OVERVIEW OF AMAZON DEFORESTATION IN 2016

Andrea Azevedo, Ane Alencar, Paulo Moutinho, Vivian Ribeiro, Tiago Reis, Marcelo Stabile; André Guimarães

Highlights

- Deforestation in 2016 peaked at its highest level since 2008, reaching almost 8,000 km^2 with an increase of 28.7% compared to 2015;

- Deforestation increased in the states of Amazonas (54%), Acre (47%) and Pará (41%); in absolute numbers, the states that deforested the most were Pará (3,025 km^2); Mato Grosso (1,508 km^2) and Rondônia (1,394 km^2), comprising, together, 75% of all deforestation recorded in 2016;

- There was little variation in deforestation in recent years by land category. It happened primarily on private land (35.4%), followed by settlements (28.6%) and unassigned public lands plus areas without recording information (24%). Protected Areas (PAs) had a significant contribution of 11.8%, noting that the Environmental Protection Areas (EPAs) – also computed here in and with great participation in percentage – are a more flexible category of PA, mainly dominated by private entities.

- From 2015 to 2016, land categories that showed increases were EPAs (36%), areas without recording information (17%) and settlements (16%);

- In Mato Grosso, Pará, Tocantins, Amapá and Maranhão, private property comprise the land category in which deforestation was predominant; in the states of Amazonas, Acre and Roraima, the predominance was in settlements; in Rondônia, deforestation was predominant in protected areas, followed closely by the category of settlements; there are still around 25% of deforestation in unmarked areas in the states of Mato Grosso and Maranhão;

- The deforestation polygons that were predominant in 2016 are still those of up to 30 hectares, covering an area of 60% of total deforestation (the "small addition" continues);

- In the settlements, 87% of deforested polygons have up to 10 hectares. Of these, 68% of the area responds to polygon bigger than 6 hectares. Polygons between 6 and 10 hectares often require machinery, which does not suggest the typical pattern of deforestation carried out by family farms, which ranges from 1 to 3 hectares and is primarily carried out with family labor.

- Of the ten towns that most deforested in 2016, five are located in Pará, two in the Amazonas, two in Rondônia and one in Mato Grosso; and all of them figure in the "top ten" ranking in the last four years.

Contact
Andrea Azevedo, director of public policy,
andrea@ipam.org.br

1. Introduction

Deforestation in the Legal Amazon has reduced more than 70% since 2004, when it reached the second highest peak in the history of monitoring the biome (27,772 km^2). That year, the federal government created several devices to control the problem, including the list of critical towns (Nepstad et al. 2014) (figure 1; figure 2). These and other measures that were taken since then have helped reduce deforestation in the region.

The good results led Brazil to propose, in 2012, in its National Plan on Climate Change (*Plano Nacional de*

Mudanças Climáticas, NPCC), a target reduction of 80% of tree cutting in relation to the average recorded between 1996 and 2005 (19,615 km^2). In practice, the country must get to 2020 with approximately 3,925 km^2 of annual deforestation, a path toward society's desire for zero deforestation in the Amazon, comprising an important step towards climate stabilization without compromising the economic and social development of the region.

However, between 2009 and 2015, deforestation remained stagnant at an average level of 6,080 km^2. In 2012 even had the lowest rate recorded in the last 20 years in the Amazon (4,571 km^2), but afterward, we had successive increases and small decreases.

Such dynamics already indicated that the "fat" had been burnt and the reduction effort for even lower rates, as set out in the PNMC, would be greater and more challenging. In the past two years, Brazil's National Institute for Space Research (*Instituto Nacional de Pesquisas Espaciais*, INPE) recorded rates increased, reaching 7,989 km^2 in 2016—the highest since 2008. This deforestation is equivalent to 128 Maracanã soccer fields per hour in 2016.

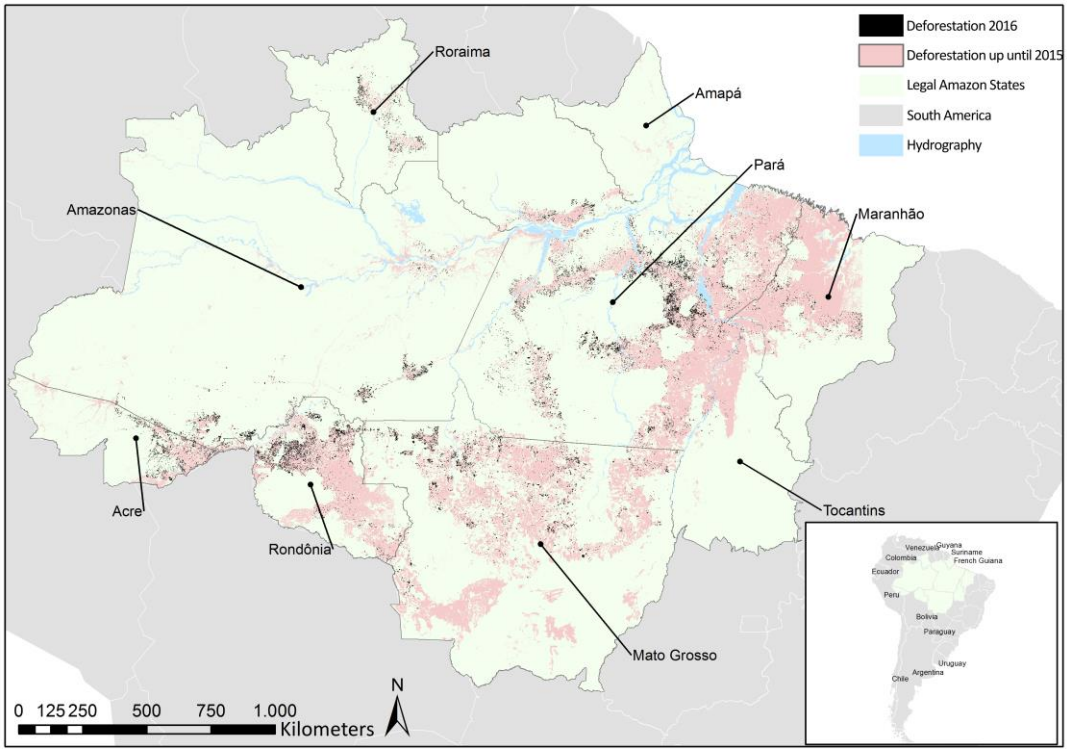

Figure 1: Map of the Legal Amazon with accumulated deforestation until 2015 (in red) and recorded in 2016 (in black). By: IPAM; Data source: Prodes/INPE.

Even within the context of political and economic crisis that Brazil has been living in the past two years, an effort made by the whole society is necessary to achieve the target set and maintain the drop in deforestation, with a new structure of command and control actions, creation of a positive agenda of production efficiency incentives in already deforested areas and more support for those who keep their forest asset, as well as more participation of the market and the banking system in controlling deforestation.

Another very important aspect is the environmental governance linked to deforestation and the implementation of the Forest Code, and, in that sense, the involvement of the towns in the process should be strengthened once again.

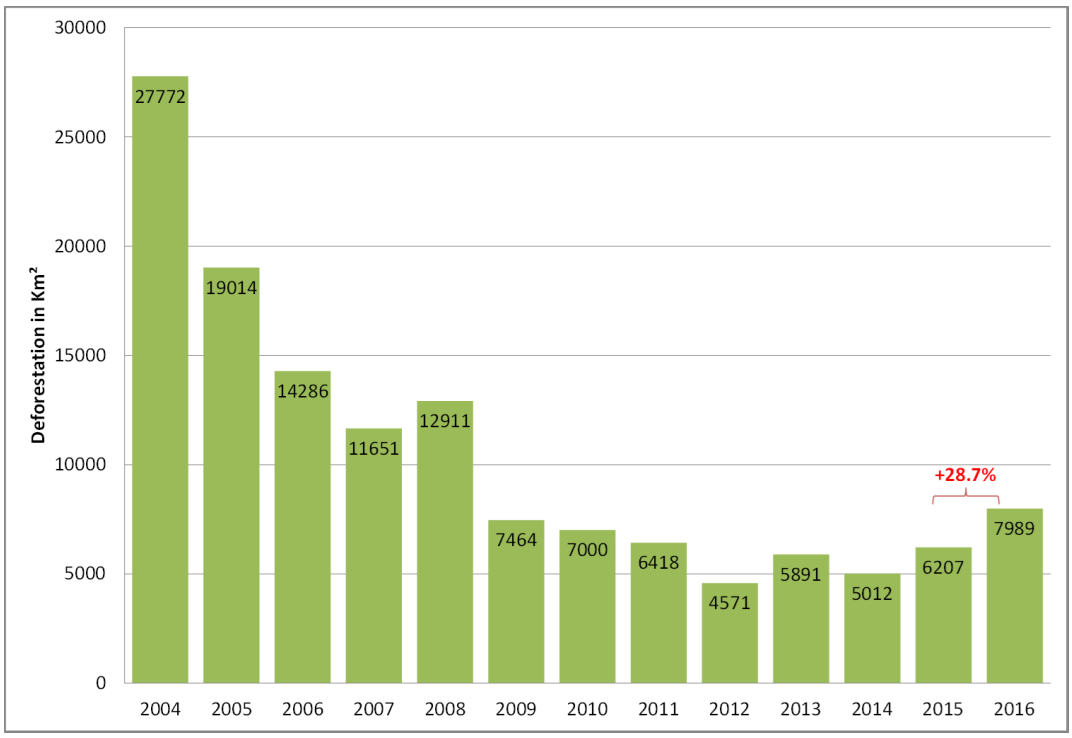

Figure 2: deforestation dynamics in the last 13 years in the Amazon biome.
By: IPAM; Data source: Prodes/INPE.

In this study, we try to dissect important aspects related to deforestation in 2016, identifying deforestation by land category, polygon size, and the amount of remaining areas, particularizing it in each of the nine states of the Legal Amazon.

1.1. Methodology

The land base of the states of Acre, Amapá, Amazonas, Pará, Rondônia and Roraima, and part of Mato Grosso, Maranhão and Tocantins was used to perform this evaluation. This base was built based on overlapping per hierarchical prioritization the indigenous land features (ISA/2016), protected areas (ISA/2016), settlements (INCRA/2015), private areas CAR (SICAR 2016), EPA (ISA/2015), The *Terra legal* Program (Serfal), SIGEF and public lands (Brazilian Forest Service/2014), from the highest to the lowest priority feature, respectively.

We quantified deforestation from the annual increase polygon published by the PRODES, which is a project that monitors the Brazilian amazon forest by satellite (INPE, 2016). For the analysis, the polygon has been redesigned from the original datum to WGS 1984 with sinusoidal spatial reference and then rasterized at the resolution of 100 x 100 meters.

The quantification of deforestation by land class, states and towns was held from the tabulation of deforestation area by selected feature using the ArcGIS software (ESRI). The 2016 deforestation polygon presented, including the residual, a total area of 6,886 km^2—1,106 km^2 less than the size reported by INPE[1].

1. The annual rate disclosed by INPE, differs, in general, from the data of gross deforestation from the result of the sum of the polygons provided by the institute. This is because when INPE converts gross deforestation data for rate, it takes into account the areas covered by clouds that may have deforestation, but were not observed (to learn more, visit www.inpe.gov.br).

2. Land categories and the contribution to deforestation in 2016

In general, over the last four years, there was little variation in the deforestation contribution by land category (Figure 3). In 2016, following the trend of the last four years, deforestation in private areas was predominant, with 35% of the total deforestation in the year. Settlements come next, with 28%.

Public areas continued to contribute, with 13% of the deforestation, while unassigned areas responded for about 10% of the total deforestation.

These unassigned areas do not fall into the above categories: the assumption is that they are private areas that do not have formal recording information (i.e. CAR, SERFAL, SIGEF) and/or state and federal public areas that are unassigned and have not yet been officially recognized as such (i.e. registered in the *Terra Legal* Program).

The other categories are composed of protected areas (indigenous lands and protected areas), which have deforestation of just over 8%. Among them, indigenous lands represent the category that historically has the lowest rate, not even reaching 2%.

In this study, the EPAs were segregated from other protected areas, as it is a category of more flexible sustainable use, privately managed, and that showed a substantial increase in deforestation (figure 4).

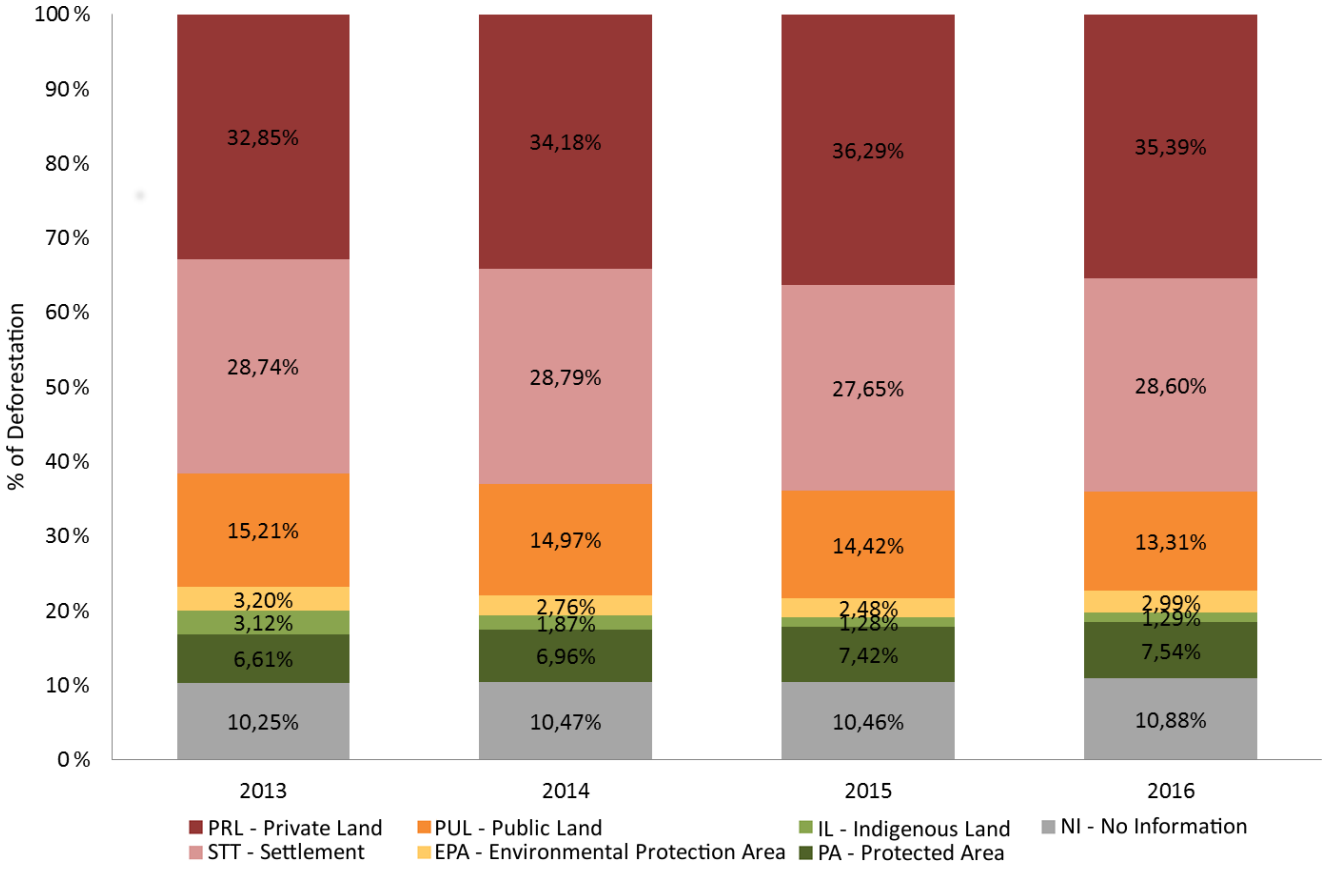

Figure 3: deforestation related to land classes, from 2013 to 2016.

2.1. Increase of deforestation by land category

The areas without information showed 17% increase in the deforestation rate in 2016, compared to 2015 (Figure 4). A strong hypothesis to explain this factor is that of private properties who deforested before entering the Rural Environmental Registry (*Cadastro Ambiental Rural*, CAR) – whose final accession deadline was extended to May 2017 – to avoid being questioned because of if (Azevedo et al., submitted.). Another hypothesis is that they are areas of conflicts and land grabbing in unidentified public lands.

In this land category, the states of Mato Grosso and Maranhão respond to 25% of total deforestation. Colniza, the town that deforested the most in Mato Grosso, has a large tree cutting area with this profile.

The second category that increased the tree cutting of forests in 2016 was the settlements, with 16% increase compared to the record of the previous year. The EPAs, which are a type of protected area with almost exclusively private governance, recorded the largest percentage increase between 2015 and 2016 (36%), indicating the role of the private entity in forest conversion in these areas. It is not forbidden to deforest in EPAs, but what is expected of this category is planning for a more sustainable use of the landscape.

Protected areas also had a significant increase in deforestation—14%. Much has happened in the Cuiabá-Santarém stretch of the BR-163 highway, especially at the Jamanxim National Forest (Jamanxim Flona), where serious illegal occupation of problems are happening[1].

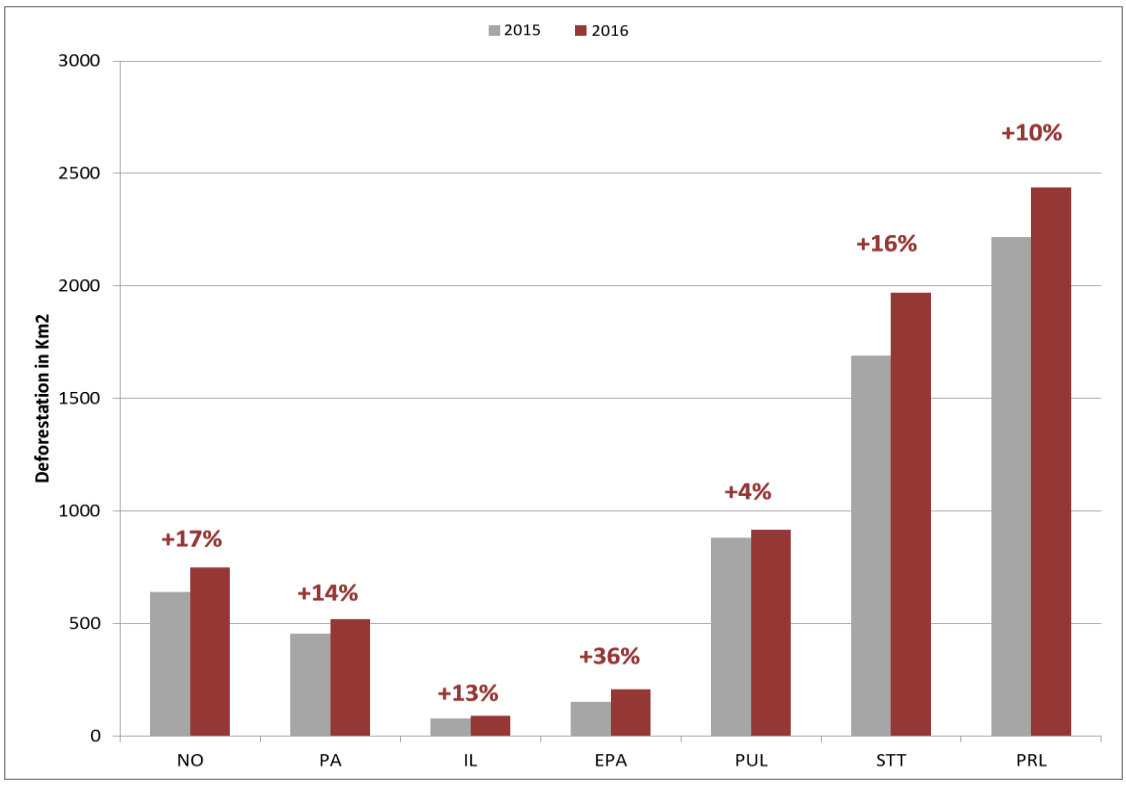

Figure 4: increase in deforestation between 2015 and 2016 by land category.

2. On December 20, 2016, the federal government reduced the area of the Jamanxim Flona, from 1,301,120 hectares to 557,580 hectares. The majority of it (438,000 ha) was incorporated into the Rio Novo National Park, while the rest was added to 230 thousand hectares to compose the new Jamanxim EPA.

2.2. Size of the polygons by land category

In recent years, deforestation of small polygons of up to 30 hectares have predominated in the Legal Amazon – the exception was in 2015, when the sum of the polygons above 30 hectares corresponded to half the total deforestation in that year.

In 2016, the contribution of deforestation of up to 30 hectares increased again and accounted for 57% of the overall result (Figure 5a). They occurred mainly in private lands and settlements (Figure 5b).

The predominance of this size of deforestation in the private land category (which concentrates 35% of total deforestation) indicates the maintenance of "addition" trend—a name used to characterize a small cleared area adjacent to property.

"Additions" are, possibly, a strategy used by medium and large landowners to evade surveillance. This is because the priority of the inspecting authority is usually attributed to large-scale deforestation, and the CAR has been little used as a low-cost monitoring tool (i.e. sending a fine by mail).

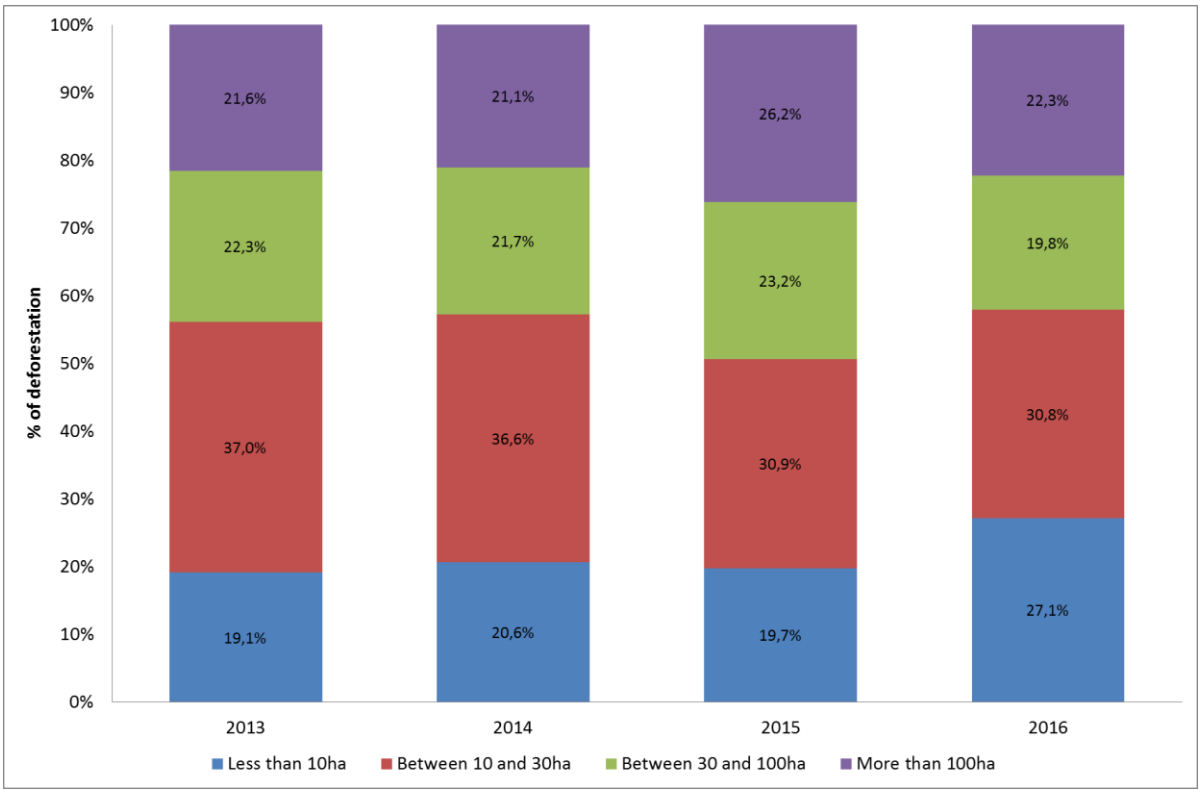

Figure 5a: size of the polygons during the last 4 years.

The analysis of the contribution of the size of the polygons by land class also indicates a growth of these small polygons in settlements. However, within settlements, it is clear that most are between 6 and 10 hectares, which is usually an atypical conversion size of family farming. This can be a symptom of land reconcentration within settlements, which is a trend observed over the last four years (Alencar et al. 2016).

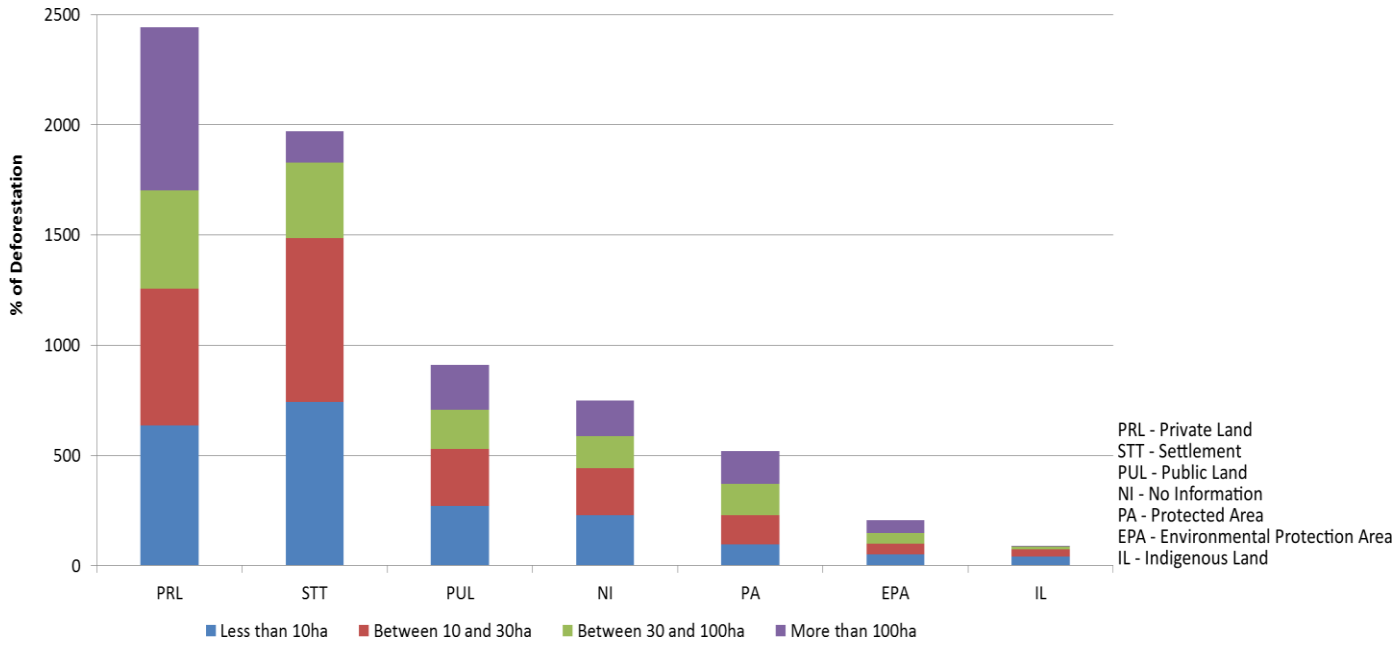

Figure 5b: Polygons size classification within each land category.

3. The contribution of each state to deforestation in 2016

Amazonas, Acre, and Pará had the largest increase in deforestation rate between 2015 and 2016, respectively (Figure 6). In absolute terms, the largest deforested area was registered in states of Pará, Mato Grosso, and Rondônia, which, together, account for 75% of total deforestation in 2016.

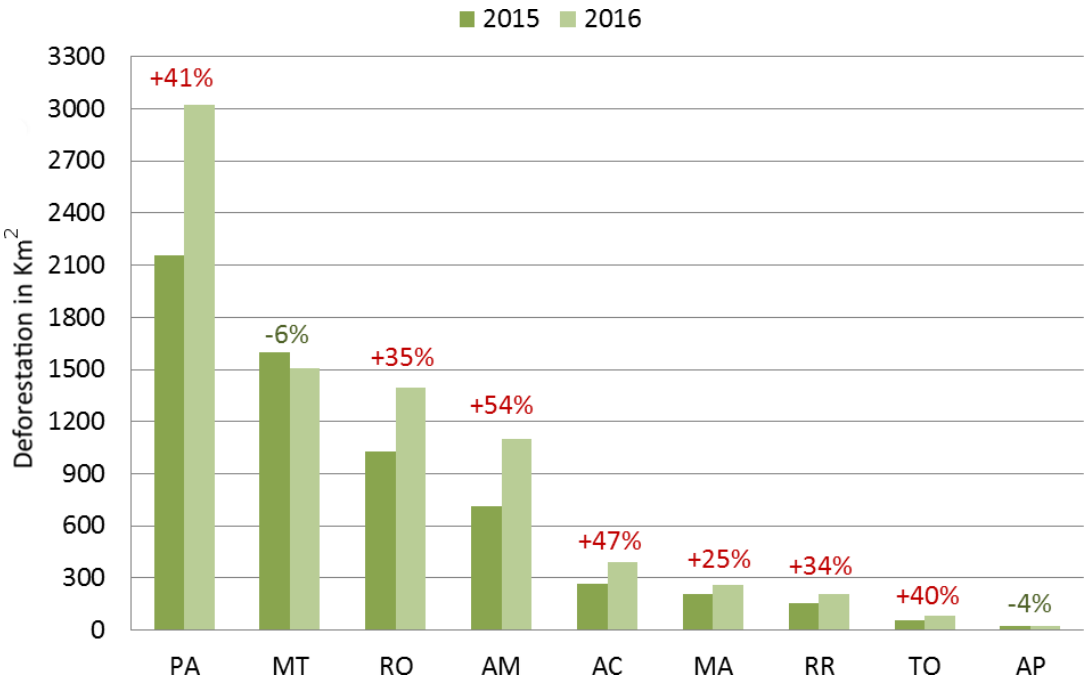

Figure 6: Increased in the deforestation rate from 2015 to 2016 by state.

3.1 Land category by states

Private lands had the greatest contribution to deforestation in five of the nine states of the Legal Amazon: Amapá, Mato Grosso, Tocantins, Pará and Maranhão (figure 7). In three states, Roraima, Acre, and Amazonas, deforestation was predominant in the settlements.

In Roraima, 35% of the deforestation occurred in unassigned public areas. In Mato Grosso and Maranhão, 25% of the deforestation occurred in areas without recording information, as mentioned earlier.

Rondônia was the only state where deforestation in protected areas (26.8%) was the biggest one, and almost all of it occurred within the sustainable use category, such as RESEX (Figure 8).

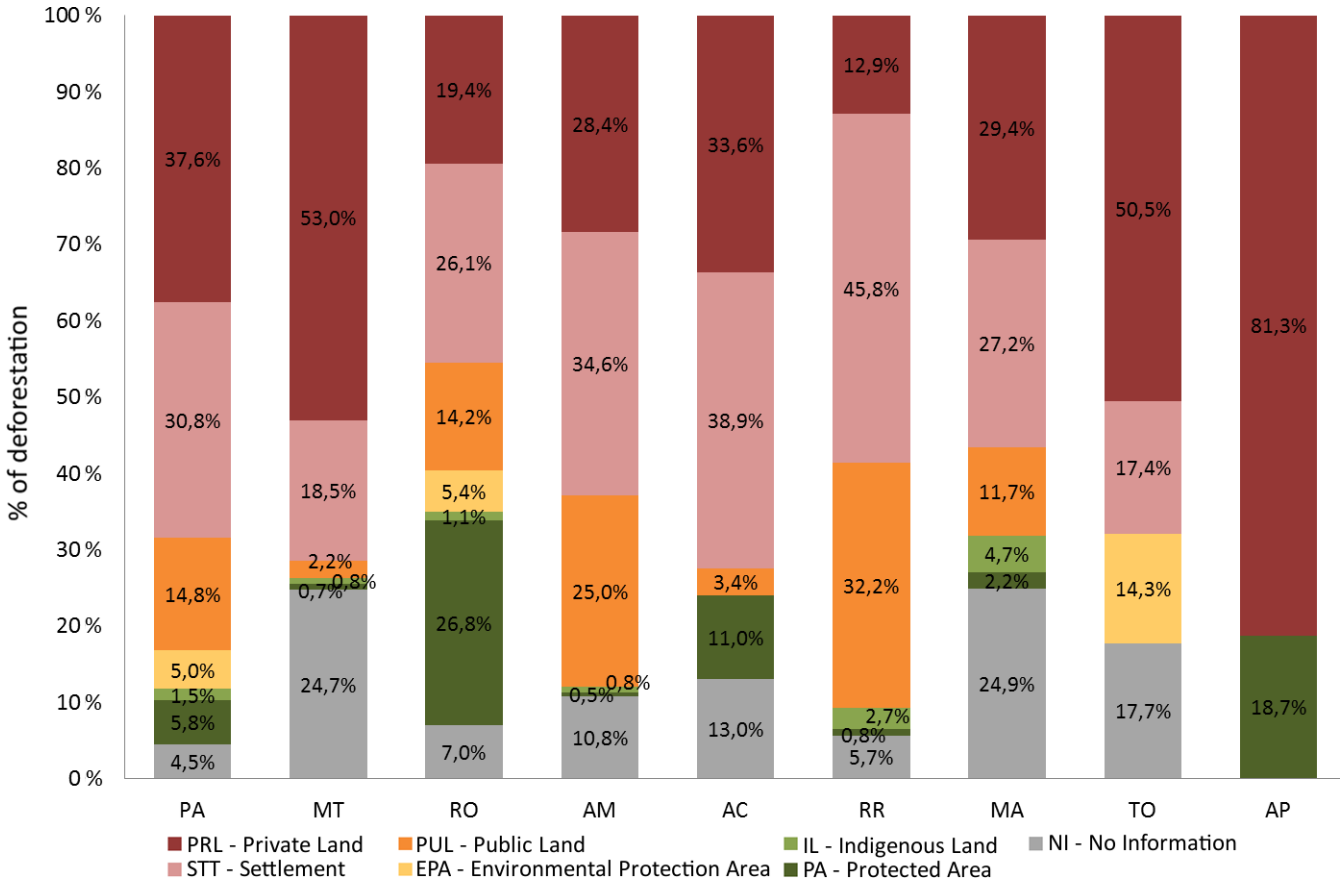

Figure 7 - Deforestation by state, broken down by land category

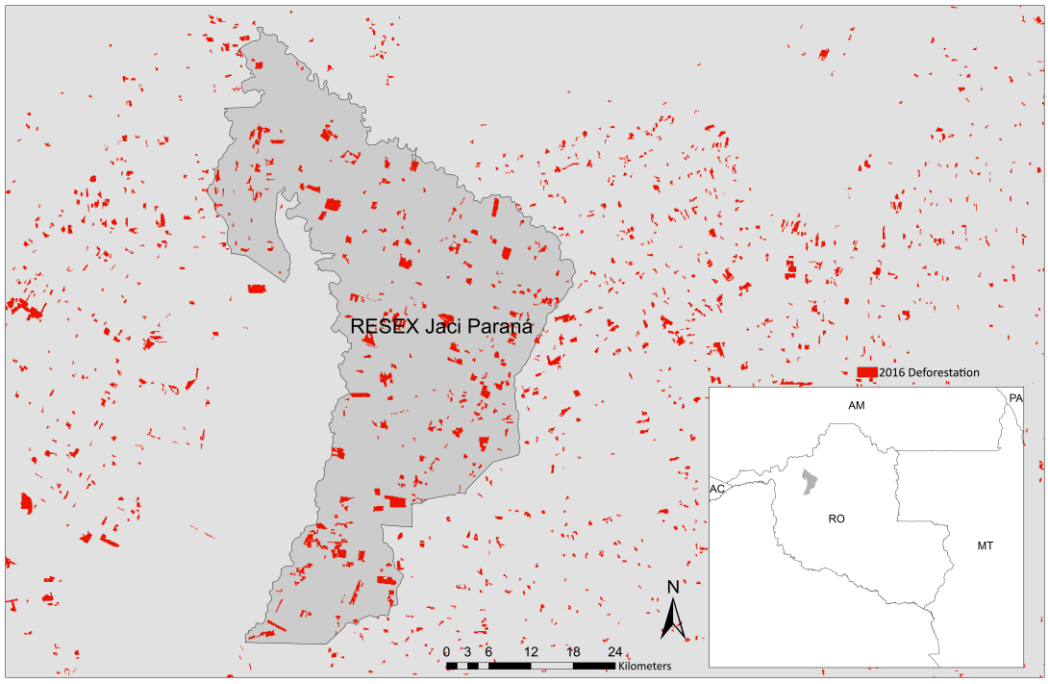

Figure 8 - Deforestation in a sustainable use protected area in Rondônia, in 2016.

Among the ten towns that deforested the most in absolute numbers, five are located in Pará: Altamira, São Felix do Xingu, Novo Repartimento, Portel, and Novo Progresso. In Amazonas, it was Lábrea and Apuí, both located in the southern part of the state—a region that has shown high rates of deforestation in recent years.

In Rondônia, deforestation was predominant in the capital city, Porto Velho, and Nova Mamoré; in Mato Grosso, in Colniza (Figure 9)—a town that, for at least the last four years, appears at the top of the state ranking.

In recent years, these ten towns have consistently remained in the list of the ones that deforest the most in the Amazon, considering the absolute area (Table 1).

	2013	2014	2015	2016
Altamira/PA	✓	✓	✓	✓
São Félix do Xingu/PA	✓	✓	✓	✓
Lábrea/AM	✓	✓	✓	✓
Porto Velho/RO	✓	✓	✓	✓
Novo Repartimento/PA	✓			✓
Colniza/MT	✓	✓	✓	✓
Portel/PA			✓	✓
Apuí/AM	✓	✓	✓	✓
Novo Progresso/PA	✓	✓	✓	✓
Nova Mamoré/RO	✓	✓	✓	✓

Table 1 - Presence of the 10 towns with the highest deforestation area rates, from 2013 to 2016.

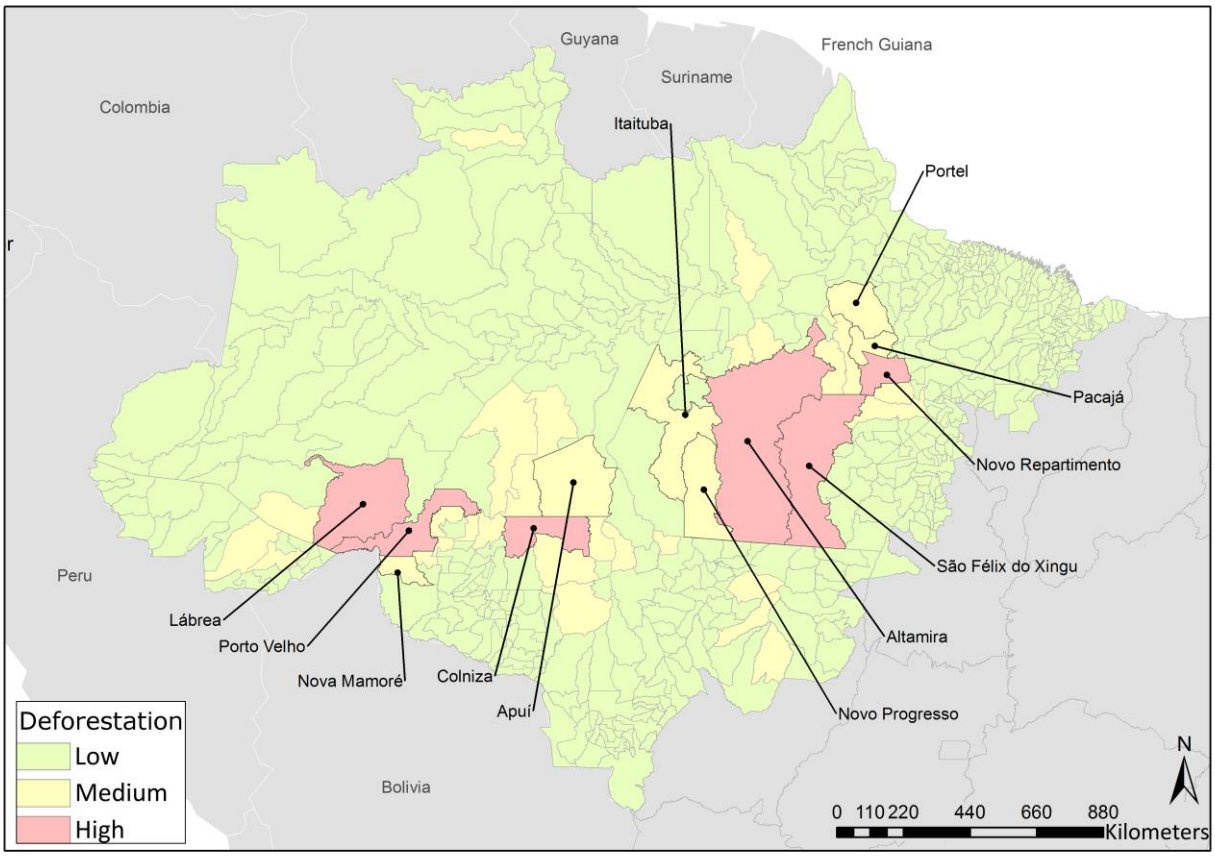

Figure 9 - Towns that deforested the most in 2016 in the Amazon.

4. Conclusion

Deforestation has not changed its profile regarding the land category and polygon size in recent years, indicating a difficulty in inducing the reduction of levels of recent years.

The predominance of deforestation in private areas shows the importance of implementing the Forest Code. The use of the CAR as a low-cost deforestation monitoring instrument, even if small, in the properties, with the issuance of notifications, may discourage the practice. This system can also be used as a tool to inform deforestation after 2008, for the use of all public and private credit system.

It is important to not only improve accountability strategies but also to encourage sustainable practices and reward private entities that do things the right way. Some examples of positive stimulus are improving and facilitating access to credit, with more credit lines to expand the use of open areas and environmental restoration; full regulation and implementation of Article 41 of the Forest Code, which establishes economic instruments for conservation and regeneration; compensation for those who have forest assets in risk areas, etc.

As for the settlements, they have been suffering from a land reconcentration process in recent years, and the 2016 data seems to reinforce this trend. The occupational review process needs to be strengthened by public agencies of command and control so that one can differentiate agrarian reform beneficiaries of external actors in order to create an appropriate strategy for solving the problem.

In the case of inhibition of speculative deforestation, which occurs both in unassigned public areas and in areas without recording information and, therefore, without governance, it is recommended to establish more effective plans for the assignment of areas, resume work with critical towns to stimulate the involvement of local environmental governance, and extend the capabilities and effectiveness of command and control actions.

Finally, the increase in deforestation in protected areas, especially near the BR-163 highway and the hydroelectric power plants of Rondônia, show that it is necessary to consolidate these areas with better management and governance. That way, they can keep their purpose of conservation of ecosystem services, biodiversity and the livelihoods of local populations, as well as serving as a barrier to the advance of the destruction of the Amazon.

References

Alencar, A., Pereira, C., Castro, I., Cardoso, A., Souza, L., Costa, R., Bentes, A. J., Stella, O., Azevedo, A., Gomes, J., Novaes, R. 2016. *Desmatamento nos Assentamentos da Amazônia: Histórico, Tendências e Oportunidades*. IPAM, Brasília, DF.

Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., Bezerra, T., DiGiano, M., Shimada, J., Motta, R., Armijo, E., Castello, L., Brando, P., Hansen, M., McGrath-Horn, M., Carvalho, O., Hess, L. 2014. *Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains*. Science 344 (6188): 1118-1123.

Suggested citation

Azevedo, A., Alencar, A., Moutinho, P., Ribeiro, V., Reis, T., Stabile, M., Guimarães, A. 2016. *Panorama sobre o desmatamento na Amazônia em 2016*. IPAM, Brasília, DF.

December 2016.
Publishing and editorial review: Cristina Amorim and Karinna Matozinhos (IPAM).

English Version by Melissa Harkin