# Forest conservation policy, additionality, and socio-environmental implications*

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**Abstract**

The world has lost one-third of its forests due to agricultural expansion. Tropical forests provide immense ecological and climate benefits but face the most rapid declines. Bolivia epitomises this crisis, currently experiencing the highest deforestation rates in South America. This study evaluates the impact of Bolivia's Protected Areas (PAs) established between 1991 and 2023 on a range of economic and environmental outcomes. We employ a novel staggered differences-in-differences (DID) design, matching units based on predicted deforestation risk in the absence of protection using a Random Survival Forest model. This design allows us to explore the determinants of location bias in PA siting, namely, why protection is typically enacted in areas under the lowest threat of conversion. Our staggered DID estimates indicate that, on average, PAs reduce deforestation rates by approximately 0.19 percentage points (pp), a substantial effect given background annual deforestation rates of 0.28pp, and avoiding approximately 1.88 $MtCO_2$ emissions. PAs in the highest risk quintile – where the potential for additionality is greatest due to intense land conversion pressure – reduce deforestation rates most substantially, by 0.54pp. Finally, we find no evidence of trade-offs between PA designation and economic outcomes, extinction risk, or carbon storage along the continuum of baseline deforestation risk. Thus, the observed location bias of PAs in Bolivia cannot be attributed to multi-objective planning. These findings underscore the importance of prioritising PAs in high-risk areas to maximise additionality.

**Keywords:** additionality, conservation policy, biodiversity, deforestation, multi-objective policy, protected areas, Random Survival Forest

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