POLICY BRIEF

PROTECTED TERRITORIES, THOUGH CRITICAL, ARE NOT ENOUGH TO SLOW AMAZON DEFORESTATION
BRAZIL REQUIRES COORDINATED AND TARGETED CONSERVATION POLICIES

INTRODUCTION

Landscape protection, or the creation of protected areas and recognition of indigenous lands, is one of the most popular policy tools used to fight deforestation worldwide. An estimated 15% of the Earth's land surface is currently under protection, totaling more than 2 billion hectares worldwide.[1] Protection is typically implemented via regulations that severely limit or entirely prohibit forest-clearing practices within defined territories, and that establish penalties for violating the regulations. These efforts to slow deforestation play a critical role in protecting natural resources and in reducing greenhouse gas emissions.

Although Brazil has long used landscape protection as part of its conservation strategy, it significantly expanded coverage in the Amazon to fight tropical deforestation in the early 2000s. Today, the country protects 258 million hectares, 13% of the global total, mostly in the Amazon region.[2] Researchers from Climate Policy Initiative / Pontifical Catholic University of Rio de Janeiro (CPI/PUC-Rio) **evaluate the effectiveness of landscape protection in slowing deforestation in the Brazilian Amazon**. Results provide two critical insights into Brazil's anti-deforestation policies and how these policies might be strengthened. First, the creation and recognition of protected territories were effective in slowing deforestation within these areas. Second, the policy had only a negligible impact on aggregate deforestation levels. **Protected territories therefore shielded forests under their domain, but they appear to have deflected deforestation to unprotected regions.**

The findings highlight the local effectiveness of protected territories, and thereby support their use in protecting high-value areas. Yet, results also reinforce the importance of pursuing protection strategies in combination with integrated conservation policy efforts to reduce deforestation throughout the Amazon.

1   UNEP-WCMC (2020). **Protected Area Territorial Profiles from the World Database of Protected Areas**, May 2020.

2   UNEP-WCMC (2020). **Protected Area Profile for Latin America & Caribbean from the World Database of Protected Areas**, May 2020.

RECOMMENDATIONS

• The use of protected landscapes to shield forests from deforestation is a strategy that works and should be maintained and expanded; however, they cannot be used in isolation to reduce overall levels of deforestation.

• Protected landscape strategies must be coordinated with complementary conservation policies to prevent the displacement of deforestation to unprotected territories.

WHAT ARE PROTECTED TERRITORIES?

The International Union for Conservation of Nature (IUCN) defines a protected territory as "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values".[3] In Brazil, protected territories include protected areas (such as national parks, natural monuments, and biological reserves) and indigenous lands. Protected areas aim at providing long-term conservation of high-value natural ecosystems, whereas indigenous lands aim at protecting nature as a means of preserving the livelihoods of indigenous communities and ensuring their right of access to and management of lands as part of their traditional way of life. Despite this difference, Brazilian legislation recognizes that indigenous lands contribute to environmental conservation and therefore regards them as protected territories.[4]

Although Brazilian protected areas and indigenous lands both classify as public lands, each is governed by a different authority and is therefore subject to different regulations. Following a period of technical assessment and public consultation, protected areas are created via laws or decrees. They can be managed at federal, state, or municipal levels, but federal and state areas are far more common in the Amazon. In contrast, indigenous lands cannot be created, only recognized.

Protected areas can be either strictly protected, where no deforestation of any form is legal, or of sustainable use, where forest clearing may be legal if duly licensed and in accordance with the area's management plan. Clearing of native vegetation in indigenous lands is only legal if performed by indigenous peoples as part of their traditional way of life.

When an area is granted protection, it becomes legally protected, since Brazil's regulatory framework allows for harsher punishment of environmental infractions committed within protected territories. Moreover, these territories are also typically under greater public scrutiny.

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3 IUCN (2008). **Protected Areas**. Available at https://www.iucn.org/theme/protected-areas/about.

4 Brazil (2006). **Decreto Nº 5.758, de 13 de Abril de 2006**. Subchefia para Assuntos Jurídicos, Casa Civil, Presidência da República.

In addition to being monitored by dedicated governmental agencies, they attract much attention from both national and international medias, as well as from the civil society. Thus, in theory, protection stems from the capacity to deter environmental offenders from engaging in illegal activities due to the higher expected risk of getting caught and severely punished when acting within protected territories.[5]

THE EXPANDING ROLE OF LANDSCAPE PROTECTION IN THE AMAZON

Landscape protection has long been used for tropical conservation purposes in Brazil — nearly two-fifths of the Brazilian Amazon was already under protection in the early 2000s. Yet, deforestation advanced at alarming rates during this period, peaking at more than 2.7 million hectares per year in 2004.[6] The Brazilian federal government responded by launching the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm), a policy plan that proposed innovative measures to slow Amazon deforestation. Within the scope of the PPCDAm, landscape protection expanded significantly. From 2004 to 2014, the extent of protected areas nearly doubled to 113 million hectares, and indigenous lands increased by 10 million hectares to reach a total of 107 million hectares.[7] By 2014, protected territories covered more than half of the Brazilian Amazon.

The growth in protection coverage during the action plan was notable, but it was the new allocation strategy that brought true novelty to protection policy. Prior to the PPCDAm, protection was granted mostly based on biological and ecological factors. Under the action plan, these remained important criteria, but current and future deforestation risks also started being considered in allocation decisions. In addition to the original goals of conserving biodiversity and protecting natural habitats, protected territories in high-risk zones were overtly meant to serve as shields against advancing forest clearings.

Figures 1 and 2 illustrate the allocation of protected territory in the Brazilian Amazon before and after the PPCDAm. Figure 1 shows landscape protection status in 2004, as well as accumulated deforestation (all forest areas that had been historically cleared in the Amazon till then). The Deforestation Arc, the southwest to northeast region that concentrated most forest clearings, captured the historical agricultural frontier pushing into the forest. In the figure, this is illustrated as the region that is within 750 kilometers of the Amazon's southeast border; areas that are farther away are greyed out. The Deforestation Arc region accounted for more than 90% of deforestation in the action plan's first decade — forest areas in this zone were therefore exposed to high deforestation pressure.[8]

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5   Existing data on Amazon deforestation do not allow legal clearings to be accurately distinguished from illegal ones. However, there is compelling, though only anecdotal and/or localized, evidence that most areas deforested over the past two decades in the region were cleared under illegal circumstances.

6   INPE (2019). **Programa de Monitoramento da Floresta Amazônica Brasileira por Satélite – PRODES** . Instituto Nacional de Pesquisas Espaciais / Ministério da Ciência, Tecnologia e Inovação.

7   MMA (2017). **Sistema Nacional de Unidades de Conservação – SNUC.** Ministério do Meio Ambiente.; FUNAI (2017). **GeoProcessamento**. Fundação Nacional do Índio.; ISA (2017). **Terras Ind'genas**. Instituto Socioambietal.

8   INPE (2019). **Programa de Monitoramento da Floresta Amazônica Brasileira por Satélite – PRODES** . Instituto Nacional de Pesquisas Espaciais / Ministério da Ciência, Tecnologia e Inovação.; INPE (2016) **Sistema de Detecção de Desmatamento em Tempo Real – DETER**. Instituto Nacional de Pesquisas Espaciais / Ministério da Ciência, Tecnologia e Inovação.

Figure 1: Amazon Protected Territory and Accumulated Deforestation, 2004

🟩 Full Protection	🟨 Sustainable Use	🟦 Indigenous Land	🟥 Deforestation
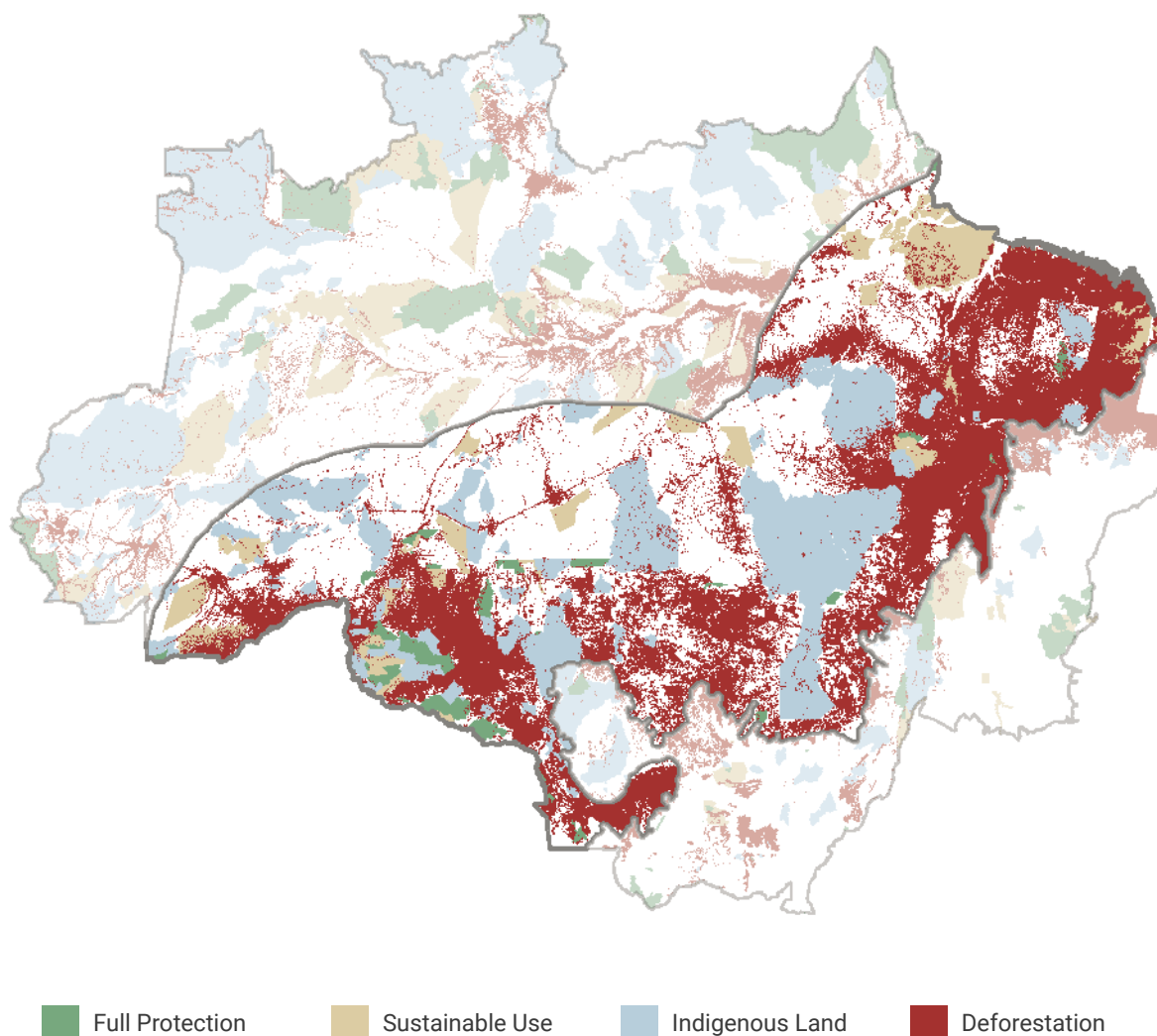
Source: *Climate Policy Initiative/ PUC-Rio (2020) with data from INPE, MMA, FUNAI and ISA*

Figure 2 clears accumulated deforestation from the map to highlight the distribution of protected territory. In 2004, landscape protection was widespread in the Amazon, but much of it was in the hinterland, far from the active deforestation frontier. Within the first decade of the action plan, when the new risk-based allocation strategy was already in place, almost 35 million hectares of protected territory were allocated to the high-risk Deforestation Arc zone. Newly protected territory in this high-pressure zone largely consisted of protected areas, which can be more easily created by the government as compared to indigenous lands. As shown in Figure 2, the spatial distribution of these newly protected territories closely resembled that of a shield, set up to contain deforestation pushing into the Amazon forest.

Figure 2: Amazon Protected Territory, 2004 and 2014

2004

2014

Full Protection　　Sustainable Use　　Indigenous Land
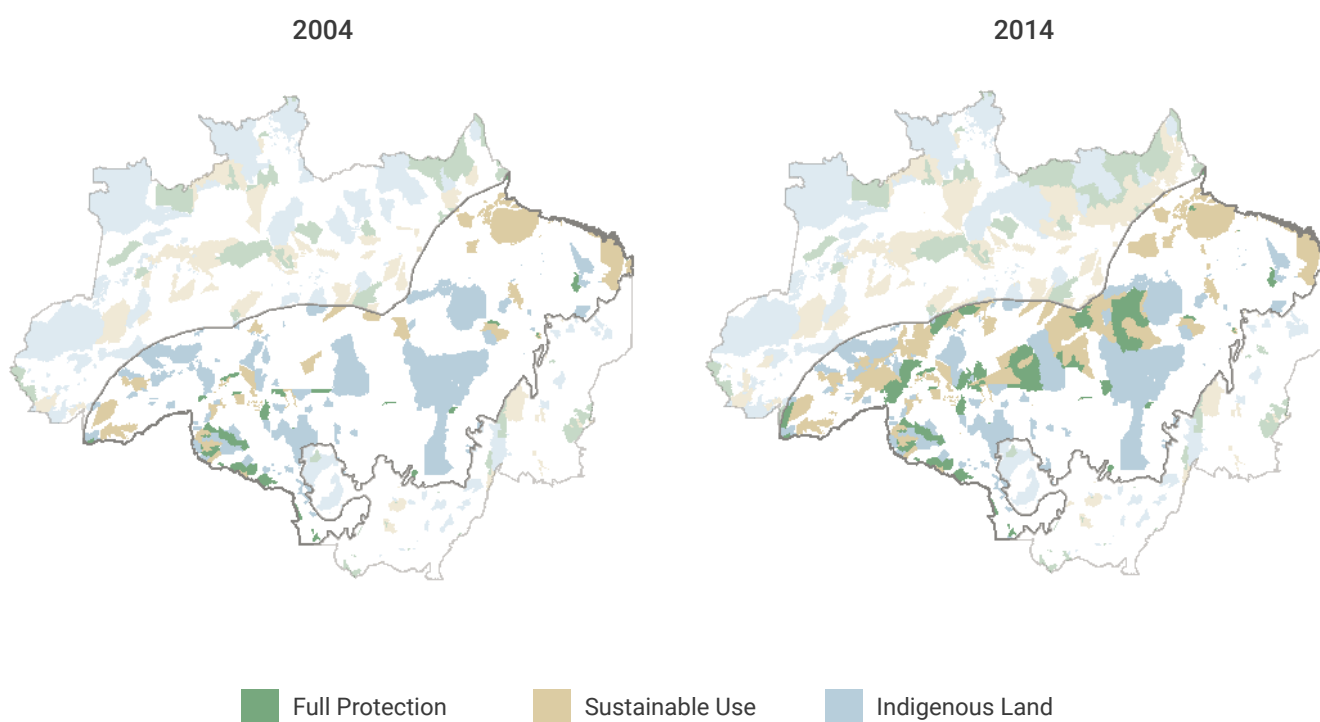
Source: Climate Policy Initiative/ PUC-Rio (2020) with data from MMA, FUNAI and ISA

ASSESSING THE ROLE OF PROTECTED TERRITORIES IN PREVENTING DEFORESTATION

Evaluating the effectiveness of landscape protection in preventing deforestation is empirically challenging for two reasons. First, areas that are granted protection are intrinsically different from the ones that remain unprotected — they might, for example, hold greater biodiversity. This means that deforestation patterns in these areas might be inherently different for reasons other than protection, so simply comparing clearing outcomes in protected and unprotected territories does not yield an accurate measure of protection's impact. Second, effectiveness depends on whether the area faced an actual threat of being deforested prior to receiving protection, since areas that are not under forest clearing pressure are unlikely to see deforestation with or without protection.

Protected territories worldwide are often — and increasingly — located in remote areas, making it difficult to assess the role this approach actually has in these regions in meeting forest conservation goals.[9] The expansion of protected territories in the Brazilian Amazon within the scope of the PPCDAm is an exception to this pattern. Because protection was henceforth granted with the explicit goal of serving as a shield against advancing forest clearings, Brazil holds a large amount of protected territory in high-risk zones. This offers a unique opportunity to empirically assess the effectiveness of landscape protection against deforestation.

Researchers at CPI/PUC-Rio test protection's shielding capacity in the Brazilian Amazon by exploring the policy approach that Brazil used in allocating protected territories. Using data from the country's satellite-based tropical forest monitoring system, they show that the regional intensity of forest clearing alerts is associated with local deforestation outcomes from 2007 to 2014.[10] Researchers therefore use this regional alert intensity as a measure of local forest clearing pressure, and use this measure to compare levels of deforestation in protected and unprotected localities exposed to equivalent deforestation pressures.

Results attest to the protection strategy's efficacy in a high-risk context, with significantly less forest being cleared in protected localities than in unprotected ones. The local effect is sizable. Increasing regional deforestation pressure by one standard deviation increases local forest clearings — but the difference between protected and unprotected localities amounts to a quarter of the sample's average local deforestation.

To understand whether this local effect impacted overall deforestation in the Amazon, the researchers use a hypothetical scenario in which landscape protection is entirely removed in the Brazilian Amazon. Table 1 presents the results, showing that without protected territories, overall deforestation totals would not have been markedly different. In fact, the difference across deforestation totals in each scenario from 2007 to 2014 is only 43,801 hectares, or 1% of total deforested area actually observed.

9   DeFries, R., Hansen, A., Newton, A. C., and Hansen, M. C. (2005). **Increasing Isolation of Protected Areas in Tropical Forests Over the Past Twenty Years**. *Ecological Applications*, 15(1):19–26.
Joppa, L. N., Loarie, S. R., and Pimm, S. L. (2008). **On the protection of "protected areas"**. *Proceedings of the National Academy of Sciences*, 105(18):6673–6678.
Joppa, L. N. and Pfaff, A. (2011). **Global protected area impacts**. *Proceedings of the Royal Society B: Biological Sciences*, 278(1712):1633–1638.

10   The satellite-based tropical forest monitoring system was adopted under the PPCDAm. It uses satellite imagery to compare changes in forest cover throughout the full extent of the Brazilian Amazon. Upon detecting potential forest loss, the system issues a georeferenced alert that pinpoints the location of recent changes in forest cover. Alerts are used by Brazilian environmental agencies to target law enforcement action.

Table 1: Amazon Protected Territory, 2004 and 2014

	Deforested Area (in hectares)	
Year	Observed	Hypothetical: No Protection
2007	1,001,963	1,010,052
2008	1,088,463	1,083,634
2009	524,428	535,353
2010	483,821	481,643
2011	467,814	454,895
2012	361,680	351,589
2013	466,920	447,774
2014	412,213	398,559
TOTAL	4,807,300	4,763,499

Note: The hypothetical column reflects a scenario in which landscape protection is entirely removed.
*Source: Assunção and Gandour (2018). **The Deforestation Menace: Do Protected Territories Actually Shield Forests?**. CPI/PUC-Rio working paper.*

Combined, these findings indicate that while protected territories effectively shield forests under their domain, they only have a negligible impact on aggregate forest clearing levels. **This attests to protection's effectiveness in curbing deforestation locally. Yet, it also suggests that protection policies affect regional deforestation dynamics, deflecting deforestation from protected to unprotected regions.**

NEXT STEPS: STRENGTHENING BRAZIL'S FIGHT AGAINST DEFORESTATION

CPI/PUC-Rio's empirical analysis provides nuanced and critical insights into the effectiveness of Brazil's landscape protection policy, and sheds light on the next steps for strengthening policy to combat Amazon deforestation.

The evidence corroborates the use of protected territories as a means of blocking advancing deforestation, as well as of protecting specific areas of interest. Yet, it also points toward the need not only for maintaining protected landscape policies, but also for designing and implementing broader, coordinated conservation strategies. **The strategic targeting of protected territories should be accompanied by integrated conservation efforts that thwart the deflection of deforestation into unprotected regions and account for how deforestation activities respond to policy.**

NOTES

DATA SOURCES

The analysis explores a rich spatially explicit (raster) dataset built from a variety of publicly available sources. The key variables and their corresponding sources are: protected area coverage from the Ministry of the Environment; indigenous lands coverage from FUNAI and ISA; deforestation increments from PRODES/INPE; and deforestation alerts from DETER/INPE. The working paper provides additional details.

METHODOLOGY

The analysis investigates differences in forest clearing outcomes in protected and unprotected localities exposed to equivalent deforestation pressures. The sample covers the 2006 through 2014 period and refers to a high-risk zone defined as the region within 750 kilometers of the Brazilian Amazon Biome southeast border. The unit of analysis is a 900-meter raster cell, but data are built from raster datasets at the 30-meter resolution. Based on this spatial panel setup, and using georeferenced deforestation alerts within a cell's 50-kilometer neighborhood to capture cell-level deforestation pressure, the analysis uses variation in protection status both across cells and over time to evaluate if forest clearings advance over protected versus unprotected cells differently. Counterfactual exercises build on estimation results to simulate forest clearing outcomes under hypothetical scenarios in which protection is revoked. The working paper provides additional details.

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