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SUMMARY

In September 2013, SAD detected 103 square kilometers of deforestation in the Legal Amazon. That represents a drop of 76% if compared with the deforestation recorded by SAD in September 2012 Of that total, 46% occurredin Rondônia followed by Amazonas (23%) Mato Grosso (15%) and Pará (9%). The proportion of clouds was similar in the comparison between September 2013 (21%) vs September 2012 (20%).

The deforestation accumulated in the period from August 2013 to September 2013, corresponding to the first two months of the current deforestation calendar, totaled 288 square kilometers. There was a reduction of 57% in relation to the previous year (August 2012 to September 2012) when deforestation totaled 663 square kilometers.

Degraded foreststotaled 16 square kilometers in September 2013. In relation to September 2012,when forest degradation totaled 283 square kilometers, there was a reduction of 94%. The majority (69%) occurred in Mato Grosso followed by Pará (25%)

Forest degradation accumulated during the period from August 2013 to September 2013 totaled 108 square kilometers. In relation to the previous period (August 2012 to September 2012) when forest degradation totaled 343 square kilometers, there was a reduction of 69%.

NOTE:
We note that the MODIS and Landsat images are not available on the server for the United States Geological Survey - USGS. Because of that, the SAD for this month used daily images up to September 27 to carry out detection of deforestation and forest degradation. Due to the incomplete analysis for the month of September, the datapresented in this bulletin may be underestimated.

We also inform that the statistics on carbon emissions compromised by deforestation and forest degradation detected by SAD will no longer be reported in this bulletin. A new form of reporting those results is being developed.

Deforestation Statistics

According to SAD, deforestation (total suppression of forest for other alternative land uses) reached 103 square kilometers in September 2013 (Figure 1 and Figure 2).

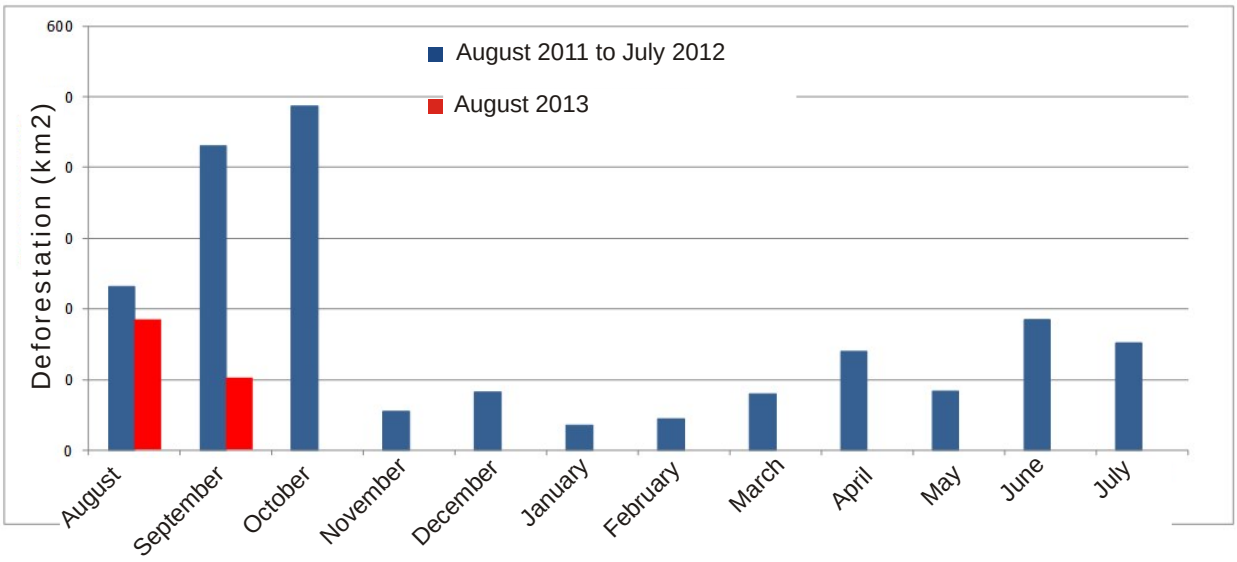

Figure 1. Deforestation from August 2012 to September 2013 in the Legal Amazon (Source: Imazon/SAD).

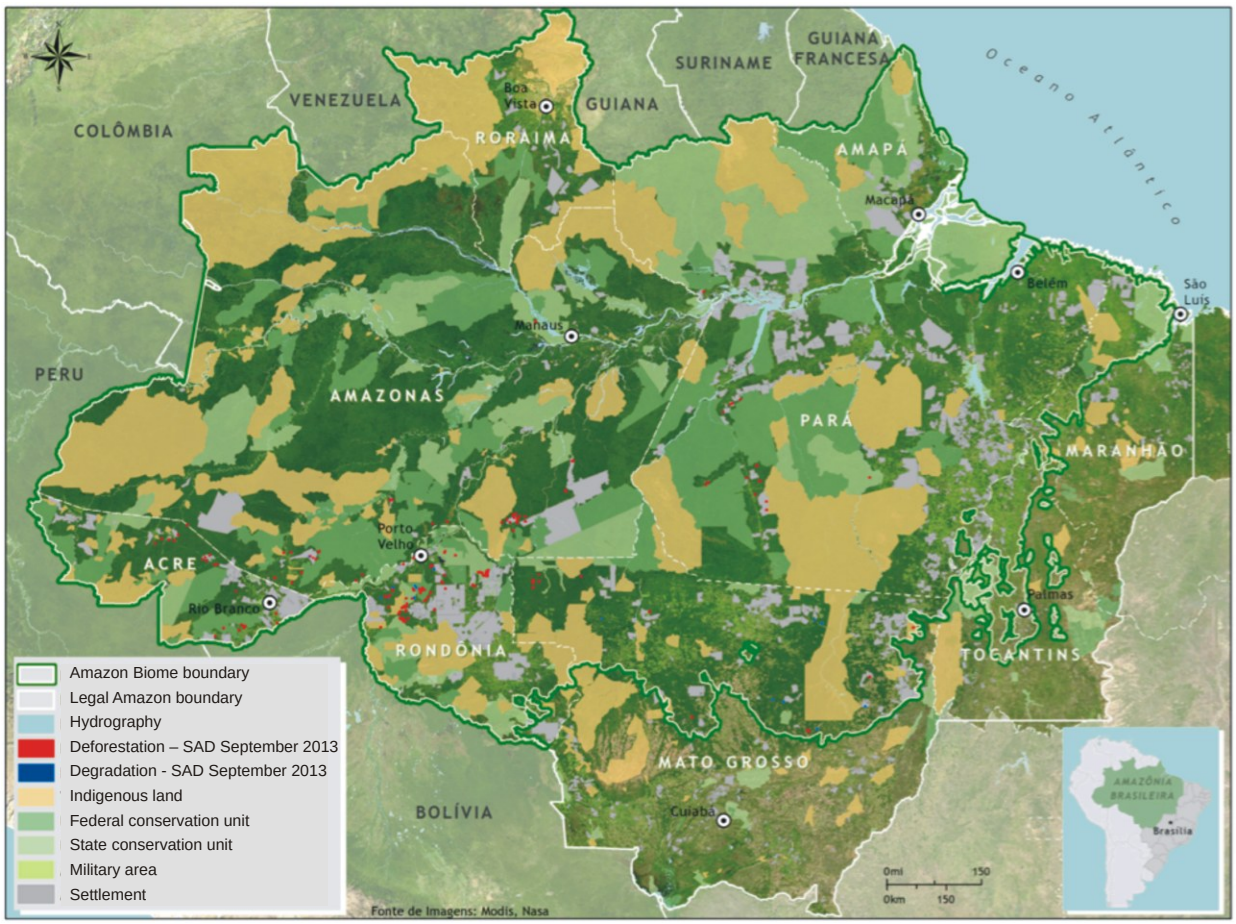

Figure 2. Deforestation and Forest Degradation in September 2013 in the Legal Amazon (Source: Imazon/ SAD).

The deforestation accumulated in the period from August to September 2013, corresponding to the first two months of the official calendar for measuring deforestation, reached 288 square kilometers. There was a reduction of 57% in deforestation in relation to the previous period (August 2012 to September 2012) when it reached 663 square kilometers.

In September 2013, the deforestation occurred in Rondônia (46%), Amazonas (23%), Mato Grosso (15%), Pará (9%) and Acre (8%) (Figure 3).

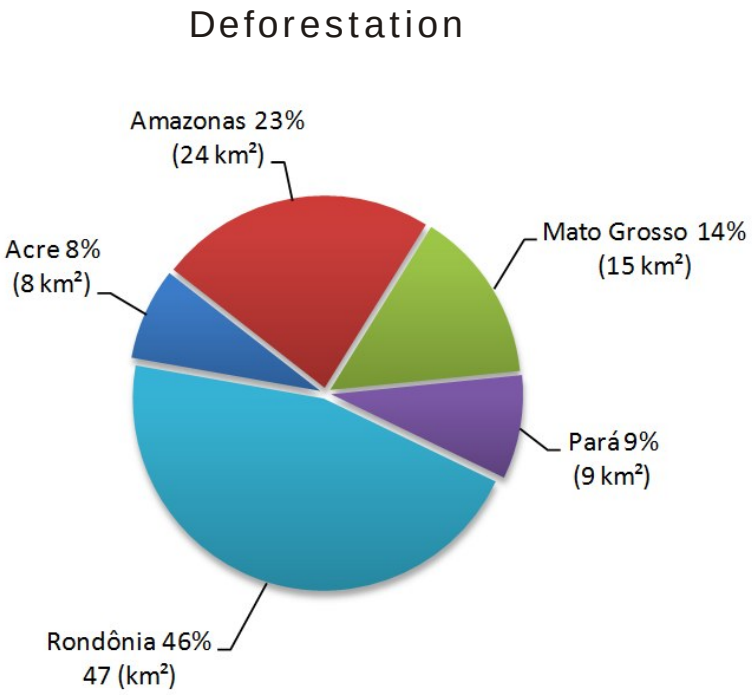

Figure 3. Percentage of deforestation in the States of the Legal Amazon Legal in September 2013 (Source: Imazon/SAD).

Considering the first two months of the current deforestation calendar (August 2013 to September 2013), Rondônia leads the ranking with 31% of the total deforested during the period. Next comes Pará with 29% and Amazonas (26%).In relative terms, there was an increase of 1,687% in Acre, 52% in Amazonas and 2% in Rondônia. On the other hand, there was a significant reductionin Pará (- 80%) and Mato Grosso (-80%)

Inabsolute terms, Rondônialeads the ranking of accumulated deforestation with 88 square kilometers, followed by Pará (84 square kilometers) and Amazonas (75 square kilometers).

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

State	August to September 2012	August to September 2013	Variation (%)
Pará	411	84	-80
Mato Grosso	105	21	-80
Rondônia	87	88	+2
Amazonas	49	75	+52
Roraima	-	1	-
Acre	1	19	+1687
Tocantins	10	-	-100
Amapá	-	-	-
Total	**663**	**288**	**-57**

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

Forest Degradation

In September 2013, SAD recorded 16 square kilometers of degraded forests (forests intensely exploited by timber harvesting and/or burned) (Figures 2 and 4). Of that total, the majority (69%) occurred in Mato Grosso, followed by Pará (25%).

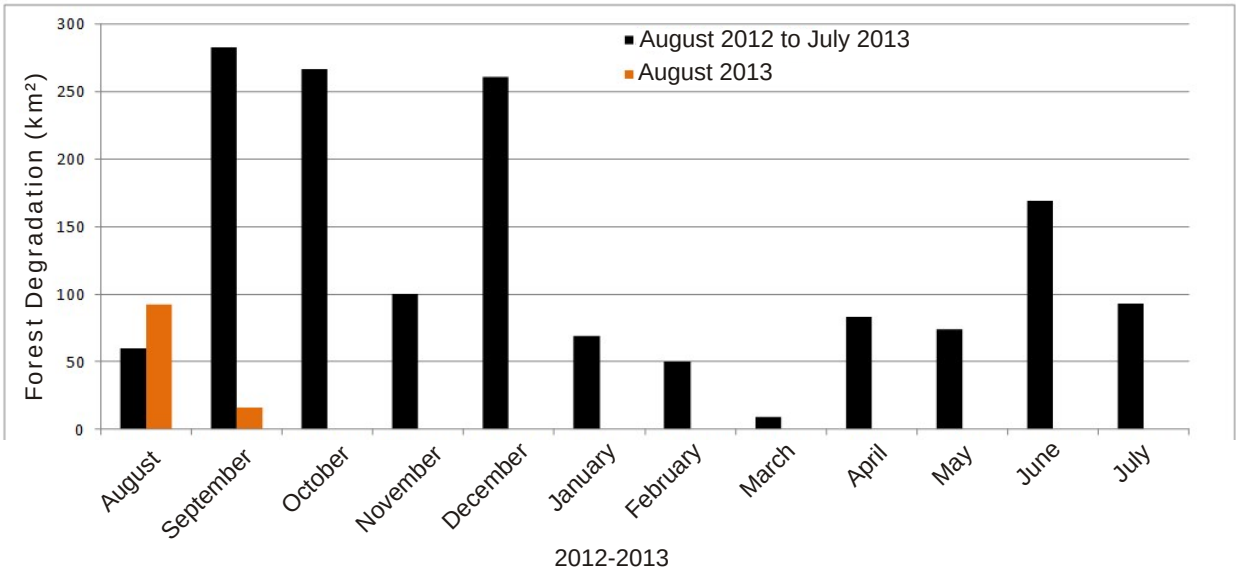

Figure 4. Forest Degradation from August 2012 to September 2013 in the Legal Amazon (Source: Imazon/SAD).

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

State	August to September 2012	Agosto to September 2013	Variation (%)
Mato Grosso	167	59	-65
Pará	162	47	-71
Rondônia	10	-	-99
Amazonas	4	2	-58
Roraima	-	-	-
Acre	-	-	-
Tocantins	-	-	-
Amapá	-	-	-
Total	**343**	**108**	**-69**

***** Data from the state of Maranhão was not analyzed.

Deforestation Geography

In September 2013, the great majority (61%) of deforestation occurred in private areas or areas under various stages of possession. The remaining deforestation was recorded in Land Reform Settlements (10%), Conservation Units (27%) and Indigenous Lands (2%) (Table 3).

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

Category	September 2013	
	km²	%
Land Reform Settlement	10	10
Conservation Units	28	27
Indigenous Lands	2	2
Private, Possession&Untitled Lands	63	61
Total (km²)	**103**	**100**

Reform Settlements

SAD recorded 10 square kilometers of deforestation in the Land Reform Settlements in September 2013 (Figure5). The Settlements most affected by deforestation were PA Acari (Novo Aripuanã, Amazonas), PDS Terra Nossa (Altamira, Pará) and PA Brasil Novo (Querência, Mato Grosso).

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

Protected Areas

In the month of September 2013, SAD detected 28 square kilometers of deforestation in the Conservation Units of Resex Jaci Paraná (Rondônia), Florex Rio Preto-Jacundá (Rondônia), PES of Guajará-Mirim (Rondônia), APA Rio Pardo (Rondônia), Florsu Mutum (Rondônia), APA Triunfo do Xingu (Pará), Resex Rio Preto-Jacundá (Rondônia), Resex Chico Mendes (Acre) and Florsu do Rio Vermelho (Rondônia) (Figure 6). In the case of Indigenous Lands, in September 2013 2 square kilometers of deforestation were detected in Igarapé Lage (Rondônia) and Urubu Branco (Mato Grosso) (Figure 7).

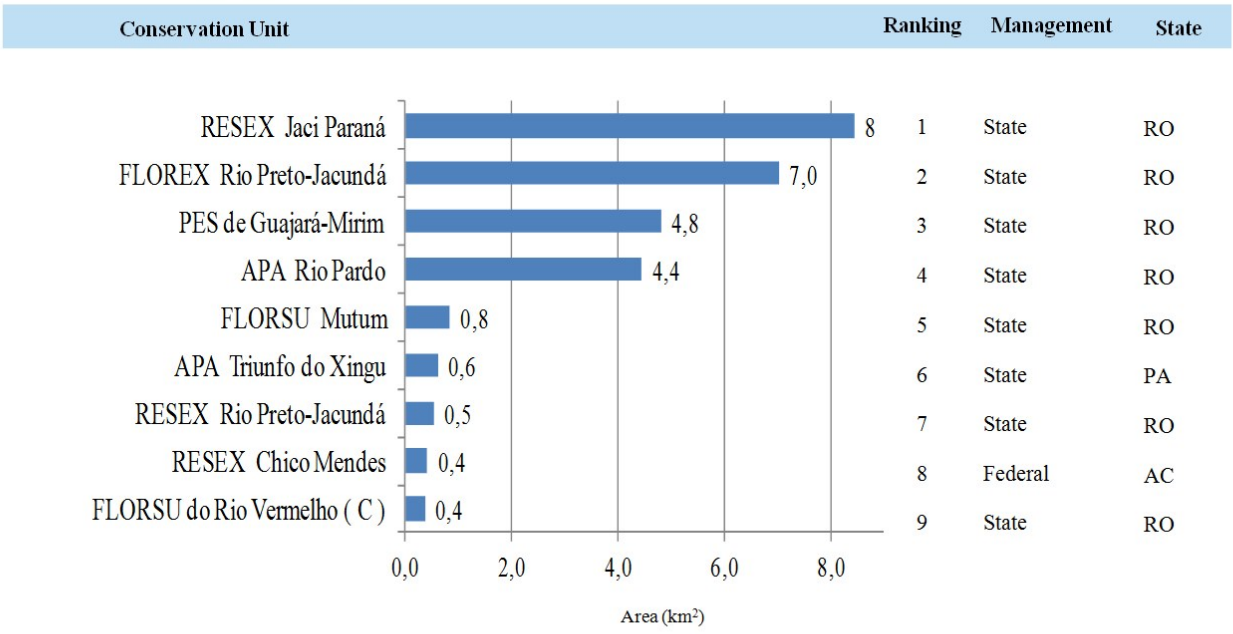

Figure 6. Conservation Units deforested in the Legal Amazon in September 2013 (Source: Imazon /SAD).

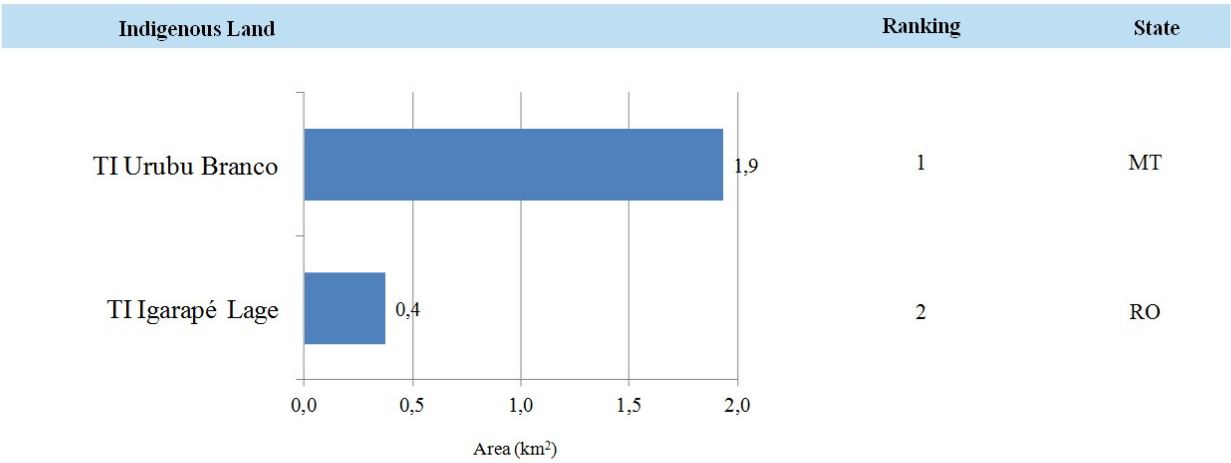

Figure 7. Indigenous Lands deforested in the Legal Amazon in September 2013 (Source: Imazon /SAD).

Municipalities Critics

In September 2013, the municipalities with the most deforestation were: Nova Mamoré and Porto Velho, both in the state of Rondônia. (Figure 8 and 9).

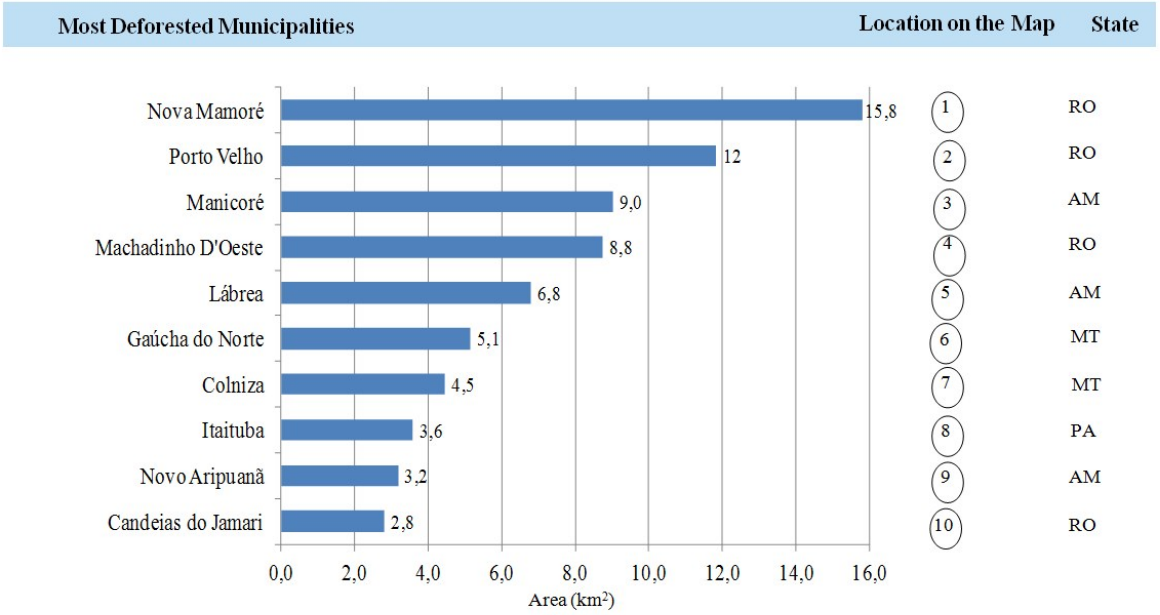

Figure 8. Municipalities with the most deforestation in the Legal Amazon in September 2013 (Source: Imazon /SAD).

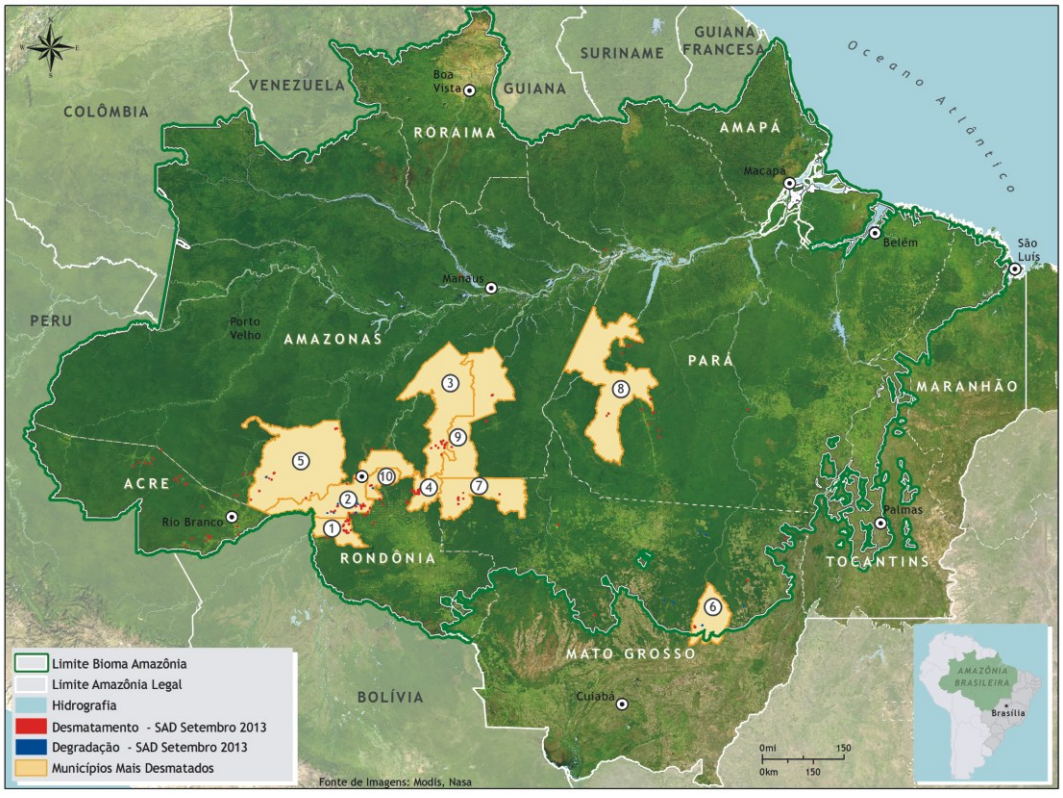

Figure 9. Municipalities with the largest areas deforested in September 2013 (Source: Imazon/SAD).

Coverage by clouds and Shade

In September 2013, it was possible with SAD to monitor 79% of the forest area in the Legal Amazonas opposed to 80% in September 2012. The other 21% of the forest territory were covered by clouds which made detecting deforestation and forest degradation difficult. The States with the greatest cloud coverwereAmapá (58%), Roraima (45%) and Pará (32%). Because of that, the data on deforestation and forest degradation in September 2013 may be underestimated (Figure10).

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

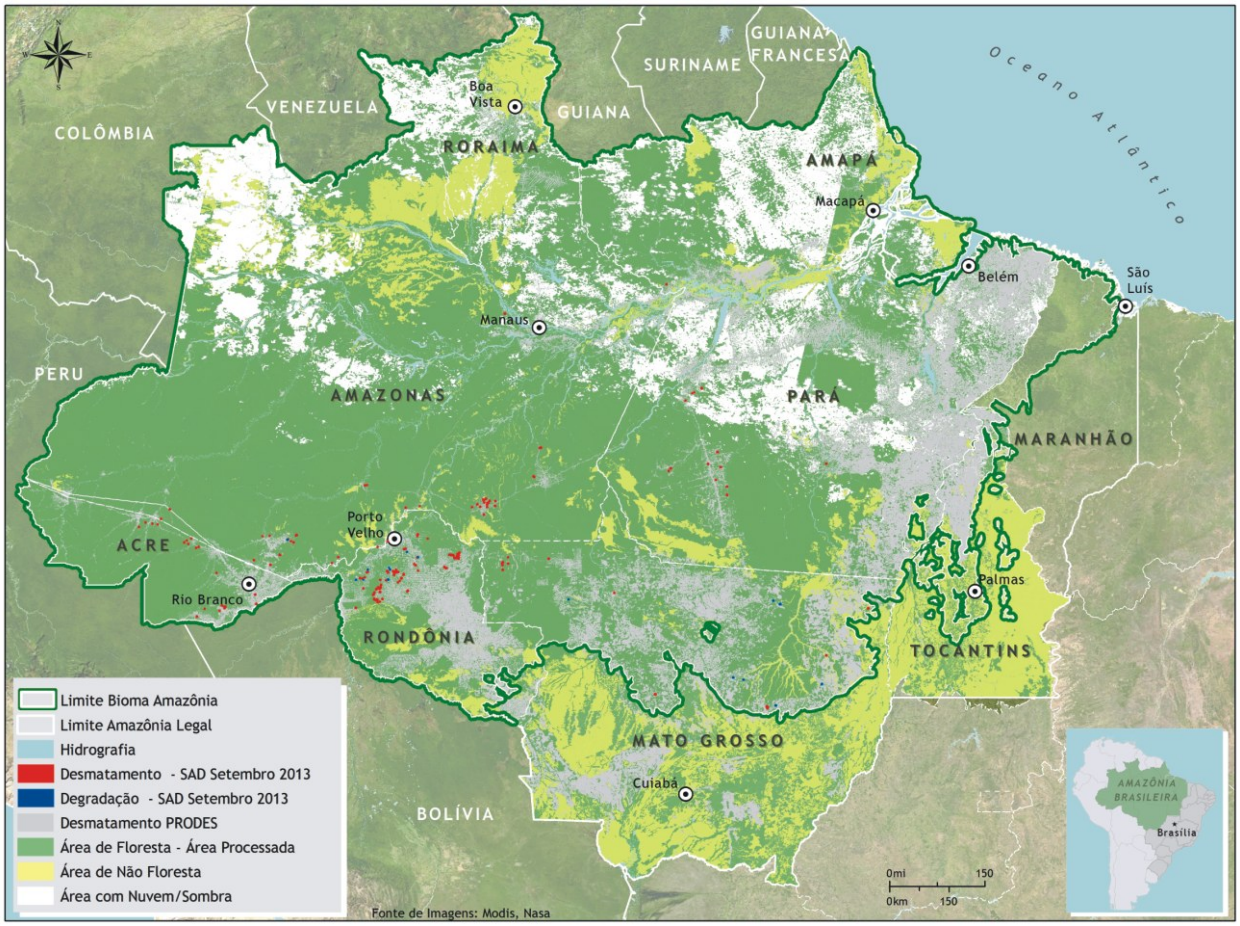

Figure 10. Area with cloud and shade in September 2013 in the Legal Amazon.

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:

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

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

$$VGs = Vegetation / (1 - Shadow)$$

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 September 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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