Deforestation report for the Brazilian Amazon (September 2015) SAD

Imazon

Summary

SAD detected 229 square kilometers of deforestation in the Brazilian Amazon in September 2015. That represented a 43% reduction in relation to September 2014 when deforestation totaled 402 square kilometers. It was possible to monitor 96% of the forest area in the Brazilian Amazon while in September 2014 monitoring covered a smaller area (93%) of the territory.

In September 2015, deforestation was concentrated in Mato Grosso (55%), Pará (28%) and Rondônia (12%), with a lower occurrence in Amazonas (3%), Acre (1%) and Roraima (1%).

Degraded forests in the Brazilian Amazon totaled 697 square kilometers in September 2015. In relation to September 2014, when forest degradation totaled 624 square kilometers, there was a 12% increase.

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Deforestation Statistics

According to SAD, deforestation (total suppression of the forest for other alternative land uses) affected 229 square kilometers in September 2015 (Figure 1 and Figure 2).

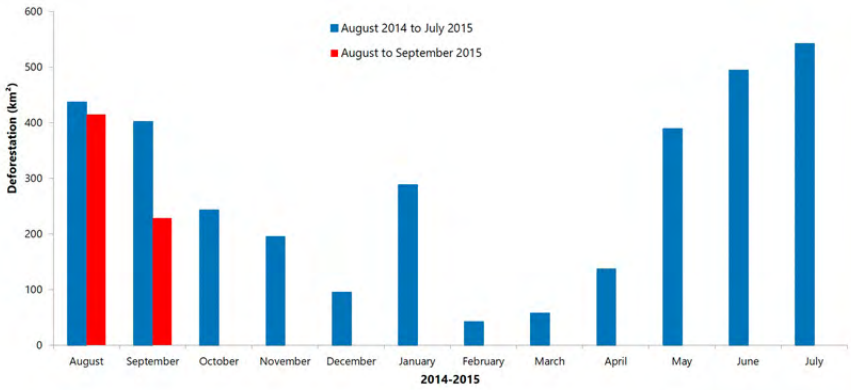

Figure 1. Deforestation from August 2014 to September 2015 in the Brazilian Amazon (Source: Imazon/SAD).

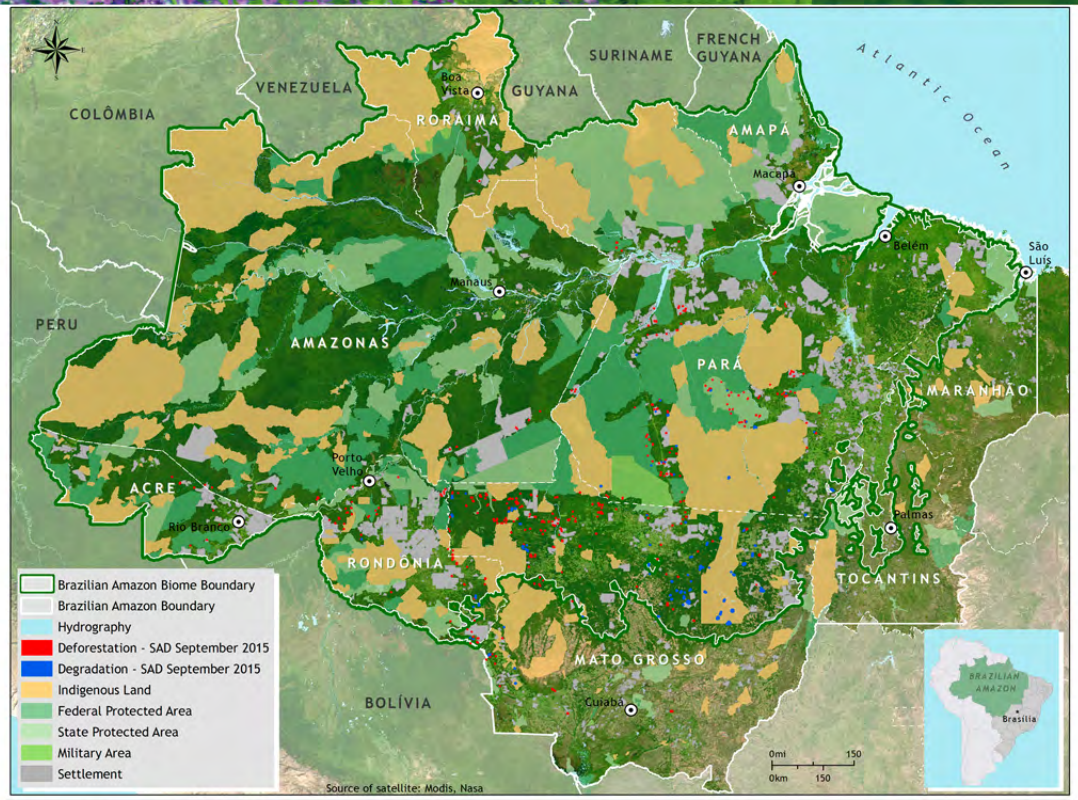

Figure 2. Deforestation and Forest Degradation in the Brazilian Amazon in September 2015 (Source: Imazon/ SAD).

In September 2015, deforestation was concentrated in Mato Grosso (55%), Pará (28%) and Rondônia (12%), with a lower occurrence in Amazonas (3%), Acre (1%) and Roraima (1%) (Figure 3).

The deforestation accumulated for the period of August to September 2015, corresponding to the first two months of the official calendar for measuring deforestation, affected 643 square kilometers. There was a 23% reduction in deforestation in relation to the previous period (August 2014 to September 2014) when it affected 839 square kilometers.

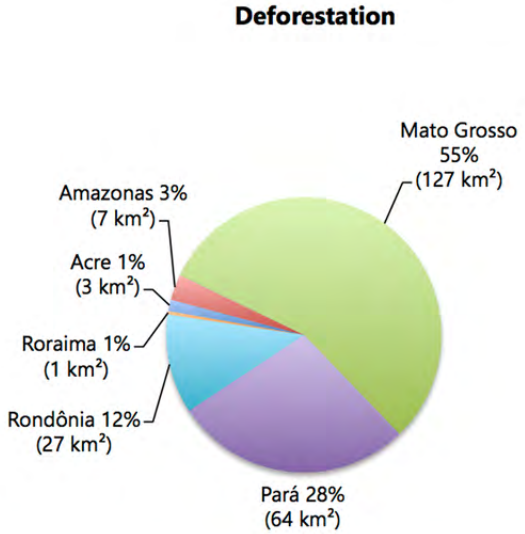

Figure 3. Percentage of deforestation in States of the Brazilian Amazon in September 2015
(Source: Imazon/SAD).

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

State	August to September 2014	August to September 2015	Variation (%)
Pará	152	212	+40
Mato Grosso	222	242	+9
Rondônia	260	60	-77
Amazonas	132	79	-41
Roraima	20	22	+9
Acre	51	8	-84
Tocantins	1	20	+1,900
Amapá	-	-	-
Total	**838**	**643**	**-23**

* Os dados do Maranhão não foram analisados.

Forest Degradation

In September 2015, SAD recorded 697 square kilometers of degraded forests (forests intensely exploited by logging activity and/or burned) (Figures 2 and 4). Of that total, the great majority (89%) occurred in Mato Grosso, followed by Pará (10%) and Rondônia (1%).

Figure 4. Forest Degradation from August 2014 to September 2015 in the Brazilian Amazon (Source: Imazon/SAD).

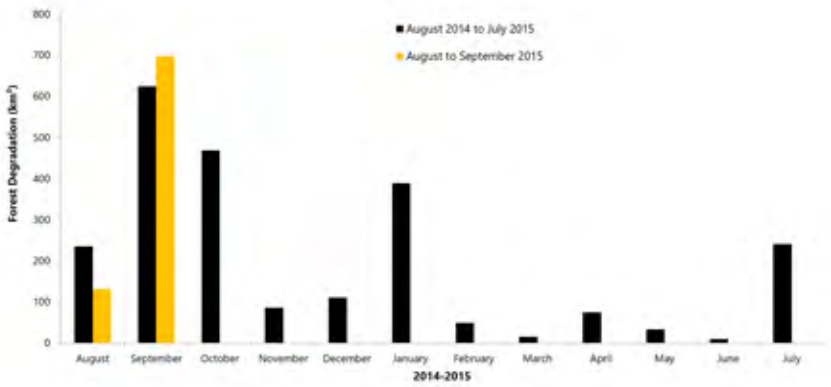

Table 2. Evolution of forest degradation Among the States of the Brazilian Amazon from August 2014to September 2014 and August 2015 to September 2015 (Source: Imazon/SAD).

State	August to September 2014	August to September 2015	Variation (%)
Mato Grosso	650	721	+11
Pará	48	79	+63
Rondônia	12	23	+93
Amazonas	1	-	-58
Roraima	-	4	-
Acre	-	-	-
Tocantins	-	-	-
Amapá	-	-	-
Total	**711**	**827**	**+16**

Geography of Deforestation

In September 2015, the majority (73%) of deforestation occurred in areas that were private or under various stages of possession. The remaining deforestation was recorded in Land Reform Settlements (14%), Conservation Units (10%) and Indigenous Lands (3%) (Table 3).

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

Category	September 2014	
	km²	%
Land Reform Settlement	32	14
Conservation Units	22	10
Indigenous Lands	6	3
Private, Possession & Untitled Public Lands	169	73
Total (km²)	**229**	**100**

Land Reform Settlements

SAD recorded 32 square kilometers of deforestation in Land Reform Settlements in September 2015 (Figure5). The Settlements most affected by deforestation were PA Santa Maria II (Machadinho D'Oeste; Rondônia), PDS Castanheira (Places; Pará) and PA Japuranoman (Nova Bandeirantes; Mato Grosso).

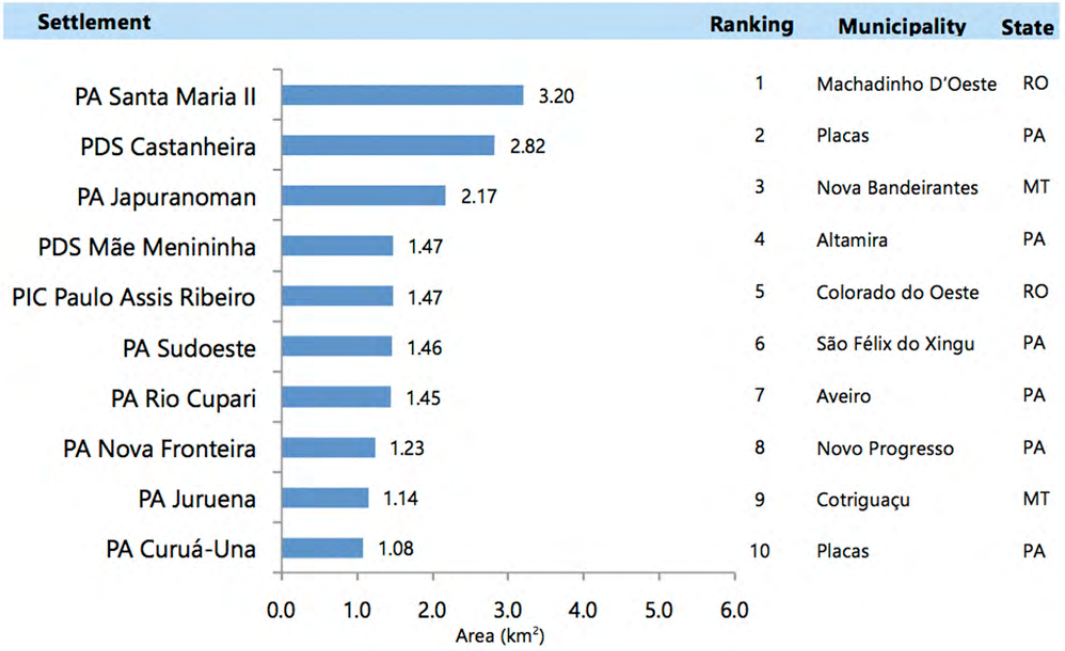

Figure 5. Most deforested Land Reform Settlements in the Brazilian Amazon in September 2015 (Source: Imazon/SAD).

Protected Areas

In the month of September 2015, SAD detected 22 square kilometers of deforestation in Conservation Units (Figure 6). In the case of Indigenous Lands, in September 2015 6 square kilometers of deforestation were detected (Figure 7).

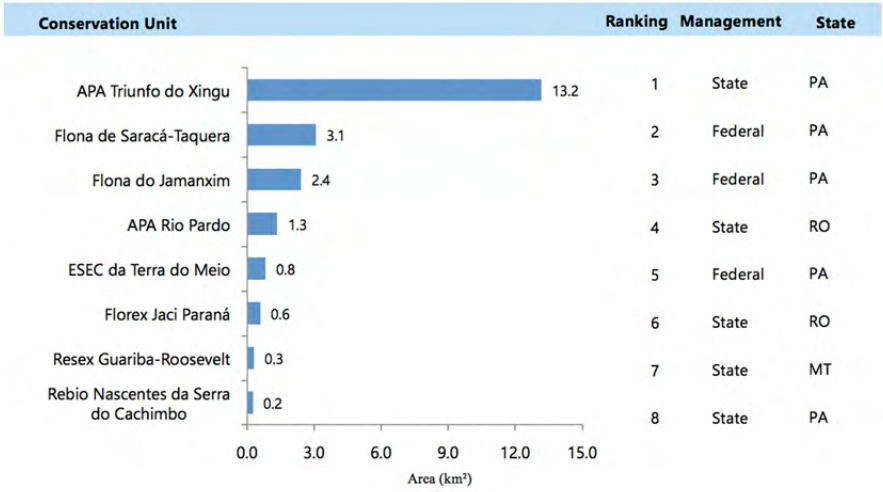

Figure 6. Most deforested Conservation Units in the Brazilian Amazon in September 2015
(Source: Imazon/SAD).

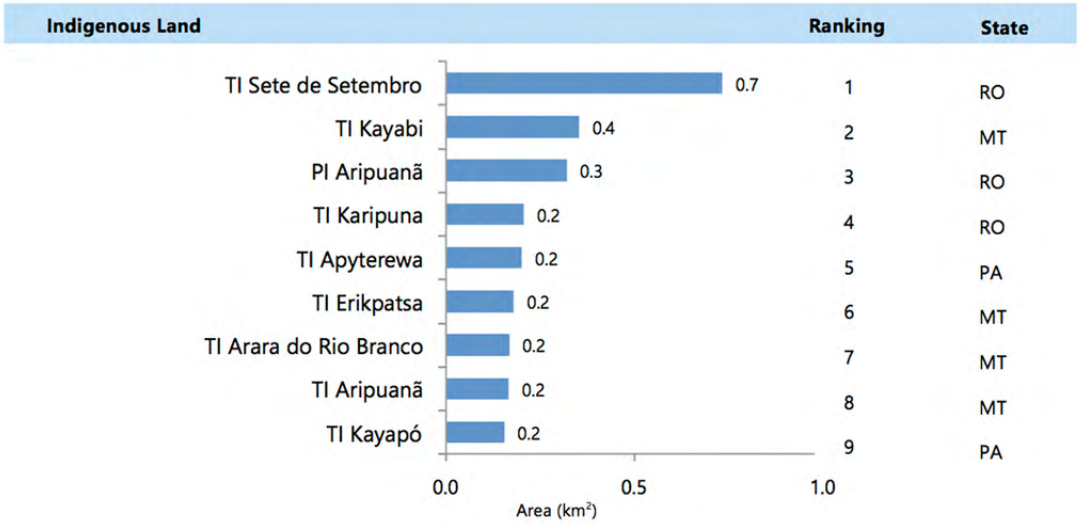

Figure 7. Most deforested Indigenous Lands in the Brazilian Amazon in September 2015
(Source: Imazon/SAD).

Critical Municipalities

In September 2015, the most deforested municipalities were: Nova Mamore (Rondônia) and Novo Progresso (Pará) (Figure 8 and 9).

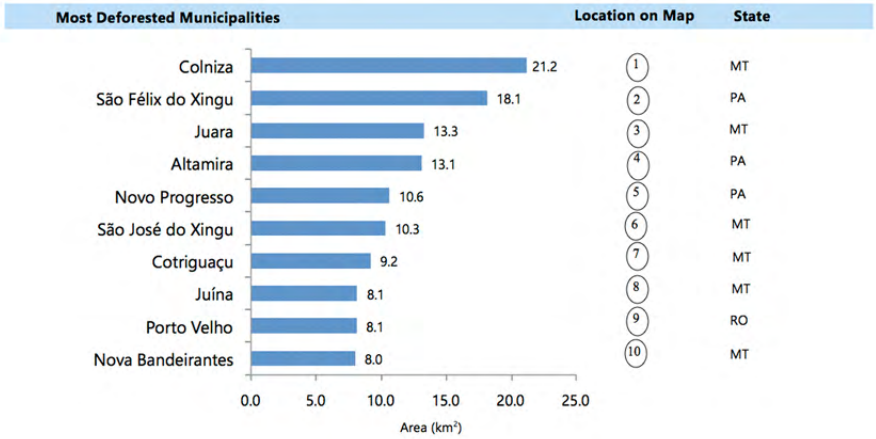

Figure 8. Most deforested Municipalities in the Brazilian Amazon in September 2015 (Source: Imazon /SAD).

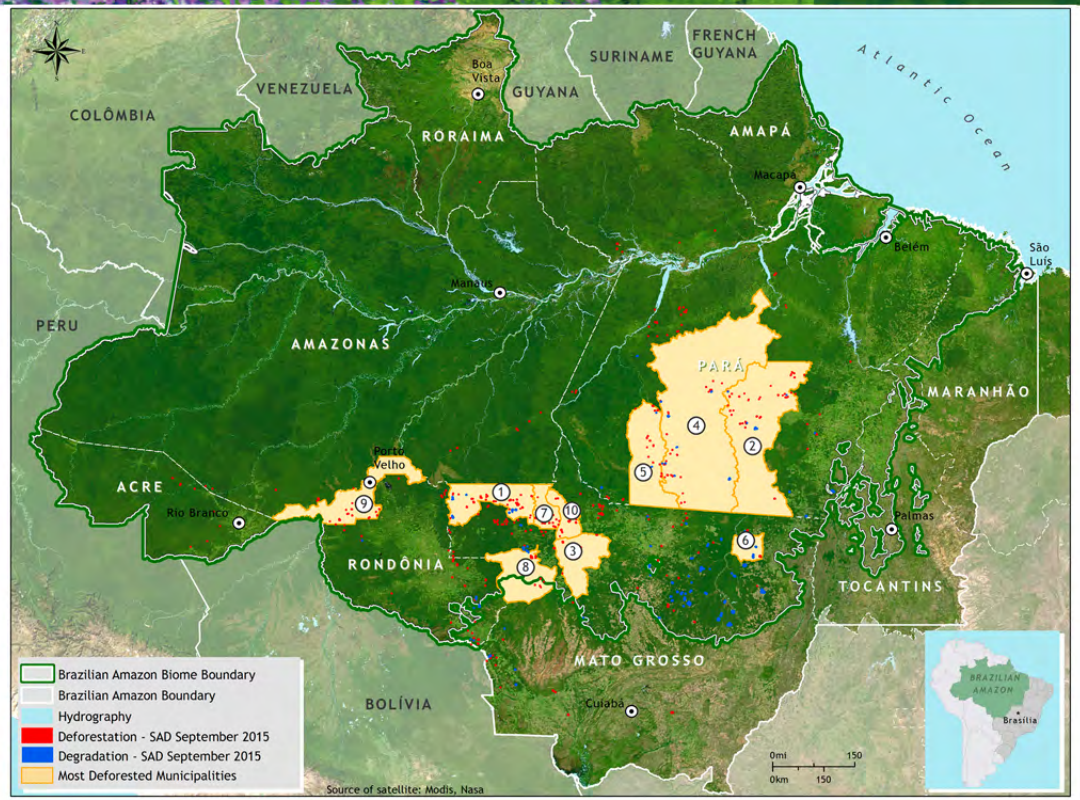

Figure 9. Municipalities com largest areas deforested in the Brazilian Amazon in September 2015 (Source: Imazon/SAD).

Cloud and Shadow Cover

In September 2015, with SAD it was possible to monitor 96% of the forest area in the Brazilian Amazon. The other 4% 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 (23%) and Pará (9%). Because of that, the data for deforestation and forest degradation in September 2015 may be underestimated (Figure 10).

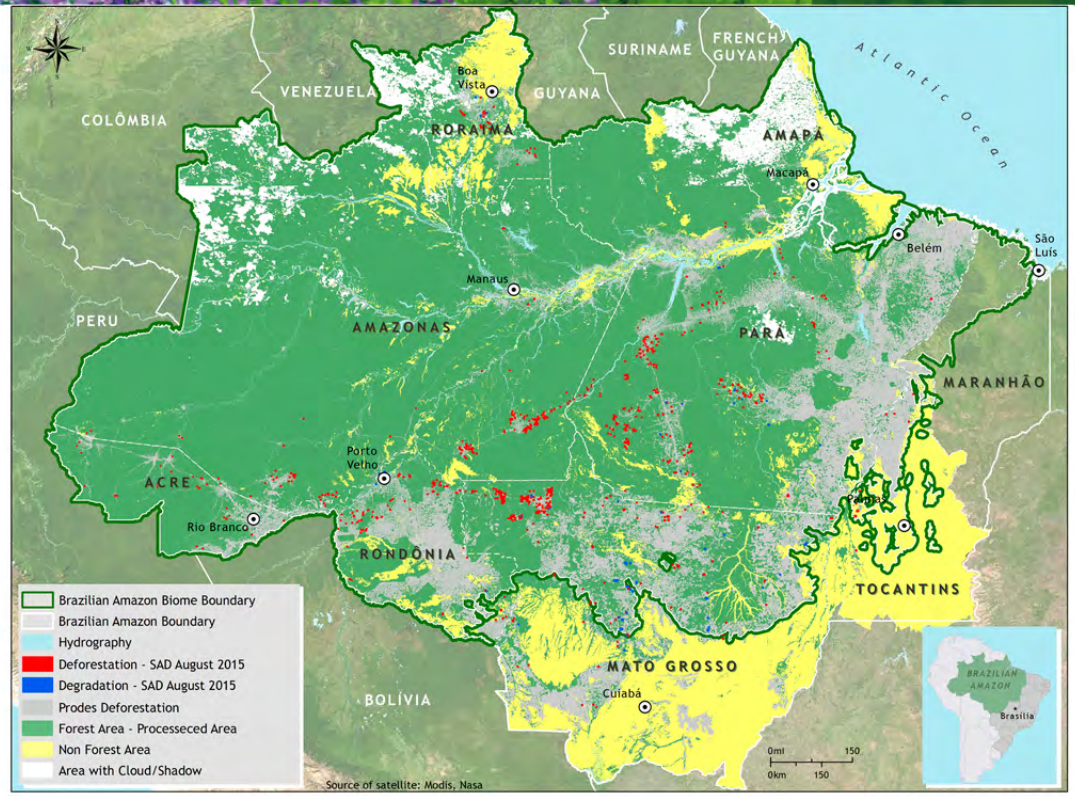

Figure 10. Area with cloud and shadow in September 2015 in the Brazilian Amazon

* The part of Maranhão that belongs to the Brazilian Amazon was not analyzed.

SAD-EE

Since August 2012 deforestation and forest degradation detection alerts have been performed using the Google Earth Engine (EE), 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 for generating deforestation and forest degradation alerts.

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:

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

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

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

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 (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 Brazilian Amazon since May 2008. In this bulletin, we present the monthly data generated by SAD from August 2014 to September 2015.

Imazon

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Data Source:

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

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http://earthengine.google.org/

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Federal Public Prosecution Service in Pará
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
Instituto Centro de Vida (ICV- Mato Grosso)

Apoio

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