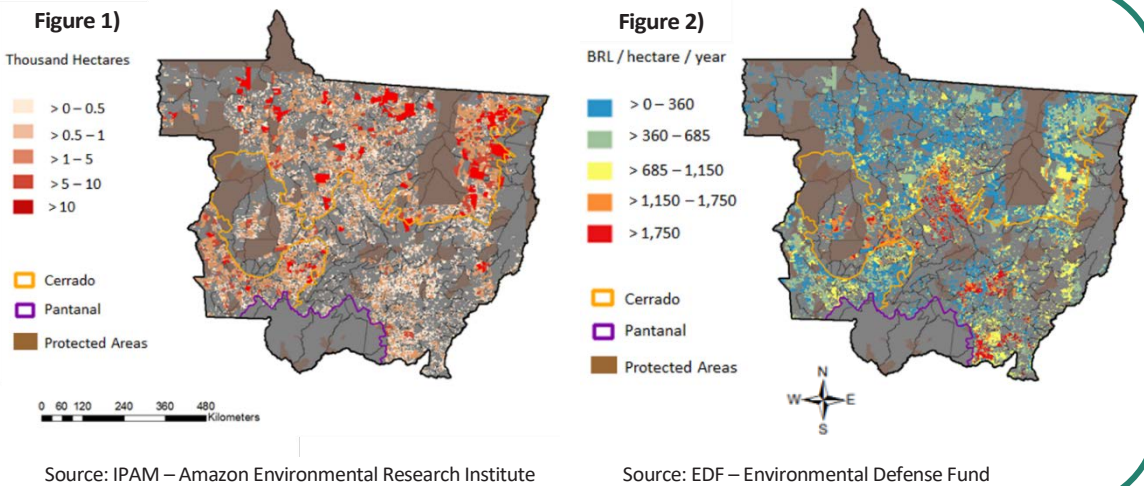


# Restoration and Market for Environmental Reserve Quotas in Mato Grosso, Brazil



Figures: 1) Spatial Distribution of 9.8 Million Hectares of Negative Vegetation Deficits on property level according to the Forest Code in the state of Mato Grosso in 2016. 2) Spatial Distribution of property level opportunity and restoration costs ranging from low (blue) to high (red) in 2016.

- › In the state of Mato Grosso (MT) in Brazil, an agricultural powerhouse with an area equal to Germany and France combined, rural private properties have an estimated deficit of native vegetation of 9.8 million hectares – compared to what they should have according to Brazil’s 2012 Forest Code (Fig. 1).
- › Out of the total deficit, 1.1 M ha need to be restored and 8.7 M ha can either be restored onsite or potentially compensated offsite through the purchase of environmental reserve quotas (CRAs in Portuguese) from landowners with native vegetation surplus. Understanding the dynamics of a future CRA market is paramount to effectively targeting restoration and avoided deforestation efforts and financing in Brazil.
- › RESTORE+ modelled market equilibria in terms of prices and traded quantities for a Mato Grosso market in environmental reserve quotas (CRAs) using property level opportunity and restoration costs (Fig. 2) to evaluate alternative market designs. Criteria to restrict supply of zero and low opportunity cost forest surpluses results in larger environmental benefits measured by the number of hectares of avoided deforestation and restoration compared to an unrestricted supply.

## Approach and aim

The 2012 Brazilian Forest Code establishes native vegetation preservation requirements within private rural properties. It mandates restoration of post-2008 native vegetation deficits, while it gives flexibility to landowners with pre-2008 deficits to become compliant either by restoration or by supporting forest protection offsite using a marketable instrument, the Forest Certificates or Environmental Reserve Quotas (*Cota de Reserva Ambiental*; CRA).

Ultimately, as landowners with native vegetation surplus and deficits trade forest certificates, the CRA market will mediate the final number of hectares of avoided deforestation and restoration.

RESTORE+ provides a microeconomic analysis of the economic and environmental impacts of alternative potential designs for the CRA market using a novel property-level database for the leading agricultural state of Mato Grosso, Brazil where private properties have to bring in compliance an estimated deficit of 9.8 million hectares (Fig. 1).

Using econometric analysis of opportunity costs of avoided deforestation, property data on native vegetation surpluses and deficits, and land values and reforestation cost estimates (Fig. 2), supply and demand curves for CRAs were built to model market equilibria under alternative policy interventions.

## Main interim results

Out of the total deficit, 1.1 M ha need to be restored and 8.7 M ha can either be restored or compensated through the trading of CRAs.

In the Amazon biome in Mato Grosso, the deficit that can be compensated amounts to 7.3 M ha while the surplus is 2.1 M ha. An unrestricted supply would result in a market equilibrium of approximately 2.0 M ha of traded CRAs at a clearing price of 625 BRL/ha/year. This equilibrium leaves 5.3 M ha to be restored. Restricting CRA supply to those hectares at risk of deforestation increases the number of hectares to be restored and increases estimated deforestation avoided.

In the Cerrado biome, the deficit that can be compensated amounts to 1.4 M ha while surplus sums up to 3.9 M ha. This supply of CRAs would drive prices to near zero. Restricting CRA supply only to hectares at risk of deforestation, such as those near existing roads or agricultural land, is fundamental to achieving additional environmental benefits measured by the number of hectares of avoided deforestation and restoration.

## Next steps

Given potential trade-offs between CRAs, avoided deforestation and restoration outcomes, the project will explore the use of targeted REDD+ payments and additional restoration incentives to complement the CRA market and maximize environmental gains.

*Further reading: Here today, Here Tomorrow: Opportunity Costs of Avoiding Deforestation in Mato Grosso, Brazil (Pietracci et al., 2020), and Designing a Market for Environmental Reserve Quotas in Mato Grosso, Brazil (EDF, 2020).*

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