A new era in the fight against deforestation in the Brazilian Amazon: Opportunities to improve policy effectiveness

Introduction

The deforestation slowdown in the Amazon is one of the most important environmental success stories of recent decades, with an 83% decrease in the annual rate of deforestation from 2004 to 2012. This accomplishment has enabled Brazil to reduce its greenhouse gas emissions by more than a third, while also preserving biodiversity and maintaining other vital ecosystem services.

Brazil achieved this dramatic reduction, in part, through ambitious government efforts to create new conservation areas and strengthen deforestation monitoring and enforcement, including the federal government's Action Plan for the Protection and Control of Deforestation in the Amazon (PPCDAm). This inter-ministerial process spawned additional public policies, including innovative approaches to target high-deforesting municipalities and to couple access to agricultural credit and markets to the environmental performance of landowners.[1]

New reserves were created to protect forests. Civil society and private-sector actors also played a major role, by working to impose a moratorium on soy and beef from illegally deforested land. Oscillations in market prices for agricultural commodities and a periodic weakening of the dollar contributed as well.

Yet annual deforestation in the Brazilian Amazon stabilized after 2009 and started to rise once more in 2013.[2] While deforestation levels are still far lower than they were at their peak in 2004, when an area almost the size of Belgium was cleared in a single year, it is clear that Brazil's deforestation policies are reaching the limits of their effectiveness. This policy brief, based on a study published in the *Proceedings of the National Academy of Sciences*,[3] examines some of the reasons for this shift and suggests new strategies for decision-makers' consideration.

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Recent deforestation in São Félix do Xingu, in the state of Pará.

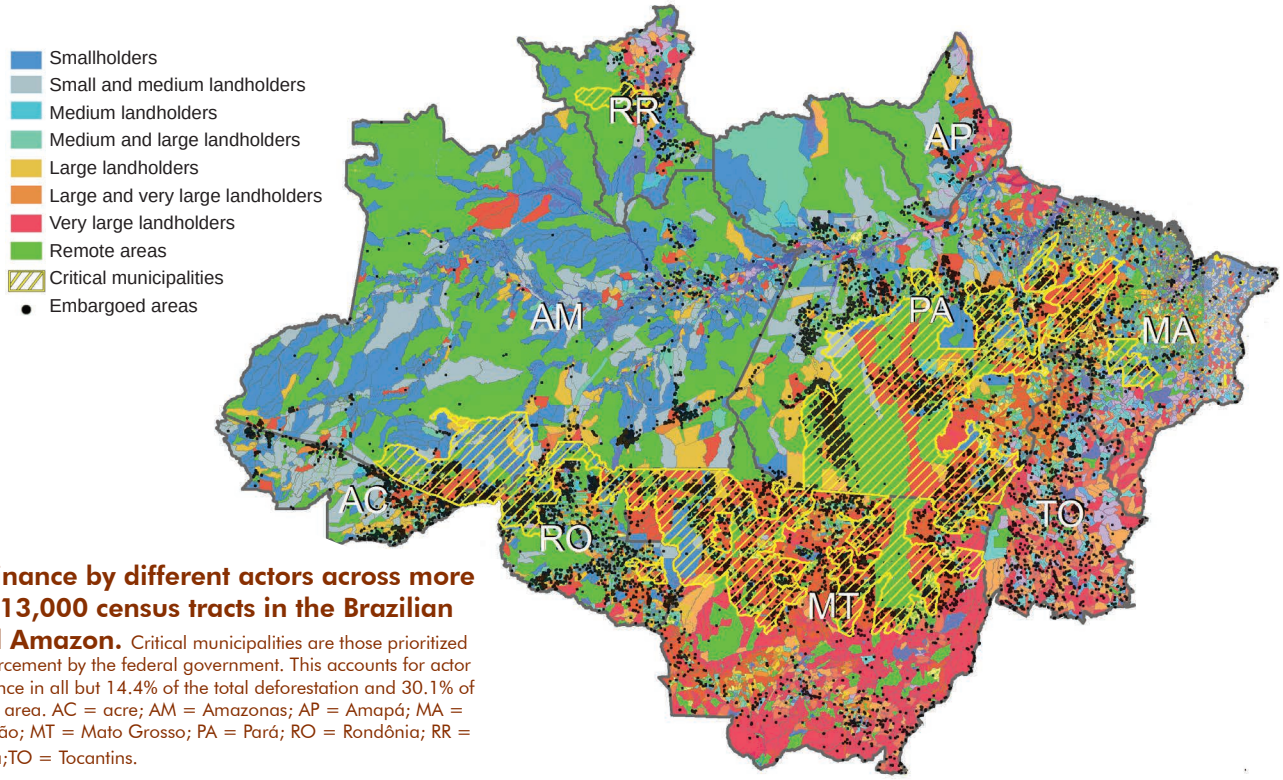
Key findings

- Brazil's concerted efforts to reduce deforestation in the Amazon have been very successful, but progress has stalled in recent years. A detailed analysis of official data suggests that the government's strategies have been more effective with large landowners than with smallholders or properties in remote areas. New, more tailored and incentive-based approaches are needed to keep reducing deforestation.
- Contrary to common claims that smallholders are now responsible for most deforestation, the data show that nearly half of the total deforestation in the Brazilian Legal Amazon in 2004–2011 occurred in areas dominated by properties larger than 500 hectares. Smallholders (properties under 100 ha) contributed only 12% of total deforestation in the Brazilian Amazon in the same period.
- Annual deforestation rates declined faster in areas dominated by large and very large landowners (80% and 81%, respectively) than in those dominated by smallholders (73%) and medium-size properties (65%), as well as remote areas (71%). This partly reflects the focus of enforcement efforts on "deforestation hotspots" where properties are typically larger.
- Forests in areas dominated by smallholders are generally in better condition, with lower levels of fragmentation and stand degradation from logging and fire. This highlights the key role of smallholders in preserving the Amazon, particularly since smallholder-dominated areas make up a large share of the remaining Amazon forest on private land.
- These findings highlight that the fight against deforestation in the Amazon is entering a new phase. Without decisive action, Brazil could see deforestation rates continue to remain stable or rise again, as recent data suggest may already be happening.

The roles of different actors in Amazon deforestation and degradation

A key first step in designing effective policies is to understand who is responsible for deforestation and forest degradation in the Brazilian Amazon, and how the roles of different types of actors have evolved over the last decade. This is not about apportioning blame, but about understanding the context: The land-owners responsible for deforestation and degradation in the Amazon vary significantly in their wealth, social and cultural background, education, and access to resources and markets. That means that measures that effectively target one set of actors may not be successful with others.

Our analysis sheds light on these differences by mapping deforestation and degradation trends against data on the types of property owners that prevail in each area: from very large landowners (2,500+ hectares), to smallholders (less than 100 ha).



Dominance by different actors across more than 13,000 census tracts in the Brazilian Legal Amazon. Critical municipalities are those prioritized for enforcement by the federal government. This accounts for actor dominance in all but 14.4% of the total deforestation and 30.1% of the total area. AC = acre; AM = Amazonas; AP = Amapá; MA = Maranhão; MT = Mato Grosso; PA = Pará; RO = Rondônia; RR = Roraima;TO = Tocantins.

While several studies have assessed the drivers of deforestation in the Amazon, our analysis is the first to link fine-scale spatial data on changes in deforestation and forest degradation with spatial data on the sub-municipal distribution of different types of actors for all 5 million km^2 of the Brazilian Legal Amazon.

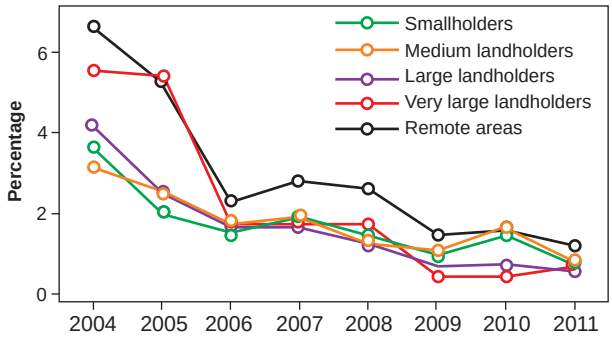
Between 2004 and 2011, our analysis shows, annual deforestation rates fell across areas dominated by all types of actors. Indeed, if deforestation had remained at the 1996–2005 baseline level, an additional 144,249 km^2 of forest would have been cleared in 2004–2011, an area of about half the size of Ecuador. However, changes in deforestation have not been consistent for all actors.

In absolute terms, between 2004 and 2011 nearly half (47%) of the total deforestation observed in the Brazilian Amazon occurred in areas dominated by properties larger than 500 ha. By contrast, only about 12% occurred in areas dominated by smallholders. A few thousand properties larger than 2,500 ha accounted for 28% of total deforestation in 2011, more than twice the contribution of any smaller property size-class.

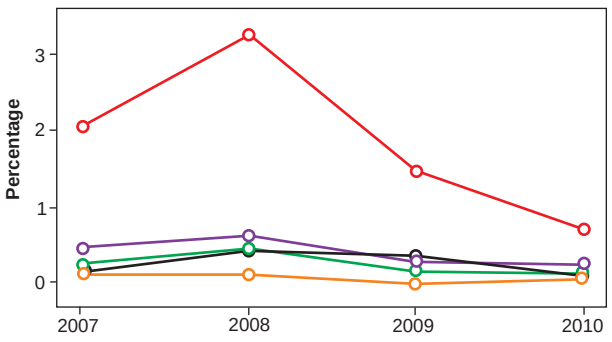
These findings clearly dispel recent claims that smallholders bear a large share of responsibility for continuing deforestation in Brazil. In fact, although the deforestation monitoring and enforcement efforts in the first two phases of the PPCDAm programme focused primarily on larger properties, it is evident that much work remains to be done in tackling deforestation by all actors.

Still, it is also true that large property owners' contribution to the total area cleared each year has declined more quickly than that of smallholders (81% drop between 2004 and 2011 for the largest properties, compared with a 73% drop for smallholders). This pattern is consistent across all states and biomes (Amazon, Cerrado) making up the Brazilian Legal Amazon, and should be expected given the law enforcement focus of the PPCDAm to date. Conversely, the relative contribution of smallholder-dominated areas has increased, from 8% of total deforestation in 2005, to 13% in 2011 – while the share attributable to properties larger than 2,500 ha dropped from 44% to 28% over the same period.

Smallholder-dominated areas also contributed relatively less to total avoided deforestation in 2004–2011, only 11%, even though 24% of the forest area in the Brazilian Legal Amazon is in areas dominated by smallholders. Taken together, these results suggest that the command-and-control measures that reduced deforestation in areas dominated by large properties are far less effective with smallholders, and new policies are needed to help reduce deforestation by smallholders.



a. Annual rate of deforestation change.



b. Percentage forest degradation per hectare of forest.

Annual deforestation and degradation dynamics per type of actor in the Brazilian Legal Amazon.

A related issue is the focus of forest conservation efforts on a small number of municipalities that had been identified as the "hotspots" of the deforestation frontier in the last decade. While this has been very effective in reducing deforestation in those municipalities, it has meant that less attention was paid to more remote areas of the Brazilian Amazon. That, in turn, has resulted in a slow but steady rise in the share of deforestation occurring in remote regions, from 18.2% in 2004 to 22.6% in 2011.

Different actors, different degrees of forest degradation

Previous studies have shown that, at least in some frontier regions, smallholders tend to deforest a larger proportion of their land in order to support their livelihoods.[4] However, when viewed at the scale of entire landscapes, smallholder-dominated areas tend to have both more forest, and forest that is in better condition – that is to say, forests that have been less fragmented and less degraded by logging and fires. This indicates that for similar-sized areas, such forests are in better ecological condition and are more effective at safeguarding biodiversity and maintaining the provision of forest-dependent ecosystem services.

This contrast can be explained, in part, by differences in production strategies and in the personal wealth of different landowners. Two major drivers of forest degradation are the expansion of new road networks and the unsustainable extraction of timber – both of which require substantial capital investment that is only available to larger and wealthier property owners. Differences in land use are also likely to be important, as smallholders typically practice small-scale farming with fallow periods. This means that large areas of second-growth forest are retained, which may result in less degradation of remnant primary forests than on larger properties, where large blocks of forest are cleared for mechanized agriculture.

Why new strategies are needed

Brazil's deforestation policies are faltering in their ability to further curb the clearance and degradation of the world's largest remaining expanse of tropical forest. To some extent, this is because efforts to curb deforestation focused first on violations that were cheaper and easier to tackle – i.e. clearances associated with larger properties in deforestation hotspots. As deforestation has shifted to smaller, more remote properties, the marginal cost of each hectare of avoided deforestation has steadily increased. In addition, it is possible that property owners have adapted their deforestation behaviour to the technical limitations of satellite monitoring and field inspections, clearing smaller and more dispersed areas to avoid detection.

Irrespective of the extent to which the enforcement of forest conservation has become more costly or more difficult, it is also arguable that the effectiveness of command-and-control punitive measures in general has diminished, as the contribution to annual deforestation from both more risk-prone and more socially vulnerable actors has increased.

The road ahead

Brazil still faces a major challenge in reaching its stated goal of reducing Amazon deforestation by 80% on 1996–2005 levels by 2020. That would require bringing annual deforestation below 4,000 km^2 – a target that may be hard to achieve given recently reported increases in deforestation in 2014.[5]

Degraded forest in Paragominas, in the state of Pará.

Yet not only has deforestation stopped declining, but changes in the political, economic and climatic conditions of the region could lead it to increase. Those changes include large-scale infrastructure projects such as hydropower and mining, increased demand for agricultural commodities, a recent weakening of the Forest Code, and the end of the voluntary soy moratorium in December 2014.

The newly elected government, which has pledged wide-ranging political reforms, has a fresh opportunity to consolidate the progress made to date and steer Brazil onto a more sustainable development trajectory. Such a shift would not only help secure the future of the Brazilian Amazon and the country's other remarkable ecosystems, but also reaffirm Brazil's environmental leadership in Latin America and on the global stage.

This policy brief was written by Toby A. Gardner and Javier Godar. It is based on a peer-reviewed, open-access article: Godar, J., Gardner, T. A., Tizado, E. J. and Pacheco, P. (2014). Actor-specific contributions to the deforestation slowdown in the Brazilian Amazon. *Proceedings of the National Academy of Sciences,* 111(43). 15591–96. DOI:10.1073/pnas.1322825111.

Endnotes

1 Assunção, J. and Rocha, R. (2014). *Getting Greener by Going Black: The Priority Municipalities in Brazil*. Climate Policy Initiative, Rio de Janeiro. http://climatepolicyinitiative.org/publication/getting-greener-going-black-priority-municipalities-brazil/.

Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., et al. (2014). Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science*, 344(6188). 1118–23. DOI:10.1126/science.1248525.

2 Satellite monitoring by INPE, Brazil's National Institute for Space Research. See: http://www.inpe.br/ingles/.

Policy recommendations

• Shift to more incentive-based measures to control deforestation and support sustainable rural development.

While command-and-control measures remain critically important in continued efforts to curb deforestation, new, more incentive-based policies are urgently needed. This is particularly important for smallholder farmers, who often do not have the means to comply with environmental regulations without compromising their livelihoods. Yet achieving this shift requires more than finance. Capacity-building – for individuals and institutions – is crucial for organizing and maintaining conditional credit lines, rural extension services, preferential market access, and payments-for-ecosystem-services schemes. Furthermore, the incentives need to not only provide appreciable benefits to landowners, but also be sustainable, even under different political regimes. Farmers need to be able to count on those benefits in the long term, or else they will be less inclined to change their practices.

The third phase of PPCDAm, with a focus on sustainable land management practices, is due to expire in 2015, and its impact and potential successor remains unclear. Existing payment schemes, including REDD+ (Reducing Emissions from Deforestation and Forest Degradation) projects, remain largely local and experimental in nature, and at current funding levels will continue to benefit only a tiny proportion of the Amazonian rural population. Scaling up sustainable practices will require a multi-sectoral commitment, with a clear vision and a stronger legal and institutional framework.

• Tailor deforestation and degradation control policies and programmes to different types of actors.

Policies and interventions to control deforestation and degradation need to be based on a clear understanding of which groups of actors are linked to changes in deforestation and degradation in different regions. Identifying which actors are associated with differing patterns of land use change can help ensure that environmental legislation is better adapted to the responsibilities, capacities and context associated with different actors – as has been partially achieved in the recent revision of the compliance requirements of the Forest Code.

A rigorous and transparent analysis that couples spatially explicit land use data with population and agricultural census data should accompany the annual publication of deforestation figures. Recognition needs to be given to the fact that smallholder-dominated areas hold some of the most preserved areas of forest left under private land within the Brazilian Amazon. Incentive measures tailored to this group, which makes up more than 80% of private properties within the Brazilian Legal Amazon, could provide a double dividend of environmental and social benefits – promoting more sustainable land-management practices, improving the well-being of the rural population, and stemming rural-urban migration.

• Adopt more advanced technologies and monitoring systems to detect deforestation.

A growing share of deforestation in the Brazilian Amazon occurs in smaller patches, outside of the detection capabilities of satellite technology currently used by the Brazilian government. Higher-resolution, radar-based sensors that are not affected by cloud cover and can provide near real-time alerts of new deforestation activity can help address this. The technology should be backed by stronger enforcement capacity, including in more remote areas away from current deforestation hotspots.

• Recognize the importance of changes in forest condition as well as in forest area.

While deforestation rates have fallen across the Amazon, many of the forests in more consolidated areas of the deforestation frontier are in poor condition and threatened by ongoing timber extraction and associated feedback effects from fire and climate change.[6] Existing forest governance and incentive schemes are almost exclusively focused on maintaining forest cover – hectares of forest. However, policy measures are urgently needed to reward efforts to improve the condition of remaining forests and avoid further degradation.

3 Godar, J., Gardner, T.A., Tizado, E.J. and Pacheco, P. (2014). Actor-specific contributions to the deforestation slowdown in the Brazilian Amazon. *Proceedings of the National Academy of Sciences,* 111(43). 15591–96. DOI:10.1073/pnas.1322825111.

4 Michalski, F., Metzger, J.P. and Peres, C.A. (2010). Rural property size drives patterns of upland and riparian forest retention in a tropical deforestation frontier. *Global Environmental Change*, 20(4). 705–12. DOI:10.1016/j.gloenvcha.2010.04.010.

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