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SUMMARY

In October 2013, SAD detected 43 square kilometers of deforestation in the Legal Amazon. That represents a drop of 91% if compared with the deforestation recorded by SAD in October 2012. Of that total, 39% occurred in Amazonas, followed by Rondônia (26%), Mato Grosso (15%), Pará (11%) and Acre (9%). Due to cloud cover, it was possible to monitor only 69% of the territory, a value lower than that obtained in October 2012 (83%).

The deforestation accumulated in the period from August 2013 to October 2013, corresponding to the first three months of the current deforestation calendar, totaled 331 square kilometers. There was a reduction of

71% in relation to the previous year (August 2012 to October 2012) when deforestation totaled 1,152 square kilometers.

Degraded forests totaled 40 square kilometers in October 2013. In relation to October 2012 there was a reduction of 85% when forest degradation totaled 268 square kilometers. The great majority (86%) occurred in Mato Grosso, followed by Rondônia (14%)

Forest degradation accumulated during the period from August 2013 to October 2013 totaled 149 square kilometers. In relation to the previous period (August 2012 to October 2012), when forest degradation totaled 611 square kilometers, there was a reduction of 76%.

Deforestation Statistics

According to SAD, deforestation (total suppression of forest for other alternative land uses)

reached 43 square kilometers in October 2013 (Figure 1 and Figure 2).

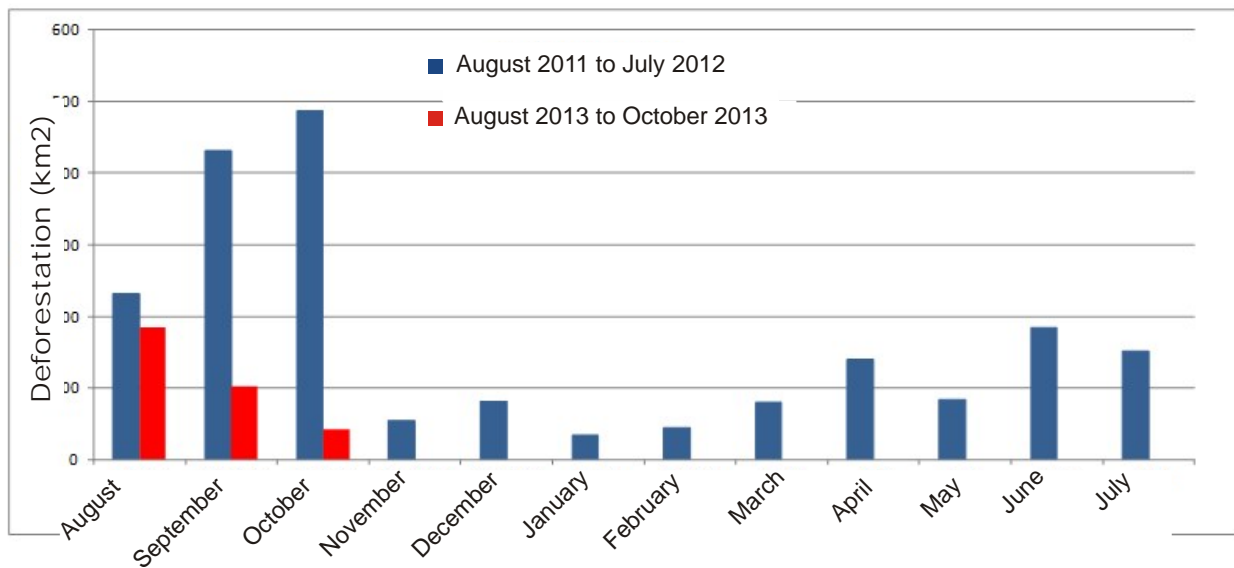


Figure 1. Deforestation from August 2012 to October 2013 in the Legal Amazon (Source: Imazon/SAD).

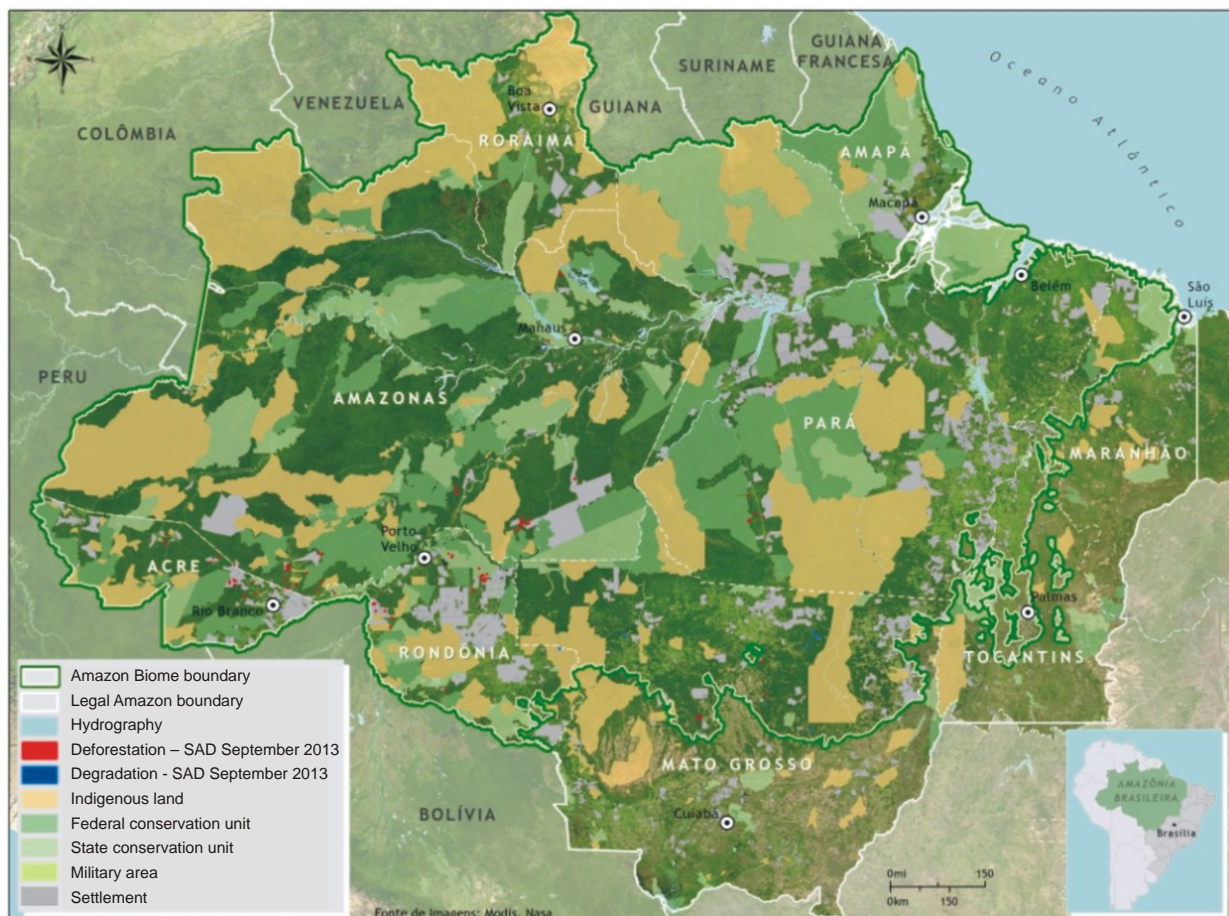


Figure 2. Deforestation and Forest Degradation in October 2013 in the Legal Amazon (Source: Imazon/ SAD).

The deforestation accumulated in the period from August to October 2013, corresponding to the first three months of the official calendar for measuring deforestation, reached 331 square kilometers. There was a reduction of 71% in deforestation in relation to

the previous period (August 2012 to October 2012) when it reached 1,152 square kilometers.

In October 2013, the deforestation occurred in Amazonas (39%), followed by Rondônia (26%), Mato Grosso (15%), Pará (11%) and Acre (9%) (Figure 3).

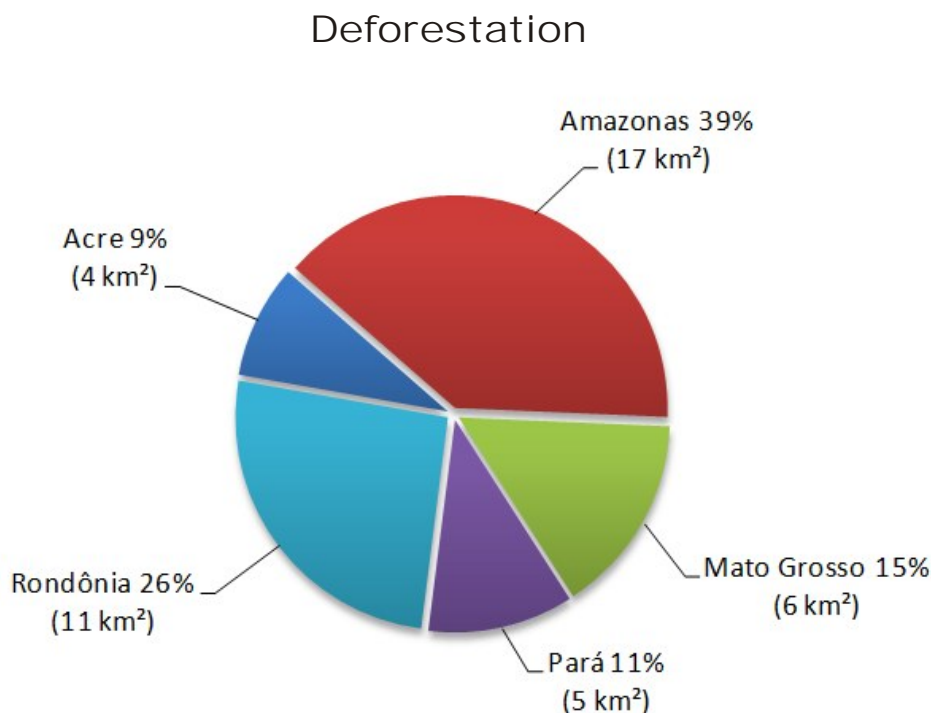


Figure 3. Percentage of deforestation in the States of the Legal Amazon Legal in September 2013 (Source: Imazon/SAD).

Considering the first three months of the current deforestation calendar (August 2013 to October 2013), Rondônia leads the ranking with 30% of the total deforested during the period. Next come Amazonas with 28% and Pará with 27%. In relative terms, there was an increase of 128% in Acre. On the other hand, there was a

significant reduction in Mato Grosso (-89%), Pará (-85%), Rondônia (-32%) and Amazonas (-31%).

In absolute terms, Rondônia leads the ranking of accumulated deforestation with 99 square kilometers, followed by Amazonas (92 square kilometers) and Pará (89 square kilometers).

Table 1. Evolution of deforestation among States in the Legal Amazon from August 2012 to October 2013 (Source: Imazon/SAD).

State	August to October 2012	August to October 2013	Variation (%)
Pará	591	89	-85
Mato Grosso	249	28	-89
Rondônia	145	99	-32
Amazonas	134	92	-31
Roraima	3	1	-76
Acre	10	23	+128
Tocantins	20	-	-100
Amapá	-	-	-
Total	1.152	331	-71

* Data from the State of Maranhão has not been analyzed.

Forest Degradation

In October 2013, SAD recorded 40 square kilometers of degraded forests (forests intensely exploited by timber harvesting and/or burned) (Figures 2 and 4). Of that total, the majority (86%) occurred in Mato Grosso, followed by Rondônia (14%).

Forest degradation accumulated during the period

from August 2013 to October 2013 (first three months of the official calendar for measuring deforestation), reached 149 square kilometers. That represents a drop of 76% in accumulated forest degradation in relation to the same previous period (August 2012 to October 2012) when forest degradation totaled 611 square kilometers (Table 2).

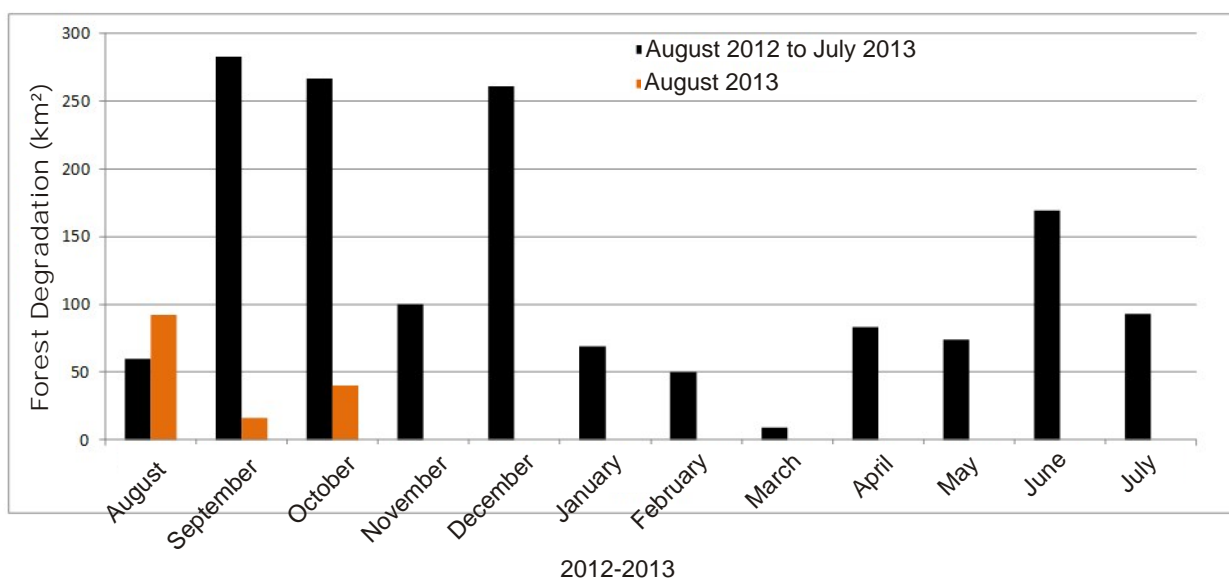


Figure 4. Forest Degradation from August 2012 to October 2013 in the Legal Amazon (Source: Imazon/SAD).

Table 2. Evolution of forest degradation among States of the Legal Amazon from August 2012 to October 2012 and August 2013 to October 2013 (Source: Imazon/SAD).

State	August to October 2012	August to October 2013	Variation (%)
Pará	591	89	-85
Mato Grosso	249	28	-89
Rondônia	145	99	-32
Amazonas	134	92	-31
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Total	1.152	331	-71

* Data from the state of Maranhão was not analyzed.

Deforestation Geography

In October 2013, the great majority (52%) of deforestation occurred in private areas or areas under various stages of possession. The remaining

deforestation was recorded in Land Reform Settlements (27%), Conservation Units (20%) and Indigenous Lands (1%) (Table 3).

Table 3. Deforestation by land category in October 2013 in the Legal Amazon (Source: Imazon/SAD).

Category	October 2013	
	km ²	%
Land Reform Settlement	12	27
Conservation Units	8	20
Indigenous Lands	0,2	1
Private, Possession & Untitled Lands	23	52
Total (km²)	43	100

Reform Settlements

SAD recorded 12 square kilometers of deforestation in the Land Reform Settlements in October 2013 (Figure 5). The Settlements most affected by

deforestation were PAE Aripuanã-Guariba (Novo Aripuanã, Amazonas), PAE Antimary (Boca do Acre, Amazonas) and PA Acari (Novo Aripuanã, Amazonas).

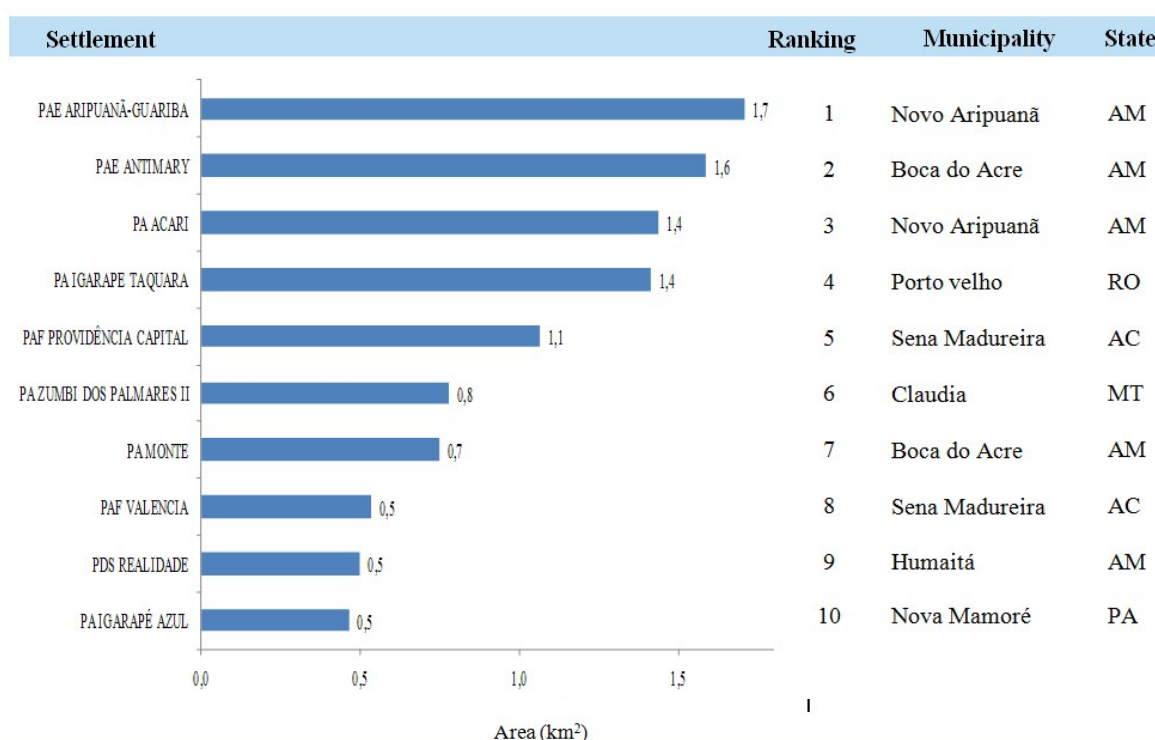


Figure 5. Land Reform Settlements deforested in October 2013 in the Legal Amazon (Source: Imazon/SAD).

Protected Areas

In the month of October 2013, SAD detected 8 square kilometers of deforestation in the Conservation Units of (Figure 6). In the case of

Indigenous Lands, in October 2013 only 0.2 square kilometers of deforestation were detected in Igarapé Lage (Rondônia).

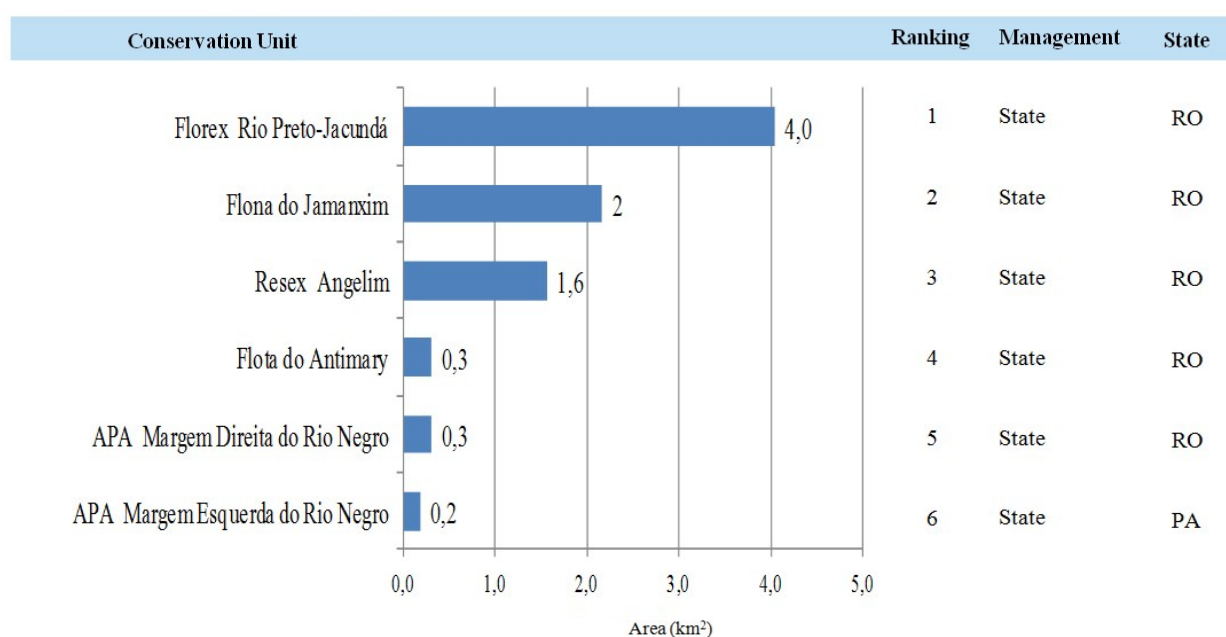


Figure 6. Conservation Units deforested in the Legal Amazon in October 2013 (Source: Imazon /SAD).

Municipalities Critics

In October 2013, the municipalities with the most deforestation were: Nova Maringá (Mato

Grosso) and Novo Progresso (Pará). (Figure 7 and 8).

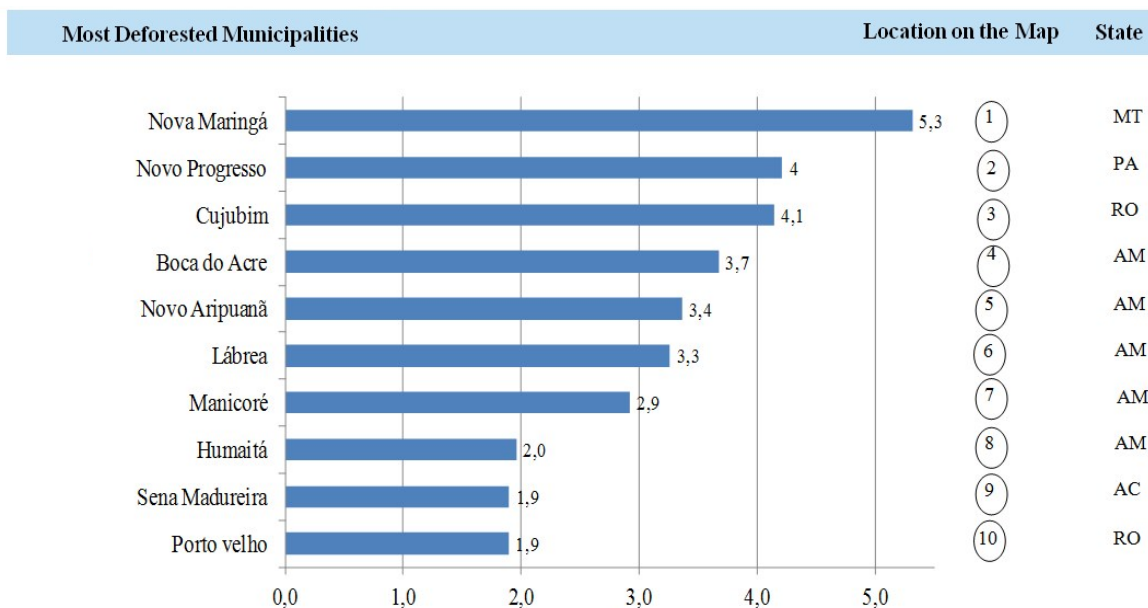


Figure 8. Municipalities with the most deforestation in the Legal Amazon in October 2013 (Source: Imazon /SAD).

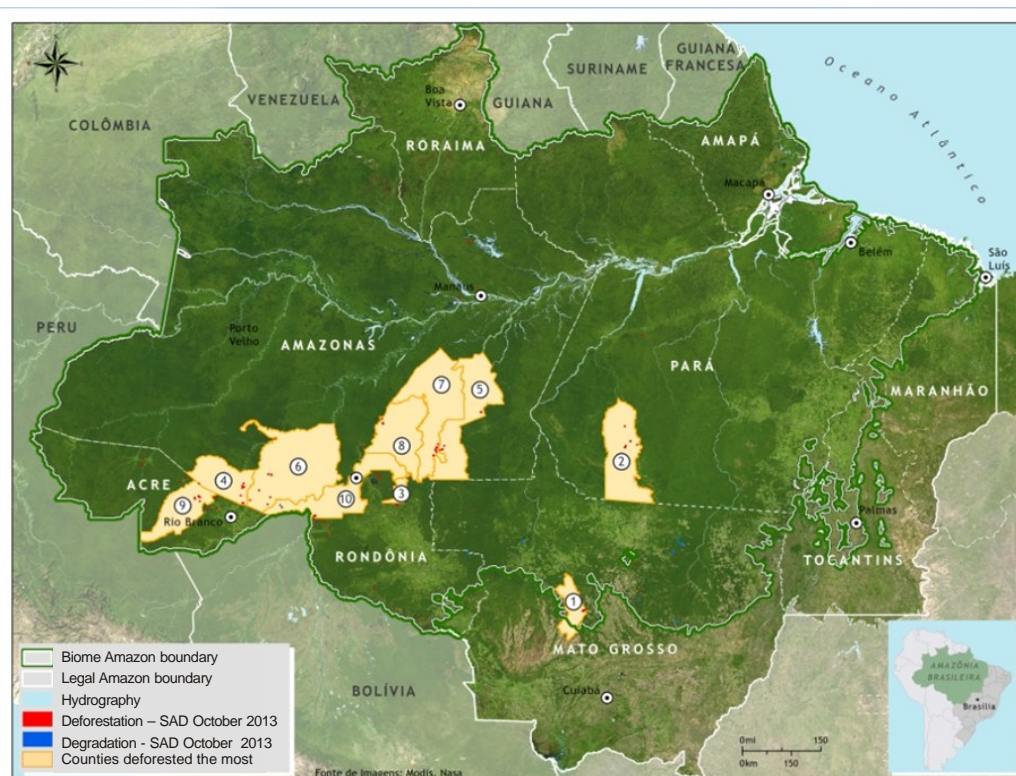


Figure 9. Municipalities with the largest areas deforested in October 2013 (Source: Imazon/SAD).

Coverage by clouds and Shade

In October 2013, it was possible to monitor with SAD 69% of the forest area in the Legal Amazon as opposed to 83% in October 2012. The other 31% of the forest territory were covered by clouds which made detecting deforestation and

forest degradation difficult. The States with the greatest cloud cover were Amapá (69%), Pará (41%) and Mato Grosso (34%). Because of that, the data on deforestation and forest degradation in October 2013 may be underestimated (Figure 9).

* Data related to the state of Maranhão, that integrates Legal Amazon, was not analyzed.

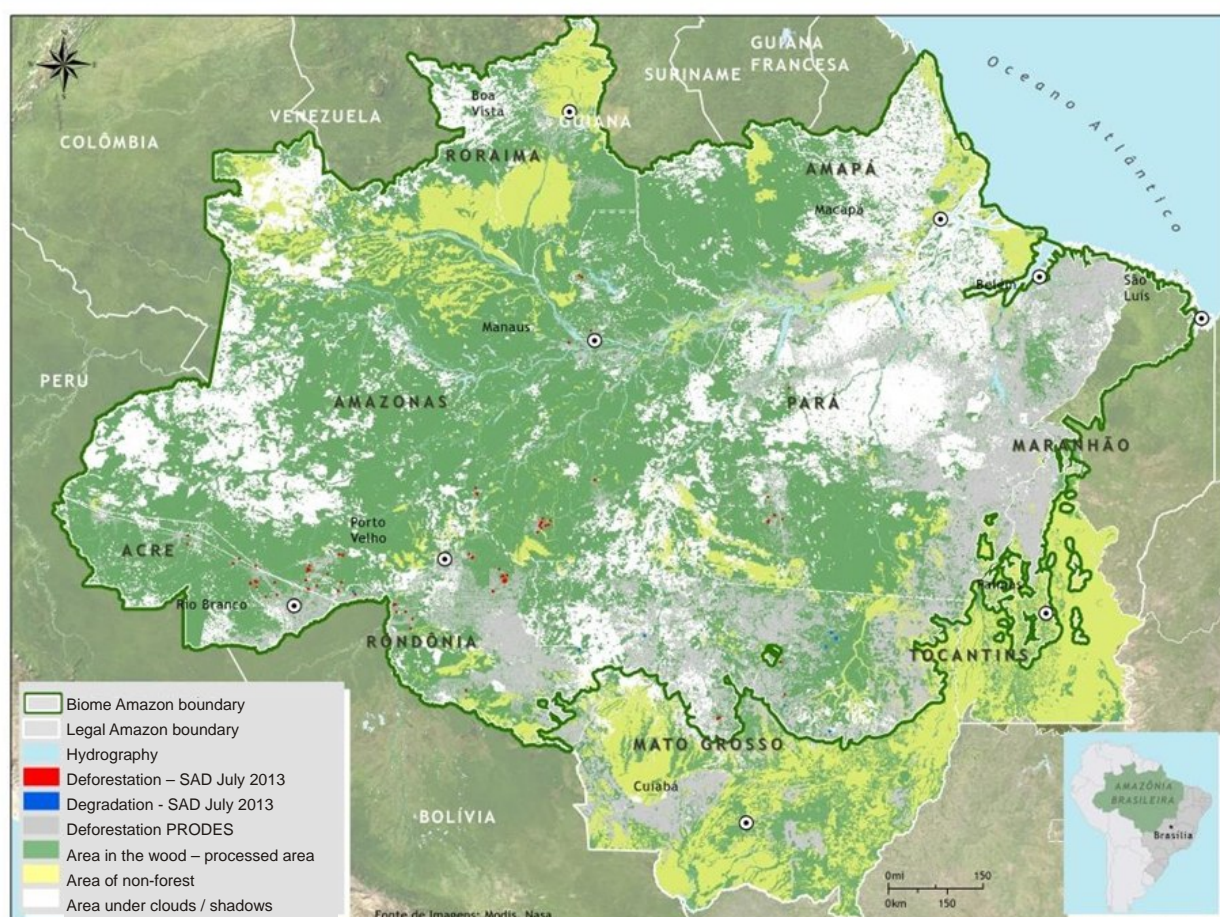


Figure 10. Area with cloud and shade in October 2013 in the Legal Amazon.

Google SAD-EE

Since June 2012 the detection of alerts of deforestation and forest degradation has been carried out in the Google's Earth Engine – EE – platform, with the new version: SAD EE. This system was developed in

collaboration with Google and uses the same process already used by SAD, with MODIS' reflectance images, in order to generate alerts of deforestation and forest degradation.

Table I: SAD 3.0

Since August 2009, SAD has been introducing some news. First, we created a graphical interface to integrate all image processing programs used in SAD. Second, we started computing deforestation in areas that were covered by clouds in the previous months, under a new class. Finally, deforestation and degradation are detected with pairs of NDFI images in a change detection algorithm. The main method remains the same as SAD 2, as described here below.

SAD generates a temporal mosaic of daily MODIS images of MOD09GQ and MOD09GA products to filter the clouds. Afterwards, we used a technique of different spectral resolution band merge, i.e., pixels of different sizes. In that case, we changed the 500 meter 5-band scale of MODIS to 250 meters. This allowed to enhance the spectral model of pixel mixture, thus supplying ability to estimate the abundance of vegetation, soils and non-active photo-synthetically vegetation (NPV, for Non-Photosynthetic, in English) components (vegetation, soil and Shadow) so to be able to calculate the NDFI with the following equation:

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

Where VG is the standardized component of vegetation for shadow given by:

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

NDFI ranges from -1 (pixel with 100% of exposed soil) to 1 (pixel with >90% with forest vegetation). Thus, we could have a continuous image showing the transition from deforested areas, crossing the degraded forests, reaching the forest with no warning signs of disturbance.

Detection of both deforestation and degradation was shown this month with the difference of NDFI images related to the consecutive months. Hence, a reduction in NDFI values ranging from -200 to -50 indicates possibly cleared areas, and a reduction ranging from -49 to -20 indicates signs of degradation.

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

SAD is already operating in the State of Mato Grosso since August 2006 and in the Amazon since April 2008. In this report, we present the monthly data generated by the SAD from August 2006 to October 2013.

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Data Source:

The deforestation statistics are generated using data from the SAD (Imazon);

INPE Data -Deforestation (Prodes)

<http://www.obt.inpe.br/prodes/>

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Google Earth Engine Team

<http://earthengine.google.org/>

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State Prosecutor of Pará

State Prosecutor of Roraima

State Prosecutor of Amapá

State Public Ministry of Mato Grosso

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