

Summary

In June 2015, SAD detected 494 square kilometers of deforestation in the Brazilian Amazon with a cloud cover of 15% of the territory. That represented a 41% reduction in relation to June 2014 when deforestation totaled 843 square kilometers and cloud cover was at 30%.

In June 2015, detected deforestation was concentrated in Amazonas (28%), Rondônia (27%), Mato Grosso (22%) and Pará (21%) and, in a lower proportion, in Roraima (1%) and Acre (1%).

The deforestation accumulated during the period of August 2014 to June 2015, corresponding to the first eleven months of the calendar for measuring deforestation, reached 2,780 square kilometers. There was a 65% increase in deforestation in relation to the previous period (August 2013 to June 2014) when it reached 1,690 square kilometers.

Degraded forests in the Brazilian Amazon totaled 9 square kilometers in June 2015. In relation to June 2014, when forest degradation totaled 48 square kilometers there was an 81% reduction.

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Deforestation statistics

According to SAD, deforestation (total suppression of the forest for other alternative land uses) reached 494 square kilometers in June 2015 (Figure 1 and Figure 2).

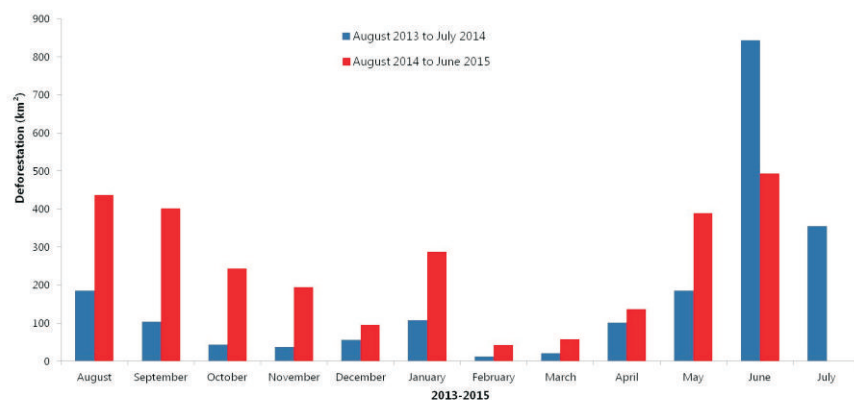


Figure 1. Deforestation from August 2013 to June 2015 in the Brazilian Amazon (Source: Imazon/SAD).

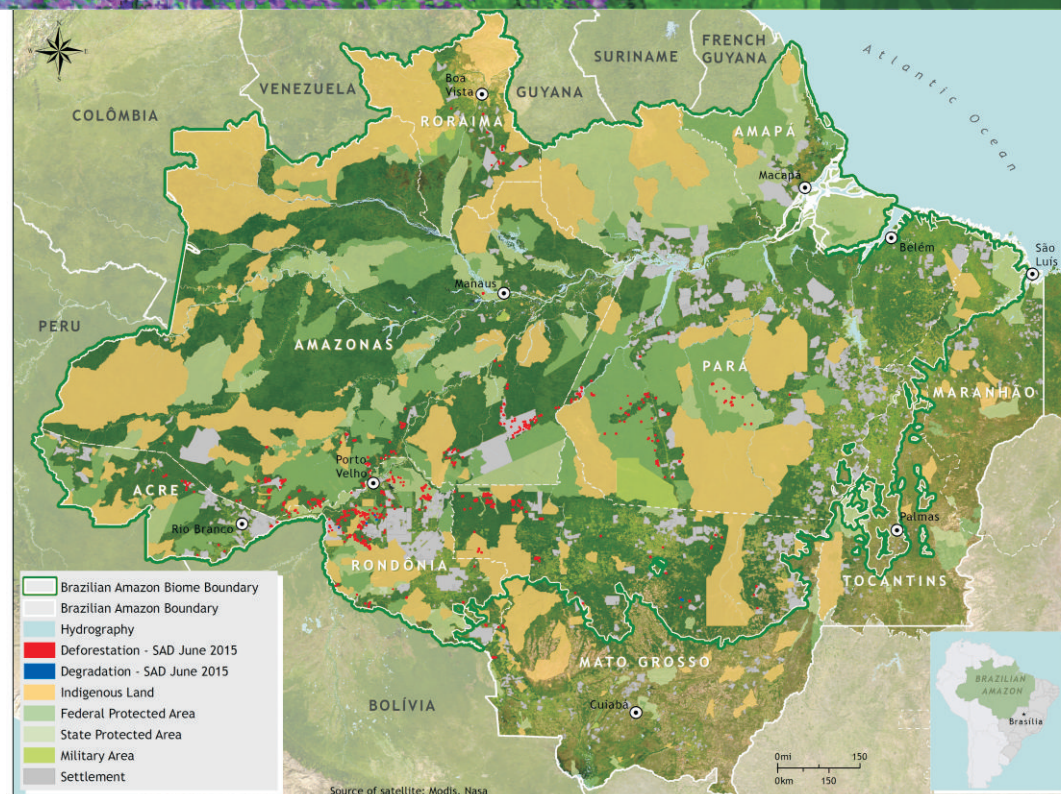


Figure 2. Deforestation and forest degradation in June 2015 in the Brazilian Amazon (Source: Imazon/ SAD).

In June 2015, deforestation occurred in Amazonas (28%), Rondônia (27%), Mato Grosso (22%) and Pará (21%) and, in a lower proportion, in Roraima (1%) and in Acre (1%) (Figure 3).

The deforestation accumulated during the period of August 2014 to June 2015, corresponding to the first eleven months of the calendar for measuring deforestation, reached 2,780 square kilometers. There was a 65% increase in deforestation in relation to the previous period (August 2013 to June 2014) when it reached 1,690 square kilometers.

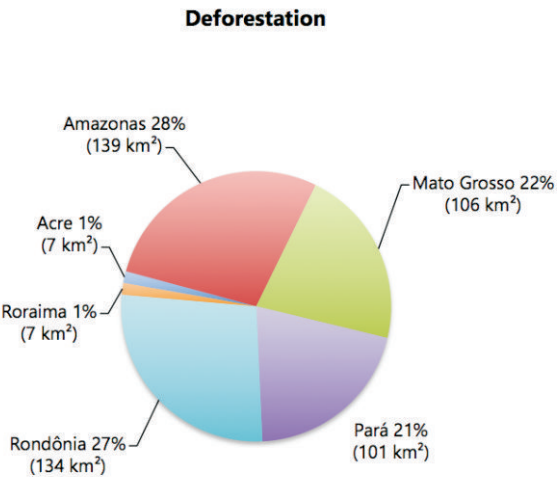


Figure 3. Percentage of deforestation in States of the Brazilian Amazon in June 2015 (Source: Imazon/SAD).

Considering the first eleven months of the current calendar for deforestation (August 2014 to June 2015), Mato Grosso leads the ranking with 34% of the total deforested during the period. Next come Pará (23%) and Rondônia (21%). In relative terms, there was a significant increase of 149% in Mato Grosso and 120% in Rondônia.

In absolute terms, Mato Grosso leads the ranking of accumulated deforestation with 943 square kilometers, followed by Pará (639 square kilometers) and Rondônia (582 square kilometers) (Table 1).

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

State	August 2013 to June 2014	August 2014 to June 2015	Variation (%)
Pará	644	639	-1
Mato Grosso	378	943	+149
Rondônia	265	582	+120
Amazonas	272	435	+60
Roraima	64	101	+59
Acre	45	73	+63
Tocantins	22	3	-87
Amapá	-	4	-
Total	1,690	2,780	+65

* Data from Maranhão were not analyzed.

Forest degradation

In June 2015, SAD recorded 9 square kilometers of degraded forests (forests intensely exploited by logging activity and/or burned) (Figures 2 and 4). Of that total, the majority (65%) occurred in Mato Grosso, followed by Rondônia (35%).

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

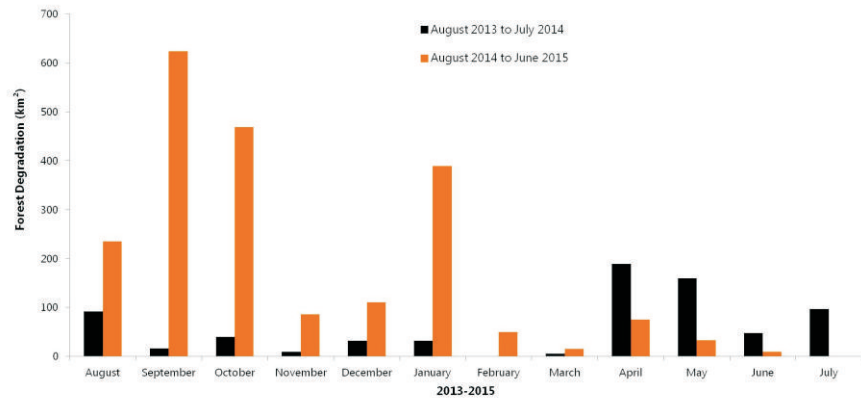


Figure 4. Forest Degradation from August 2013 to June 2015 in the Brazilian Amazon (Source: Imazon/SAD).

State	August 2013 to June 2014	August 2014 to June 2015	Variation (%)
Mato Grosso	489	1.771	+262
Pará	75	117	+56
Rondônia	43	44	+1
Amazonas	4	8	+100
Roraima	3	4	+33
Acre	-	-	-
Tocantins	-	-	-
Amapá	-	2	-
Total	614	1,946	+217

* Data from Maranhão were not analyzed.

Geography of deforestation

In June 2015, the majority (59%) of deforestation occurred in areas that were private areas or under various stages of possession. The remaining deforestation was recorded in Land Reform Settlements (15%), Indigenous Lands (1%) and Conservation Units (25%) (Table 3).

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

Category	June 2015	
	km ²	%
Land Reform Settlement	74	15
Conservation Units	122	25
Indigenous Lands	5	1
Private, Possession & Untitled Public Lands	293	59
Total (km²)	389	100

Land Reform Settlements

SAD recorded 74 square kilometers of deforestation in Land Reform Settlements in June 2015 (Figure 5). The Settlements most affected by deforestation were PA Rio Juma (Apuí; Amazonas), PA Jacaré (Jacareacanga; Pará) and PA Acari (Novo Aripuanã; Amazonas).

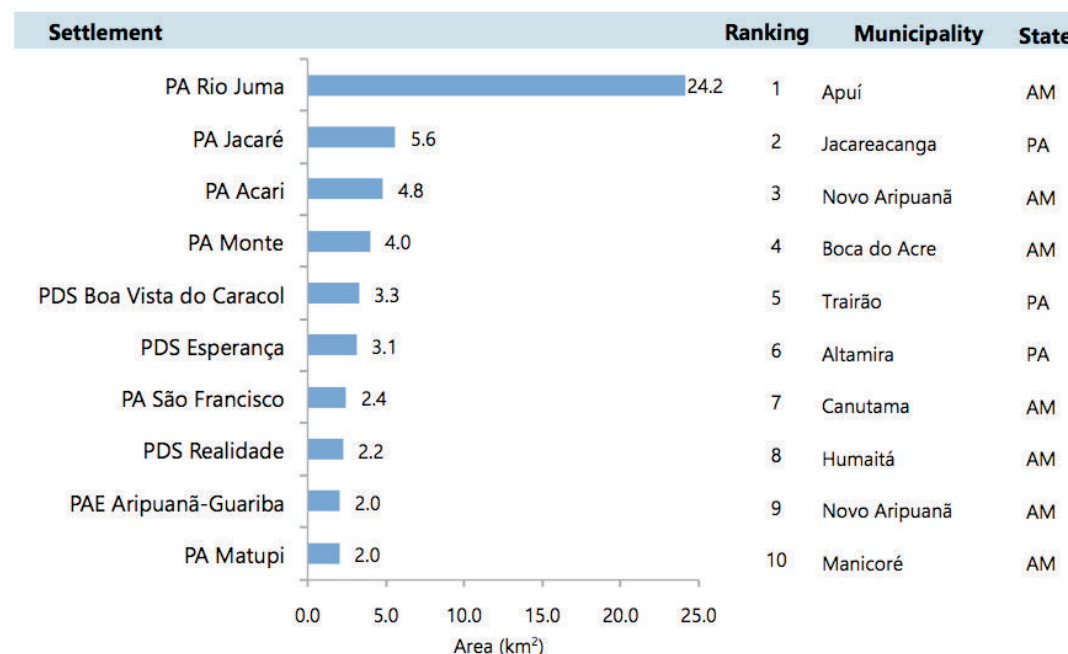


Figure 5. Land Reform Settlements deforested in June 2015 in the Brazilian Amazon (Source: Imazon/SAD).

Protected Areas

In the month of June 2015, SAD detected 122 square kilometers of deforestation in Conservation Units (Figure 6). In the case of Indigenous Lands, in June 2015, 5 square kilometers of deforestation were detected in TI Zoró (Mato Grosso) and TI Caititu (Amazonas).

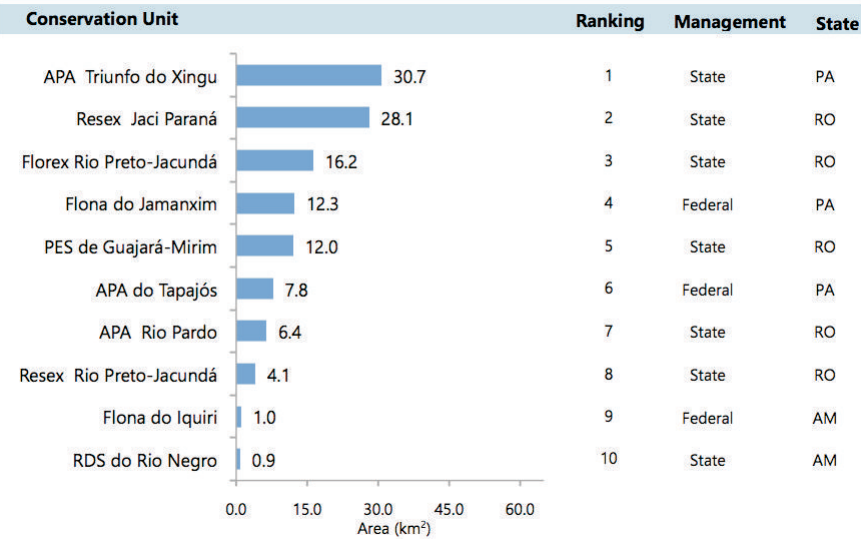


Figure 6. Most deforested Conservation Units in the Brazilian Amazon in June 2015 (Source: Imazon/SAD).

Critical municipalities

In June 2015, the most deforested municipalities were: Lábrea (Amazonas) and Colniza (Mato Grosso) (Figure 7 and 8).

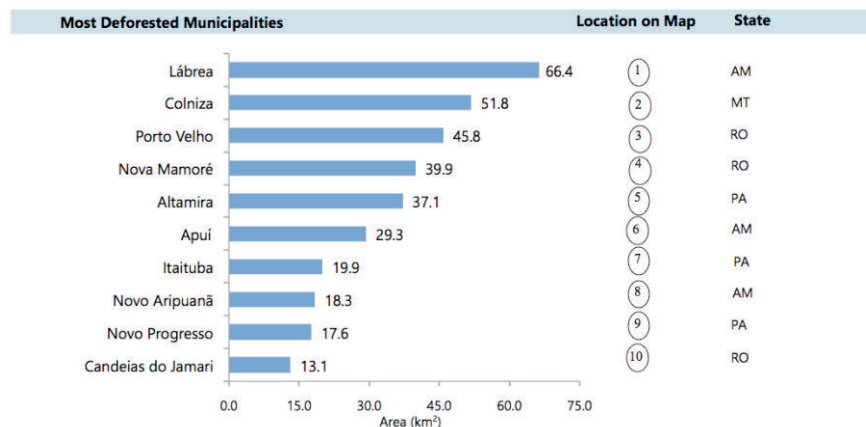


Figure 7. Most deforested municipalities in the Brazilian Amazon in June 2015 (Source: Imazon /SAD).

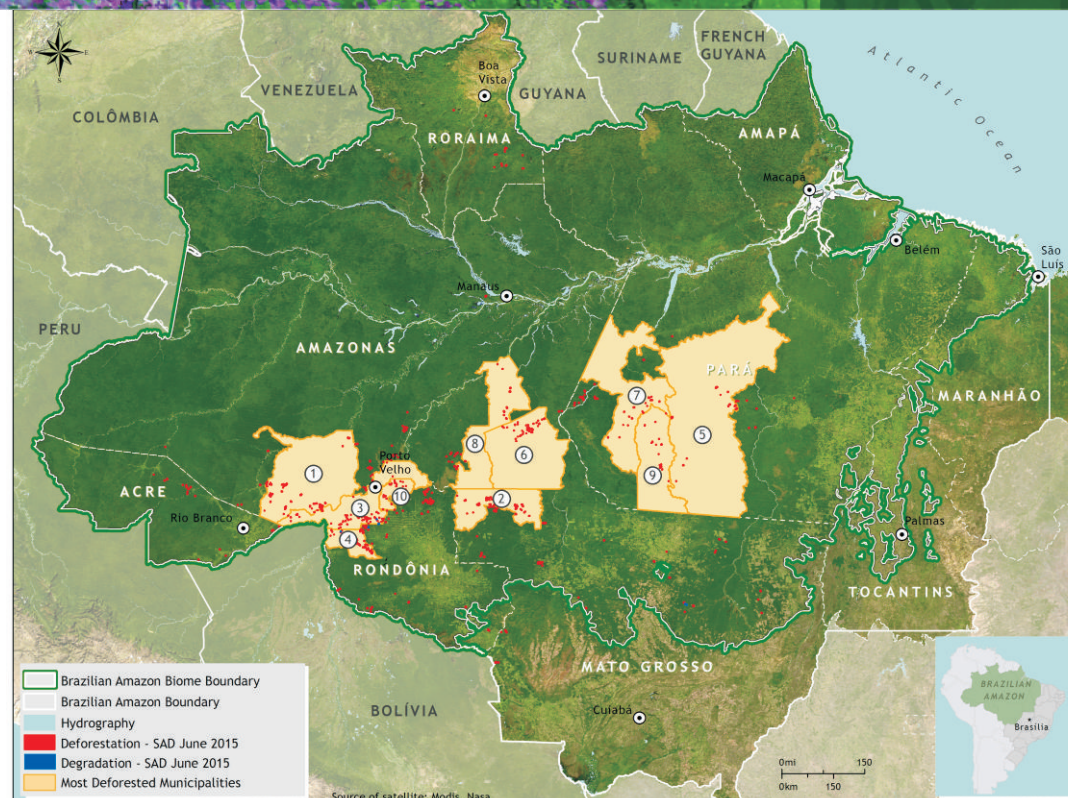


Figure 8. Municipalities with the largest areas deforested in June 2015 (Source: Imazon/SAD).

Cloud and shadow cover

In June 2015, with SAD it was possible to monitor 85% of the forest area in the Brazilian Amazon. The other 15% 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 June 2015 maybe underestimated (Figure 9).

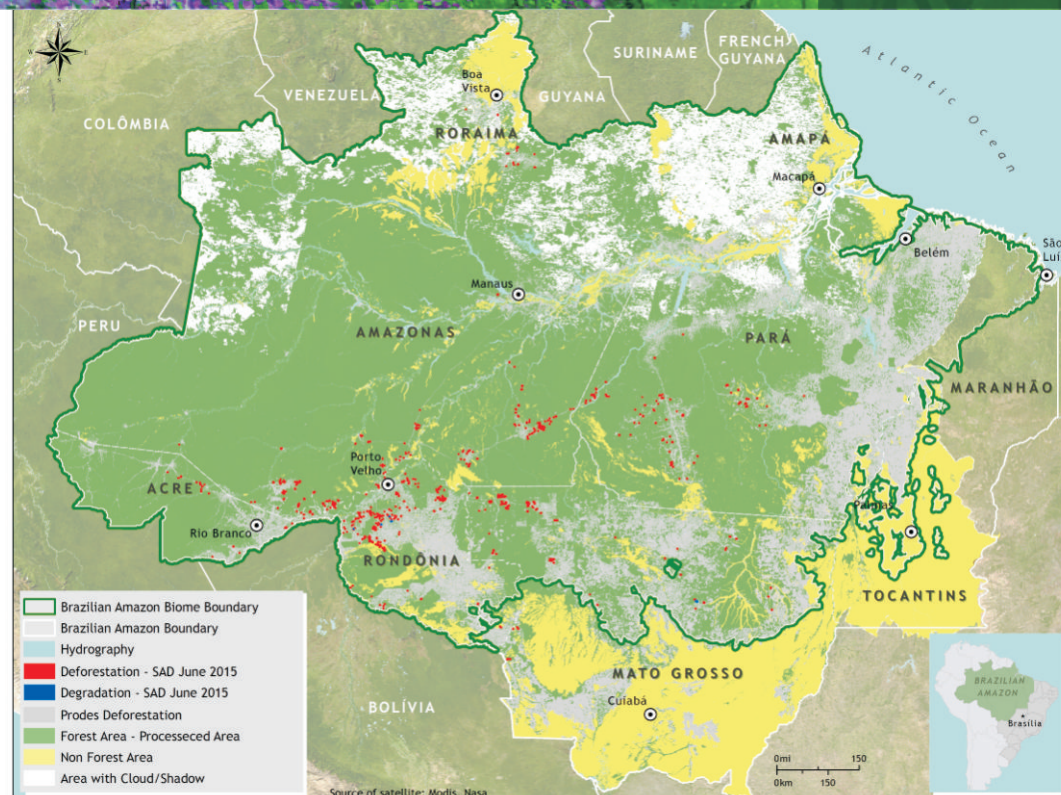


Figure 9. Area with cloud and shadow in June 2015 in the Brazilian Amazon.

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 June 2015.

Team reasponsible

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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/>

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

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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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