

Summary

In May 2015, SAD detected 389 square kilometers of deforestation in the Brazilian Amazon with a cloud cover of 39% over the territory. That represented an increase of 110% in relation to May 2014 when deforestation totaled 185 square kilometers and the cloud cover was 38%.

In May 2015, the deforestation occurred in Amazonas (27%) and Mato Grosso (27%), followed by Pará (23%) and Rondônia (21%) and, at a lower proportion, Roraima (11%).

The deforestation accumulated during the period from August 2014 to May 2015, corresponding to the first ten months of the calendar for measuring deforestation, reached 2,286 square kilometers. There was a 170% increase in of deforestation in relation to the previous period (August 2013 to May 2014) when it reached 846 square kilometers.

Degraded forests in the Brazilian Amazon totaled 33 square kilometers in May 2015. In relation to May 2014, when forest degradation totaled 159 square kilometers, there was a 79% reduction.

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Deforestation statistics

According to SAD, deforestation (total suppression of the forest for other alternative land uses) reached 389 square kilometers in May 2015 (Figure 1 and Figure 2).

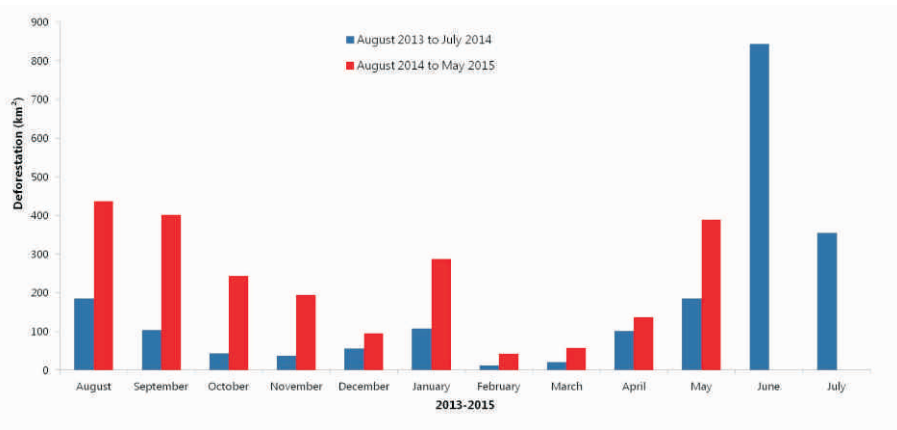


Figure 1. Deforestation from August 2013 to May 2015 in the Brazilian Amazon (Source: Imazon/SAD).

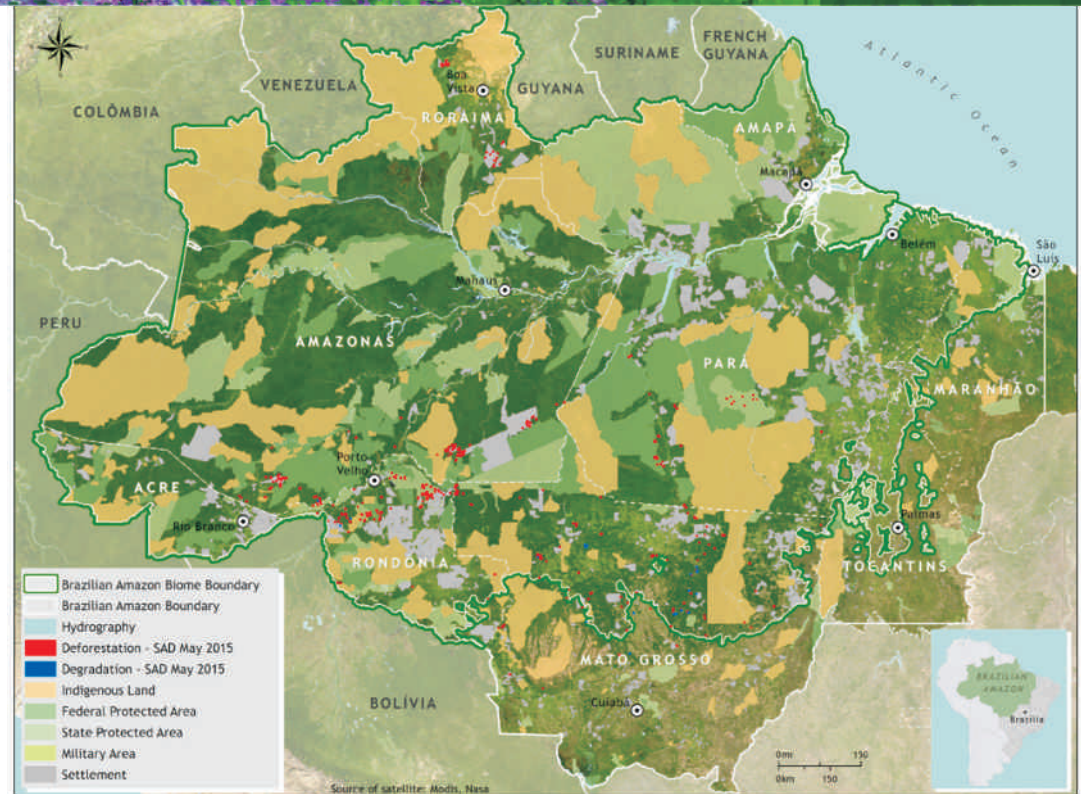


Figure 2. Deforestation and forest degradation in May 2015 in the Brazilian Amazon (Source: Imazon/ SAD).

In May 2015, deforestation occurred in Amazonas (27%) and Mato Grosso (27%), followed by Pará (23%) and Rondônia (21%) and, in a lower proportion, Roraima (11%) (Figure 3).

Accumulated deforestation during the period from August 2014 to May 2015, corresponding to the first ten months of the calendar for measuring deforestation, reached 2,286 square kilometers. There was a 170% increase in deforestation in relation to the previous period (August 2013 to May 2014) when it reached 846 square kilometers.

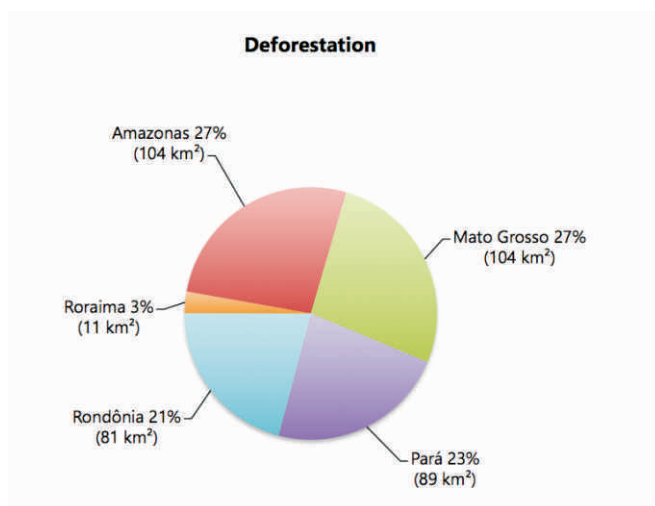


Figure 3. Percentage of deforestation in States of the Brazilian Amazon in May 2015 (Source: Imazon/SAD).

Considering the first ten months of the current deforestation calendar (August 2014 to May 2015), Mato Grosso leads the ranking with 37% of the total deforested during the period. Next come Pará (24%) and Rondônia (20%). In relative terms, there was a significant increase of 222% in Rondônia and 218% in Mato Grosso.

In absolute terms, Mato Grosso leads the ranking of accumulated deforestation with 837 square kilometers, followed by Pará (537 square kilometers) and Rondônia (448 square kilometers) (Table 1).

Table 1. Evolution of deforestation among States in the Brazilian Amazon from August 2013 to May 2014 and August 2014 to May 2015 (Source: Imazon/SAD).

State	August 2013 to May 2014	August 2014 to May 2015	Variation (%)
Pará	179	537	+200
Mato Grosso	263	837	+218
Rondônia	139	448	+222
Amazonas	136	296	+118
Roraima	64	94	+48
Acre	43	67	+55
Tocantins	22	3	-87
Amapá	-	4	-
Total	846	2.286	+170

* Data from Maranhão were not analyzed.

Forest degradation

In May 2015, SAD recorded 33 square kilometers of degraded forests (forests intensively exploited by logging activity and/or burned) (Figures 2 and 4). Of that total, the great majority (96%) occurred in Mato Grosso, followed by Amazonas (2%) and Rondônia (2%).

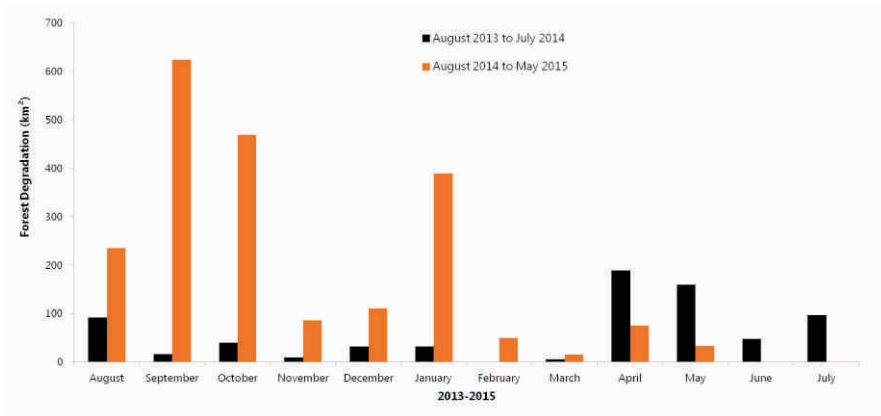


Figure 4. Forest Degradation from August 2013 to May 2015 in the Brazilian Amazon (Source: Imazon/SAD).

Table 2. Evolution of forest degradation among States in the Brazilian Amazon from August 2013 to May 2014 and August 2014 to May 2015 (Source: Imazon/SAD).

State	August 2013 to May 2014	August 2014 to May 2015	Variation (%)
Mato Grosso	333	1,768	+431
Pará	48	117	+144
Rondônia	20	37	+89
Amazonas	3	8	+173
Roraima	3	4	+26
Acre	-	-	-
Tocantins	-	-	-
Amapá	-	2	-
Total	407	1,936	+376

* Data from Maranhão were not analyzed.

Geography of deforestation

In May 2015, the majority (55%) of deforestation occurred in areas that were private or under various stages of possession. The remaining deforestation was recorded in Land Reform Settlements (13%), Indigenous Lands (1%) and Conservation Units (31%) (Table 3).

Table 3. Deforestation by land title category in May 2015 in the Brazilian Amazon (Source: Imazon/ SAD).

Category	May 2015	
	km ²	%
Land Reform Settlement	51	13
Conservation Units	123	31
Indigenous Lands	3	1
Private, Possession & Untitled Public Lands	212	55
Total (km²)	389	100

Land Reform Settlements

SAD recorded 51 square kilometers of deforestation in Land Reform Settlements in May 2015 (Figure 5). The Settlements most affected by deforestation were PA Rio Juma (Apuí; Amazonas), PA Monte (Boca do Acre; Amazonas) and PAE Aripuanã-Guariba (Novo Aripuanã; Amazonas).

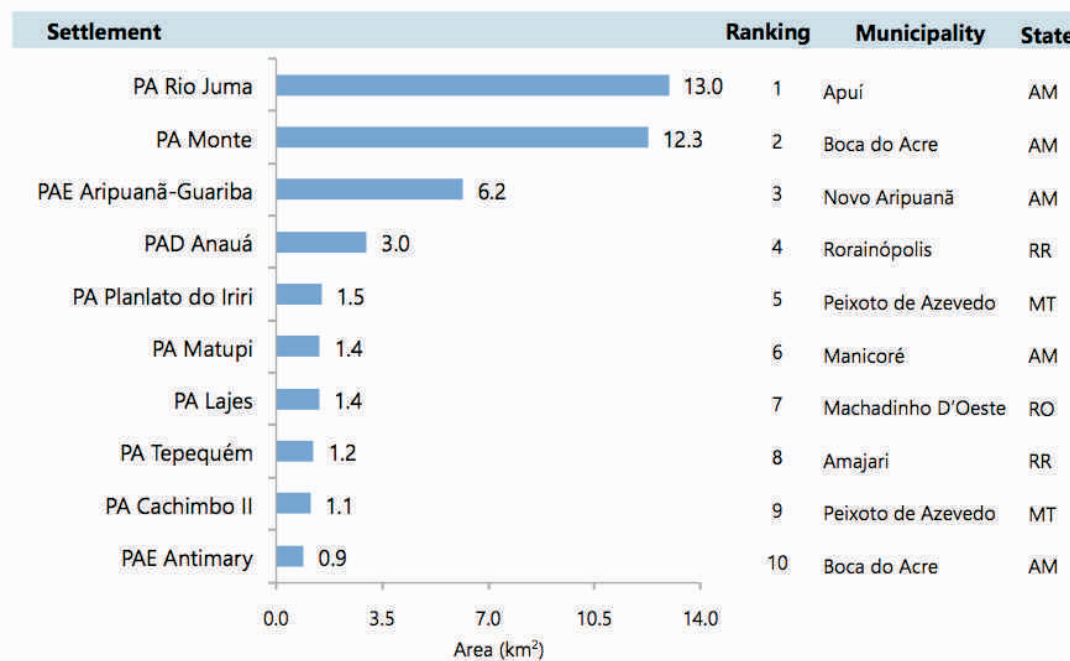


Figure 5. Land Reform Settlements deforested in May 2015 in the Brazilian Amazon (Source: Imazon/SAD).

Protected Areas

In the month of May 2015, SAD detected 123 square kilometers of deforestation in Conservation Units (Figure 6). In the case of Indigenous Lands, in May 2015 were 3 square kilometers of deforestation were detected (Figure 7).

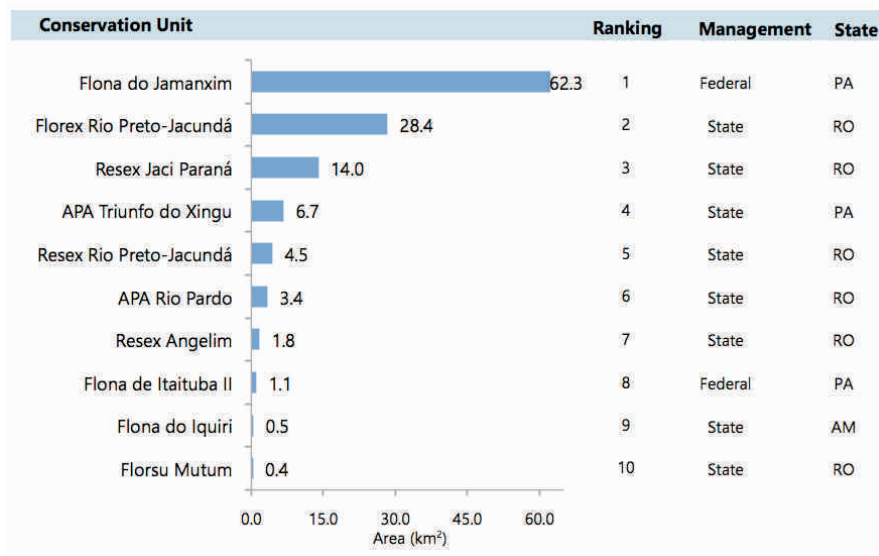


Figure 6. Most deforested Conservation Units in the Brazilian Amazon in May 2015 (Source: Imazon/SAD).

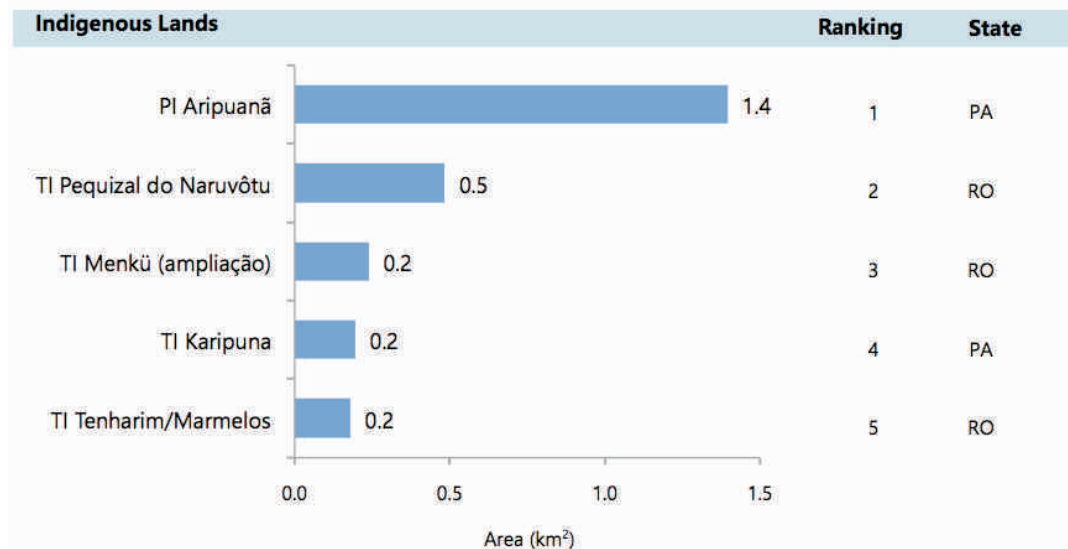


Figure 7. Most deforested Indigenous Lands in the Brazilian Amazon in May 2015 (Source: Imazon/SAD).

Critical municipalities

In May 2015, the most deforested municipalities were: Novo Progresso (Pará) and Lábrea (Amazonas) (Figure 8 and 9).

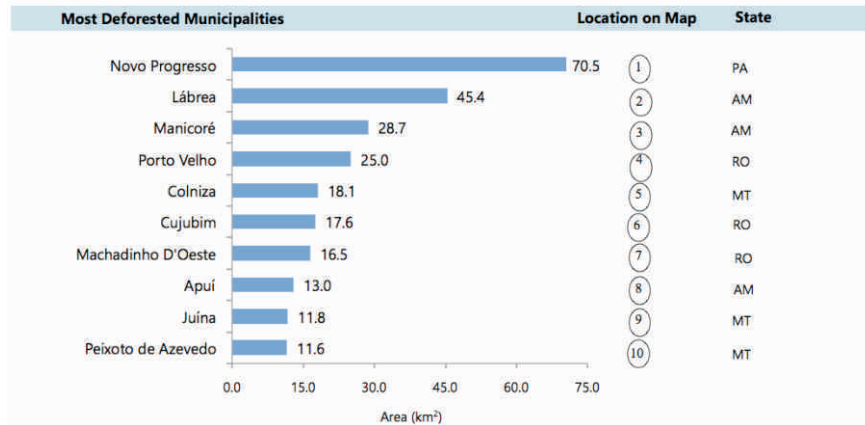


Figure 8. Most deforested municipalities in the Brazilian Amazon in May 2015 (Source: Imazon /SAD).

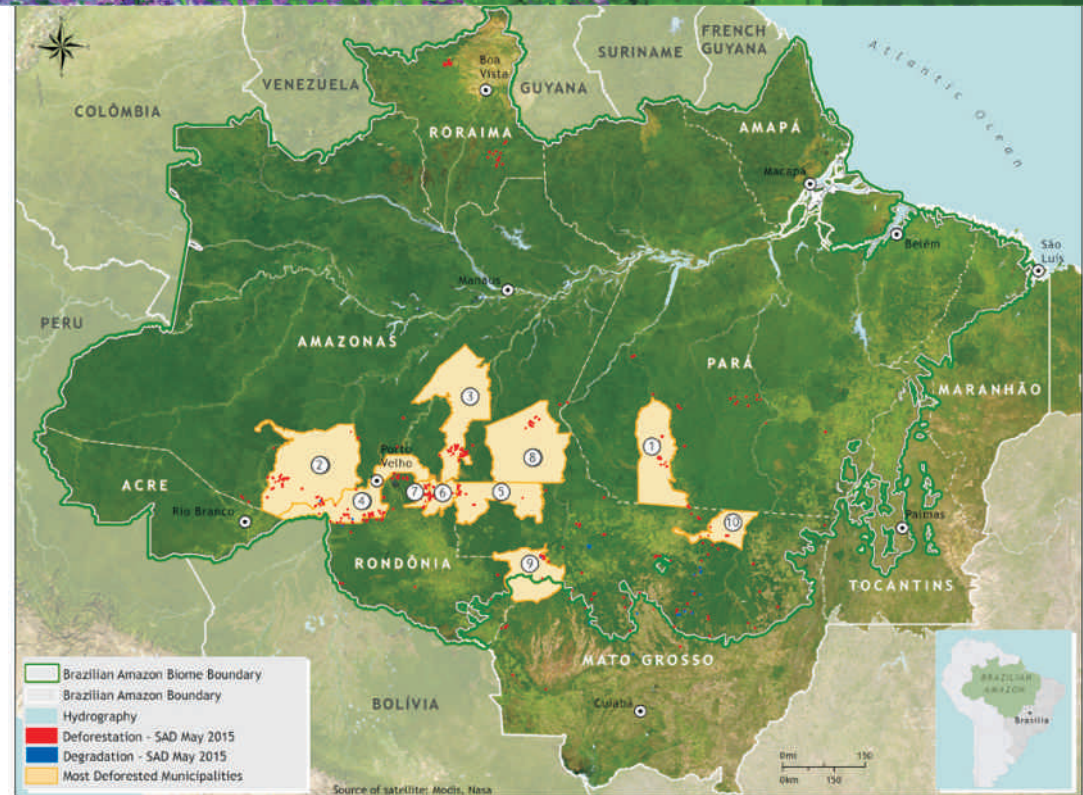


Figure 9. Municipalities with the largest areas deforested in May 2015 (Source: Imazon/SAD).

Cloud and shadow cover

In May 2015, with SAD it was possible to monitor 61% of the forest area in the Brazilian Amazon. The other 39% of forest territory was covered by clouds, which made detection of deforestation and forest degradation difficult. The States with the largest cloud cover were Amapá (79%), Roraima (54%) and Pará (46%). Because of that, the data for deforestation and forest degradation in April 2015 may be underestimated (Figure 10).

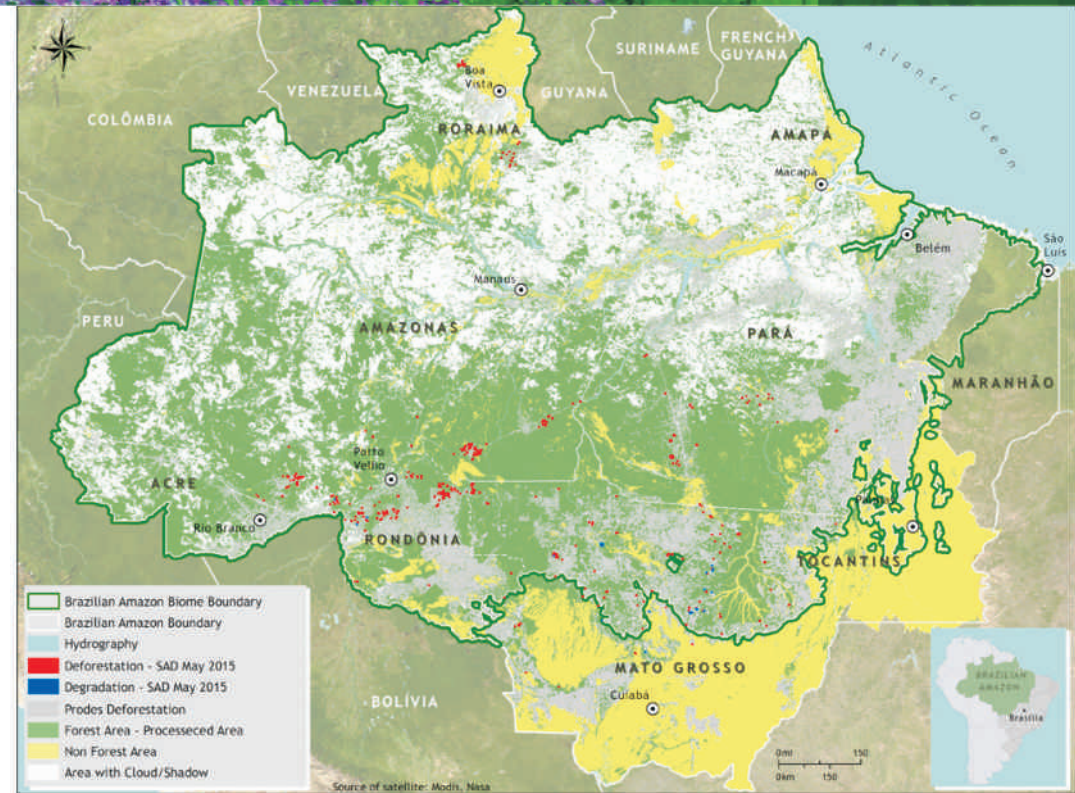


Figure 10. Area with cloud and shadow in May 2015 in the Brazilian Amazon.

SAD-EE

Since July 2012 deforestation and forest degradation detection alerts have been performed using the Google Earth Engine platform (EE), with the new SAD EE version. That system was developed in collaboration with Google and uses the same process already employed by SAD 3.0 (Box I), with reflectance images from MODIS to generate the deforestation and forest degradation alerts.

* The portion of Maranhão that is part of the Brazilian Amazon was not analyzed.

BOX I: SAD 3.0

Since August 2009, SAD has had some new features. First, we created a graphic interface to integrate all of the image processing programs used in SAD. Next, we began to compute deforestation in areas that were covered by clouds in the previous months in a new class. Finally, deforestation and degradation are detected with pairs of NDFI images using a change detection algorithm. The principal method continues to be the same as with SAD 2.0 as described below.

SAD generates a temporal mosaic of daily MODIS images from the MOD09GQ and MOD09GA products for filtering clouds. Next, we use a technique for fusing different spectral resolution bands, i.e. with pixels of different sizes. In this case, we made a change in scale from 5 bands with 500 meter pixels in MODIS to 250 meters. That allowed us to improve the spectral mixture model and provided the capacity for estimating the abundance of Vegetation, Soils and Non-Photosynthetic Vegetation (NPV) components (Vegetation, Soil and Shadow) to calculate the NDFI, with the following equation:

$$\text{NDFI} = \frac{\text{VGs} - (\text{NPV} + \text{Soil})}{\text{VGs} + \text{NPV} + \text{Soil}}$$

Where VGs is the Vegetation component normalized for shadow given by:

$$\text{Vgs} = \text{Vegetation} / (1 - \text{Shadow})$$

The NDFI varies from -1 (pixel with 100% of exposed soil) to 1 (pixel with > 90% of forest vegetation). Thus, we have a continuous image that shows the transition from deforested areas, going through degraded forests, until reaching forest without signs of disturbances.

Detection of deforestation and degradation this month involved a difference in the NDFI images from consecutive months. Thus, a reduction in the NDFI values of from -200 to -50 indicates possible deforested areas and from -49 to -20 indicates signs of degradation.

SAD 3.0 Beta is compatible with previous versions with a (SAD 1.0 and 2.0), because the threshold for detecting deforestation was calibrated to generate the same type of response obtained by the previous method.

SAD has been in operation in the State of Mato Grosso since August 2006 and in the Legal Amazon since August 2008. In this bulletin, we present the monthly data generated by SAD from August 2013 to May 2015.

Team responsible

General Coordination: Carlos Souza Jr. e Adalberto Veríssimo (Imazon).
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Team: João Siqueira e Marcelo Justino (Image interpretation),
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Data source

Statistics for deforestation are generated using data from SAD (Imazon);
Data from INPE- Deforestation (PRODES)
<http://www.obt.inpe.br/prodes/>

Acknowledgements

Google Earth Engine Team
<http://earthengine.google.org/>

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State Public Prosecution Service of Pará
State Public Prosecution Service of Roraima
State Public Prosecution Service of Amapá
State Public Prosecution Service of Mato Grosso
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Support

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