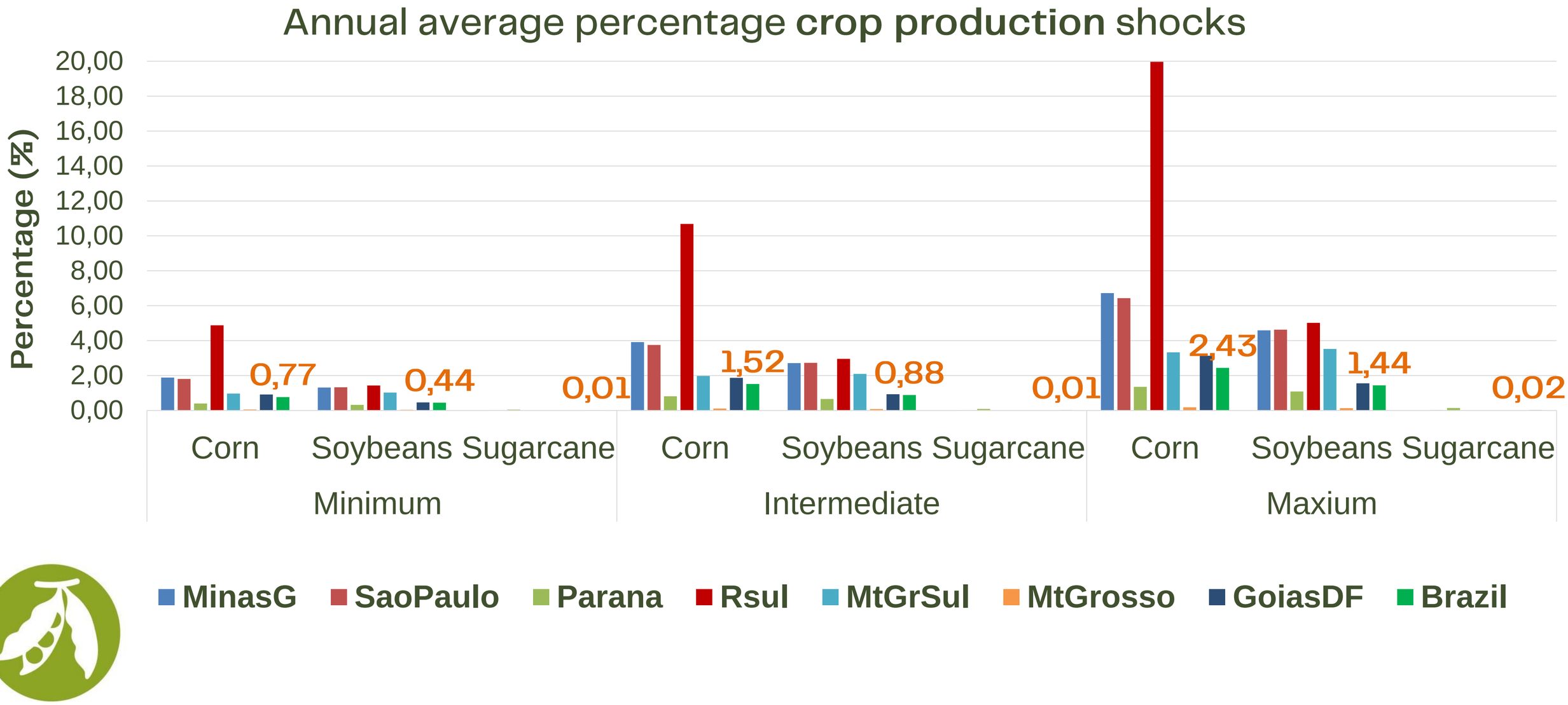
14.2 to 28.5 million wild pigs

4,320 to 14,397 thousand tons of crop damage

Policy Shocks: Regional Distribution

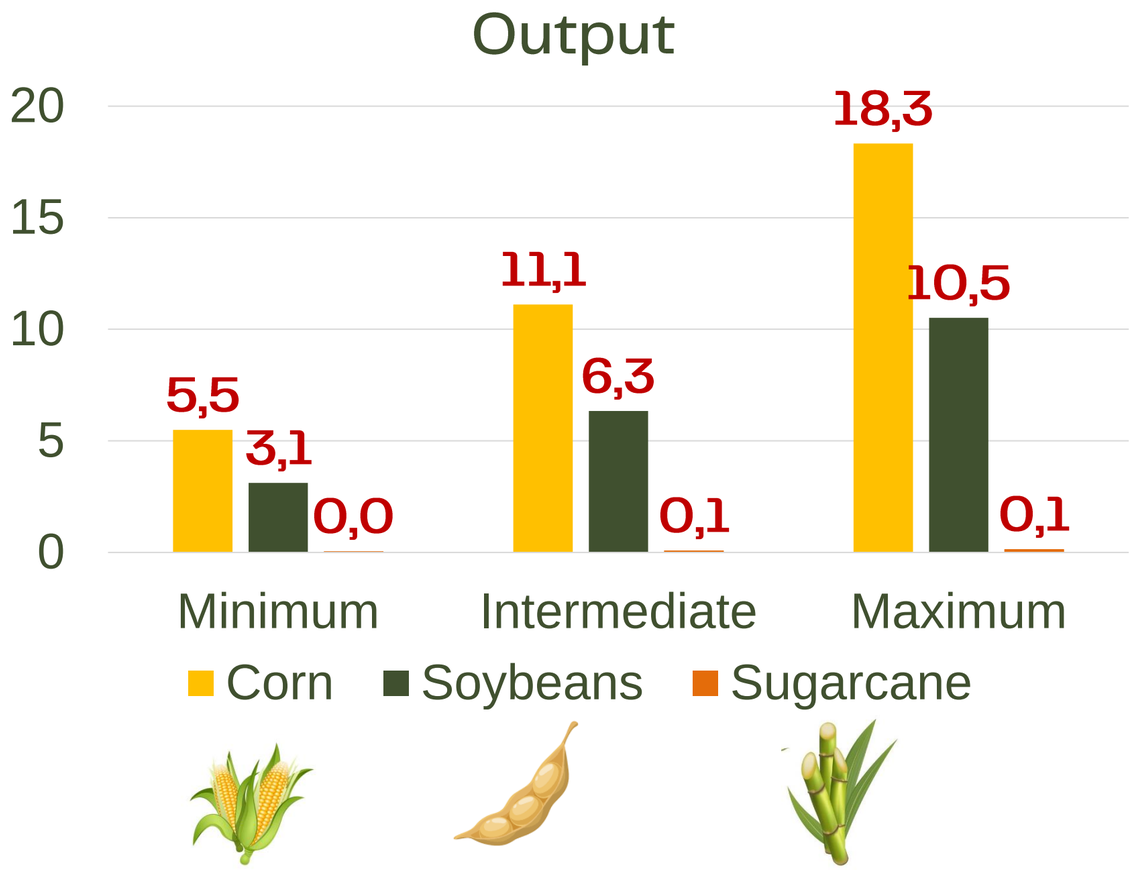


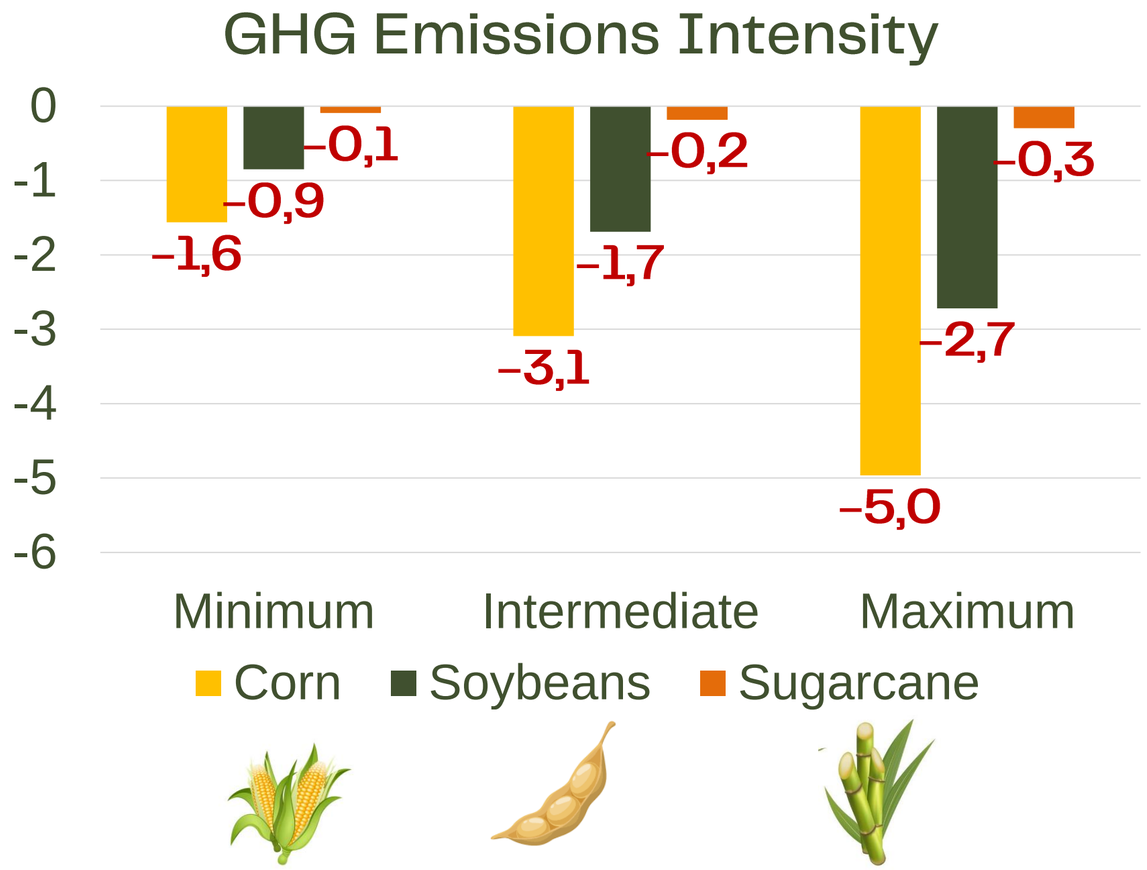
Policy Shocks: Simulated Parameters



Results and Discussion

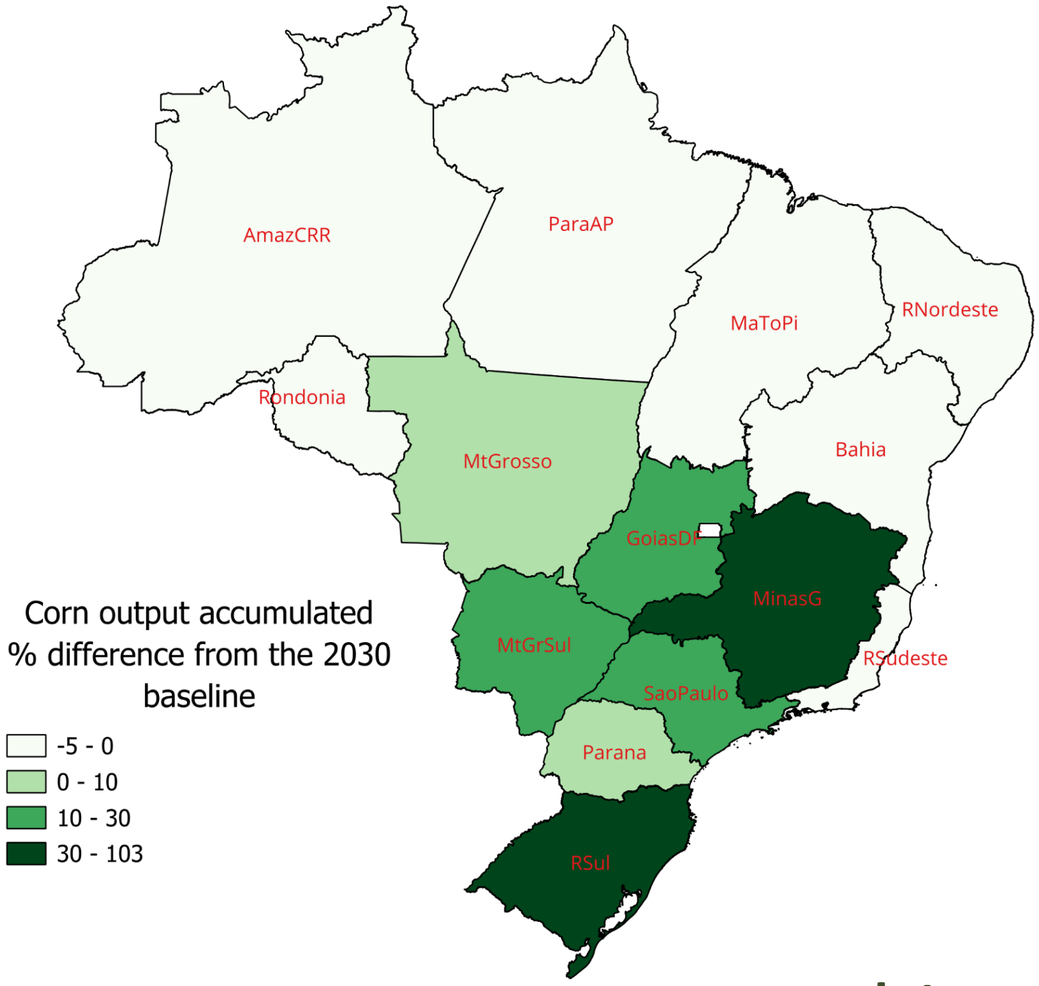
Crop impacts: National

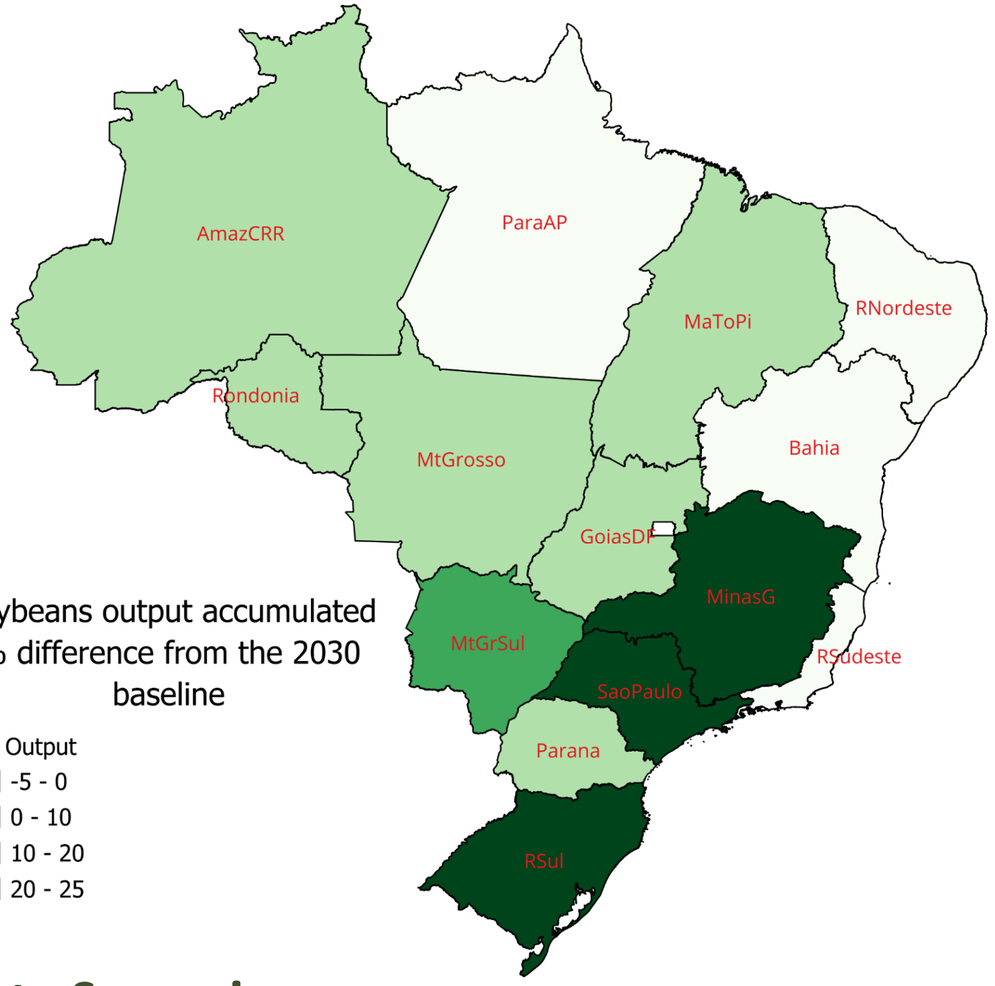




Accumulated percentage difference from the 2030 baselines

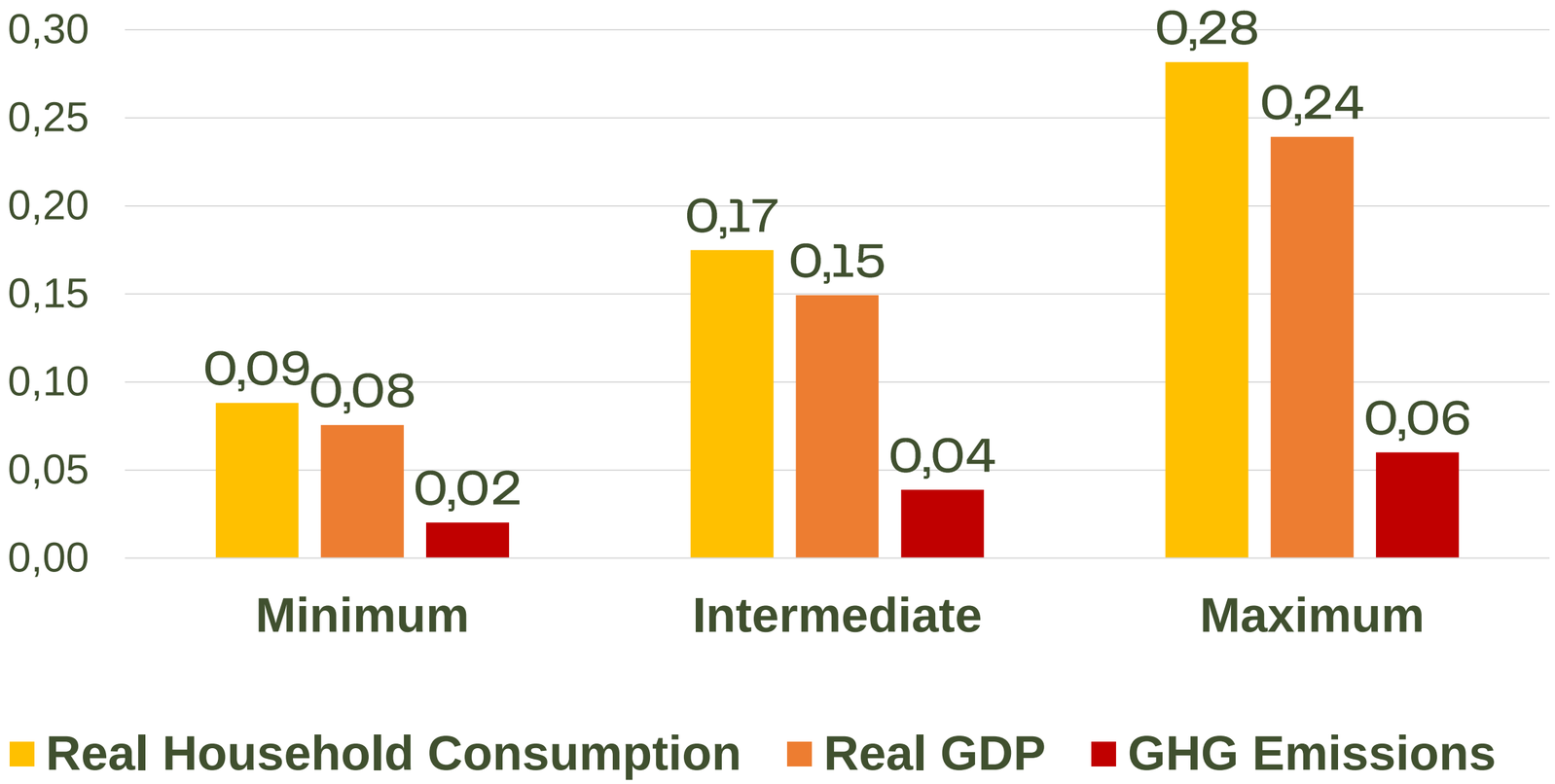
Crop impacts: National





Intermediate Scenario

Macroeconomic impacts: National



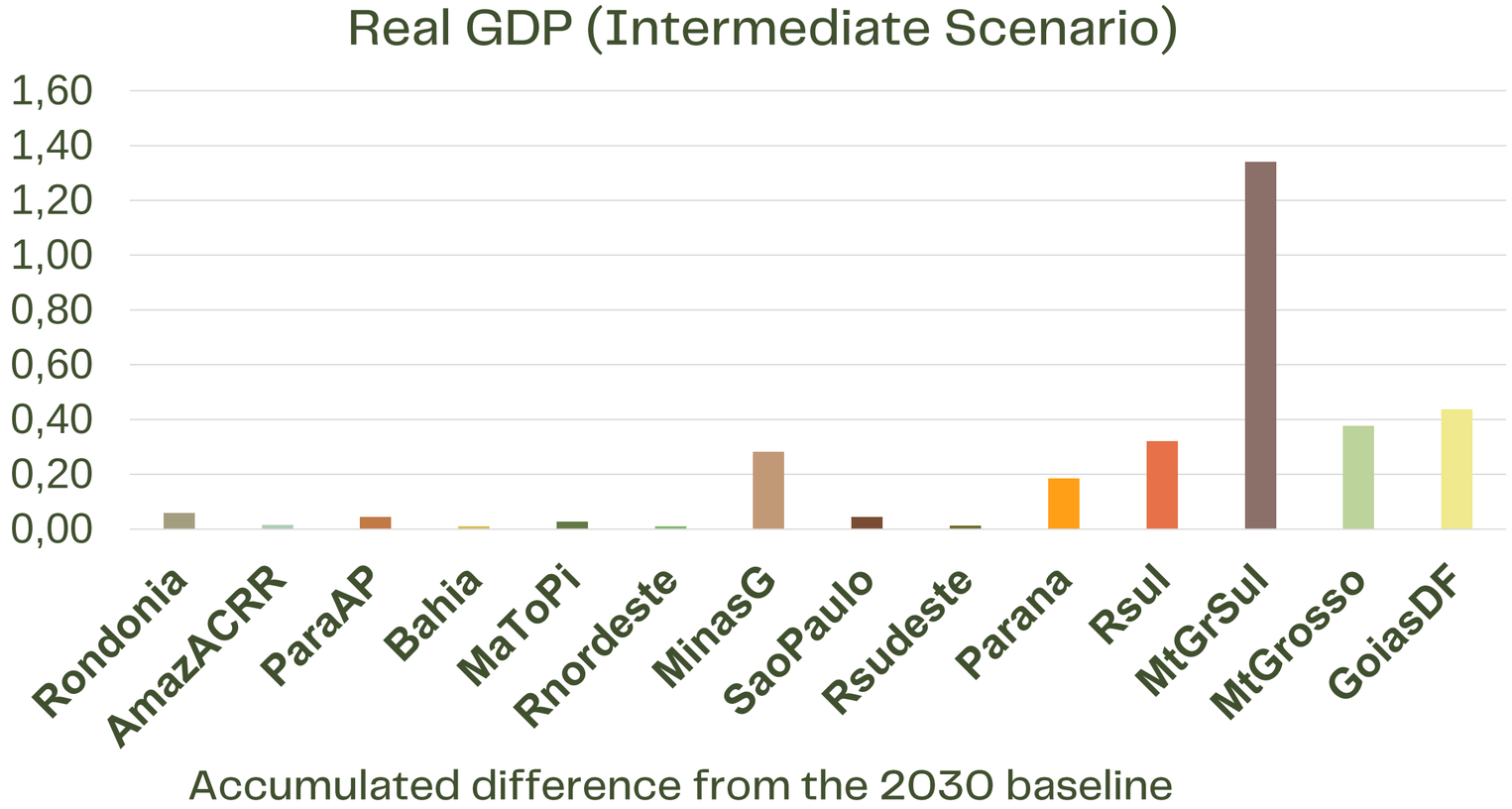
GDP:
US$ 2.1 to US$ 6.7 billions

GDP/Wild Pig:
US$ 155.94 to US$ 246.44

GDP/hectare:
US$ 5.50 to US$ 17.36

Accumulated percentagem difference from the 2030 baselines

Macroeconomic Impacts: Regional

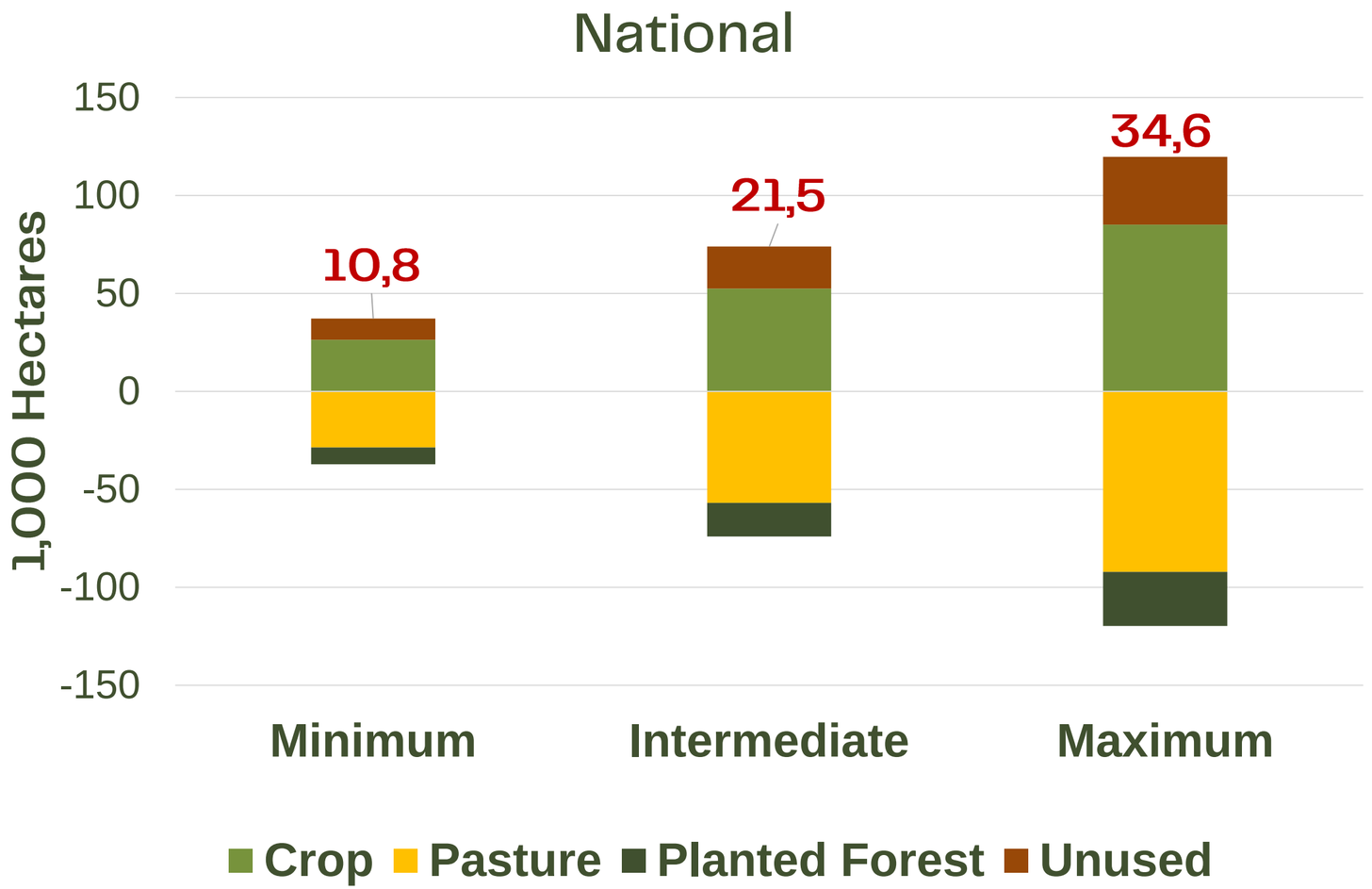


Crop importance to regional output

Historical harvested wild pigs share

Larger benefits with population management

Land Use Change

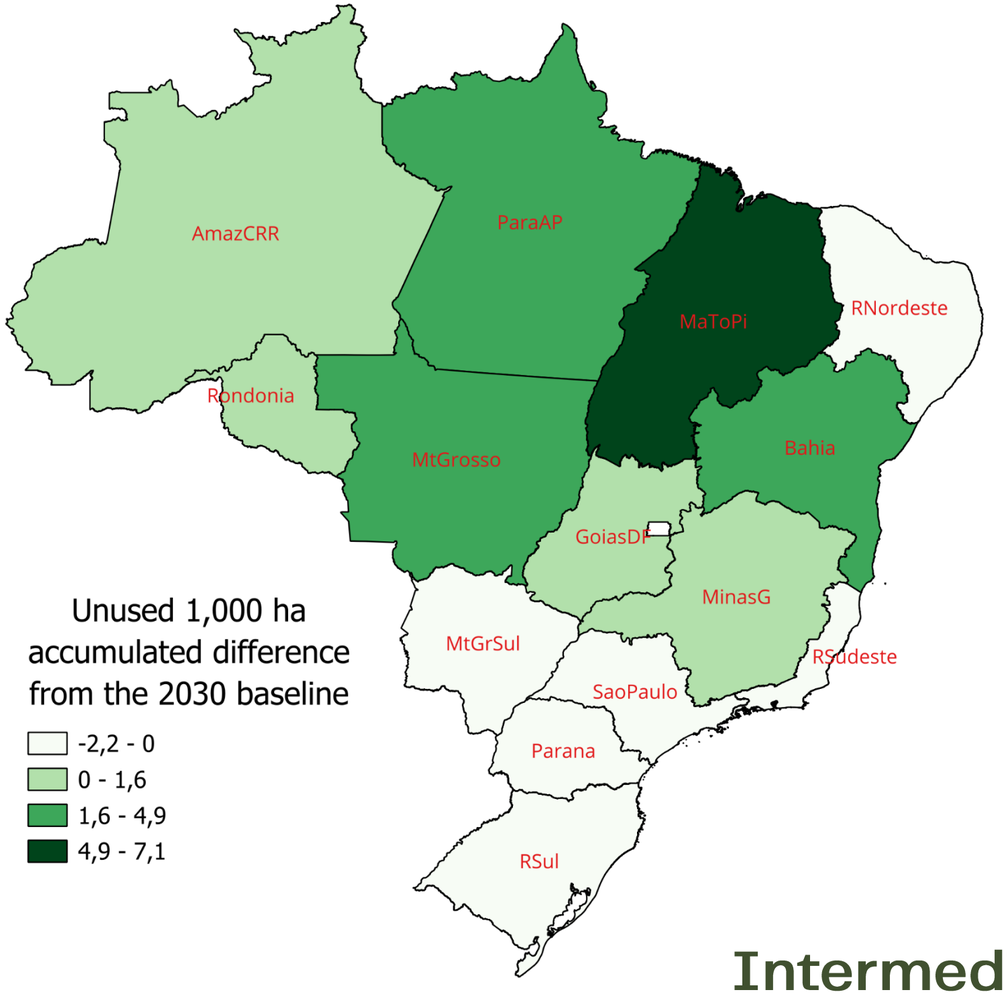


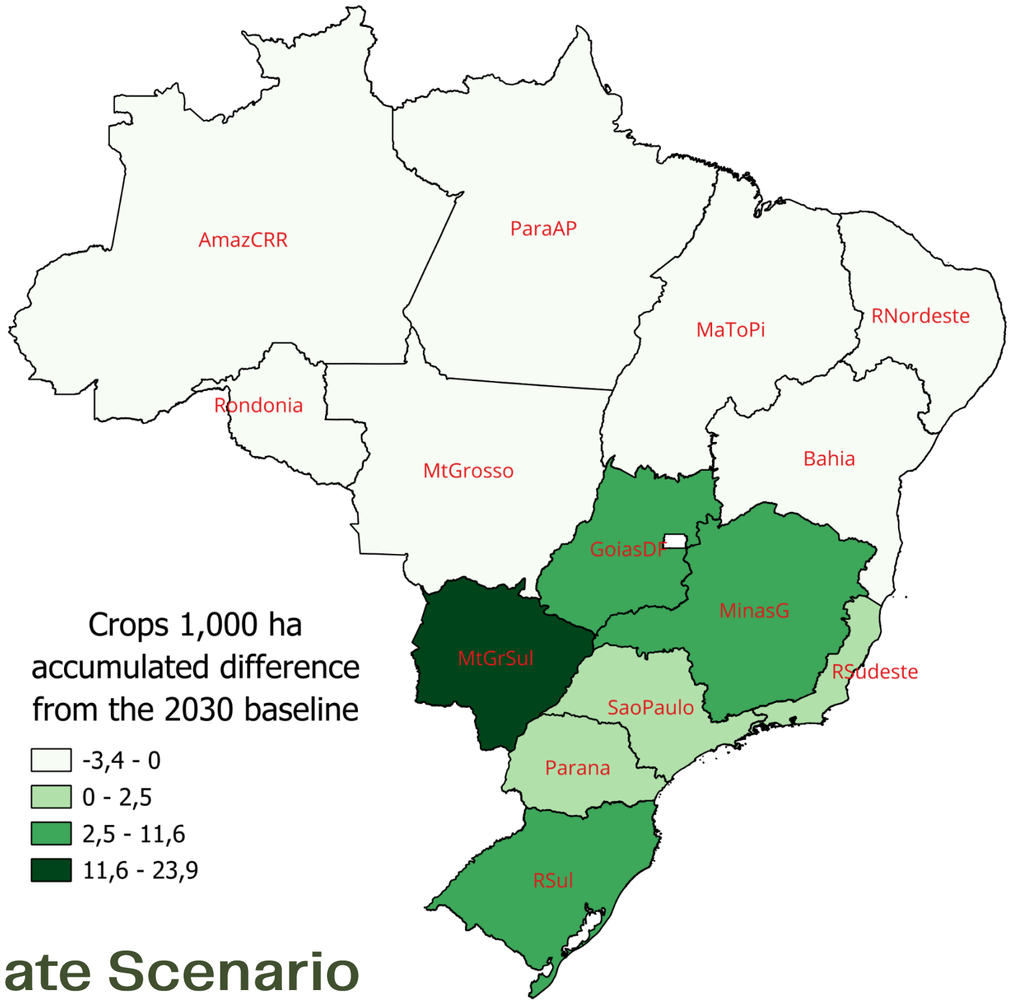
Would avoid up to 34.6 thousand hectares

Stimulate Pasture conversion to Crops

Accumulated difference from the 2030 baselines

Land Use Change





Intermediate Scenario

Conclusion and Policy Implications

01

- ✓ Economic growth
- ✓ Lower GHG emission intensity
- ✓ Avoided deforestation
- ✓ Other unmeasured environmental benefits

02

- ✓ Enables cost-benefit analysis
- ✓ Facilitates regional policies
- ✓ Data for insurance design

03

- ✓ Improving population data
- ✓ Growth rates
- ✓ Regional distribution
- ✓ Diet composition

Thank You!

ESALQ
Luiz de Queiroz College of Agriculture
University of São Paulo

GPP
Grupo de Políticas Públicas
USP - ESALQ