Transparency in FOREST MANAGEMENT

STATE OF PARÁ – 2011 to 2012

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ABSTRACT

We evaluated the timber harvesting situation in the State of Pará from August 2011 and July 2012. To do this, we verified the regularity of information regarding management plans in the Autefs (Timber Harvesting Authorizations) as well as between the Autefs and the timber credits from authorized logging issued by Sema (Pará State Environmental Secretariat). The result of this analysis showed that the great majority (87%) das Autefs were regular, while only 13% presented inconsistencies (area authorized in already logged area and area authorized greater than the forest management area).

We also estimated the area logged in a legal manner (authorized) and illegal (not authorized) using NDFI images derived from Resourcesat satellite images. Of a total of 157,239 hectares of forests used for timber harvesting during the period (August 2011-July 2012), the great majority (78%) were not authorized by Sema, while 22% (34,902 hectares) were authorized.

Considering the forests affected by illegal timber harvesting, the majority (67%) were located in areas that were private, vacant federal lands or disputed; another 25% were in land reform settlements; and 8% in Protected Areas. In relation to the previous period (August 2010-July 2011), there was a significant increase of 151% (73,535 hectares) in the unauthorized timber harvesting.

Finally, we assess the quality of performance of forest management in Pará comparing two periods: i) August 2010 to July 2011; and ii) August 2011 to July 2012. We observed that good quality logging dropped from 5,966 hectares to 2,966 hectares (-50%) between the periods. Medium quality harvesting increased from 37,617 hectares to 48,832 hectares (30%) and while that of low quality rose from 17,217 hectares to 26,361 hectares (53%).

To make an overall assessment of the timber harvesting situation in Pará, we used information from the control systems at Sema - Simlam (Integrated System for Licensing and Environmental Monitoring) and Sisflora (System for Sale and Transportation of Forest Products) – which were overlapped with those generated by Simex (System for Monitoring Timber Harvesting), developed by Imazon (Box 1).

FOREST CONTROL SYSTEM

According to the Simlam system (Sema/PA), in 2011 153 Autefs were issued out of a total of 148 forest management plans, corresponding to an area of more than 120 thousand hectares of forest. This led to a credit of 3.5 million cubic meters of logwood and 1.6 million cubic meters of forest residues. In 2012, there were approximately 160 Autefs of a total of 160 forest management plans covering an area of approximately 122 thousand hectares of forest. That represented a volume of almost 3.2 million cubic meters of logwood and de slightly more than 822 thousand cubic meters of forest residues. Almost all of this timber (99.6%) came from native forest, and the remainder (0.4%), from planted forest.

In Sisflora, approximately 3.3 million cubic meters of logwood and 1.6 million cubic meters of forest residues were registered[1] in 2011. In 2012, around 2.4 million cubic meters of logwood and 296 thousand cubic meters of forest residues were authorized (Table 1).

[1] The timber credits are only issued by Sisflora after approval by Simlam and Ceprof. This explains the differences between the volumes with Simlam and Sisflora. Ceprof is an electronic registration system that contains information abort the owner, company, property, licensed activity and those who have technical and legal responsibility.

Table 1. Volumes of timber authorized by Simlam and by Sisflora for 2011 and 2012.

Year	Autef (Qt)	PMF (Qt)	Authorized area (ha)	Volume Simlam (m^3)		Volume Sisflora (m^3)		Difference in volume between Simlam and Sisflora (m^3)	
				Log	Residue	Log	Residue	Log	Residue
2011	153	148	120,017	3,526,542	1,621,686	3,295,150	1,566,071	-231,392	-55,616
2012	160	160	122,518	3,189,050	822,252	2,411,429	296,198	-777,621	-526,054

GEOGRAPHY OF TIMBER HARVESTING IN PARÁ

We mapped unauthorized logging (illegal and predatory) and authorized logging (forest management) in the State of Pará using the method described in Box 1.

The total area of timber harvesting detected was 157,239 hectares of forests, of which 122,337 (78%) were not authorized and 34,902 hectares (22%) were authorized for forest management. In comparison with logged areas detected in the previous period, we verified a significant increase of 151% in unauthorized logging and of only 8% from authorized logging (Figures 1 and 2).

The largest occurrence of unauthorized logged areas was in southwestern Pará (32% - Uruará and Trairão). The remainder occurred in the southeast (19% - Paragominas and Ulianópolis), Marajó (17% - Portel and Bagre), northeast (16%- Tailândia and Mojú) and Lower Amazon (16% - Prainha and Santarém) (Figure 1).

Figure 1.

Authorized harvesting (authorized management) and non-authorized harvesting (predatory) in the State of Pará from August/2011 to July/2012.

(Source: Imazon/Simex).

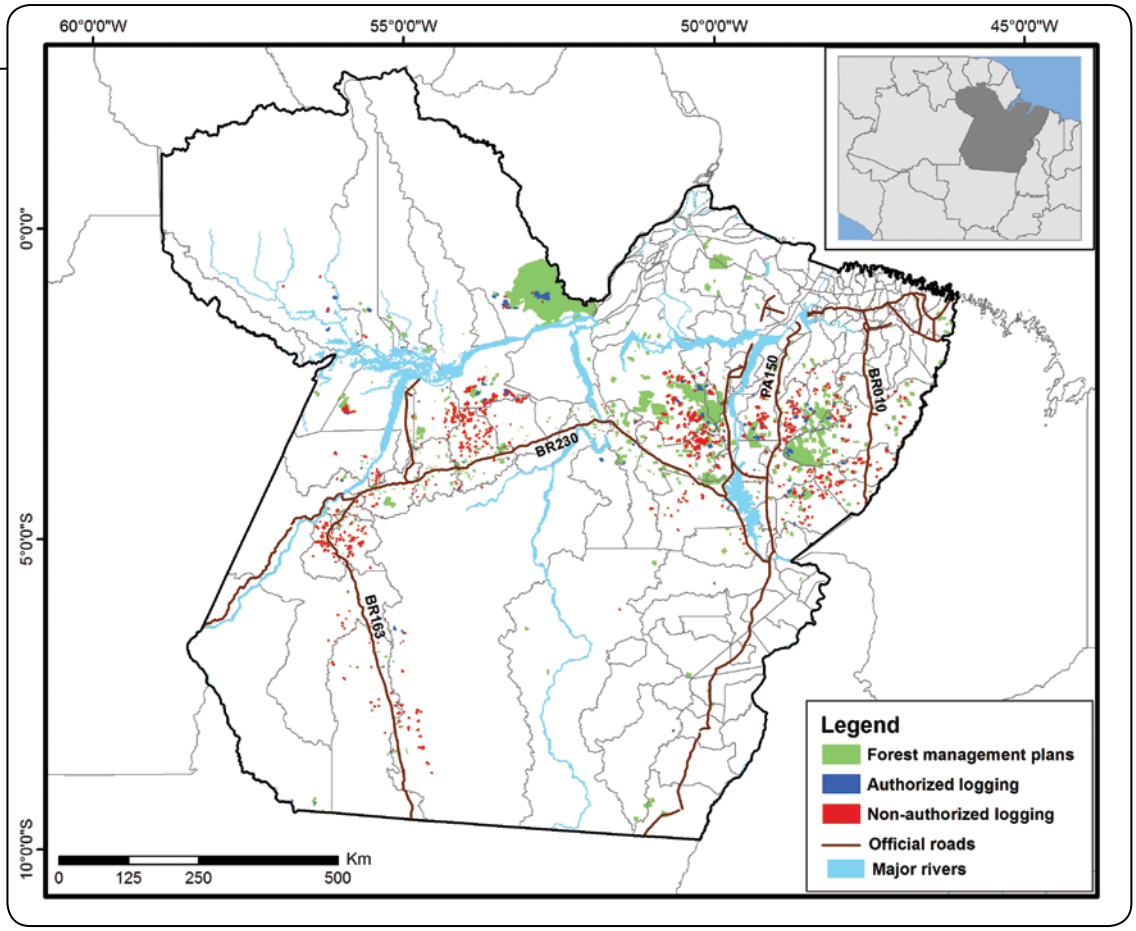
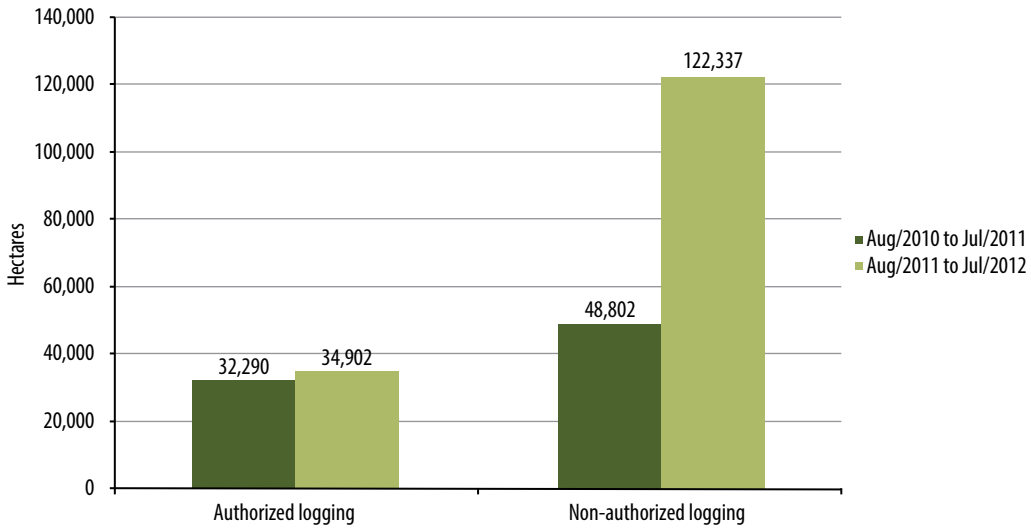


Figure 2.

Comparison of areas logged with and without authorization in the State of Pará from August/2010 to July 2011 and August/2011 to July/2012.

(Source: Imazon/Simex).



CRITICAL MUNICIPALITIES

Of the 122,337 hectares of forests logged without authorization in Pará from August 2011 to July 2012, the majority (72%) occurred in 10 municipalities (Figures 3 and 4). The five municipalities with the largest areas of timber harvesting illegal were Portel (banks of the Amazon River), Pacajá (BR-230), Prainha (banks of the Amazon River), Uruará (BR-230) and Trairão (BR-163). The remaining 34,902 hectares (28%) were distributed in a more scattered manner among another 33 municipalities.

Figure 3.

The ten municipalities with the largest areas logged without authorization in the State of Pará from August/2011 to July/2012.

(Source: Imazon/Simex).

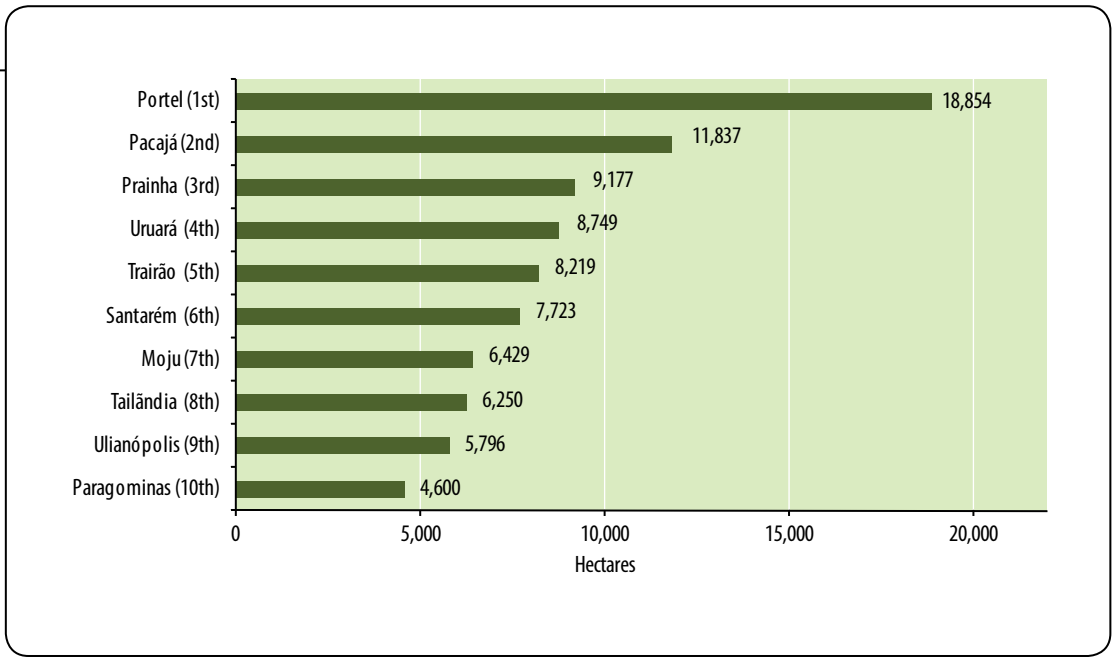
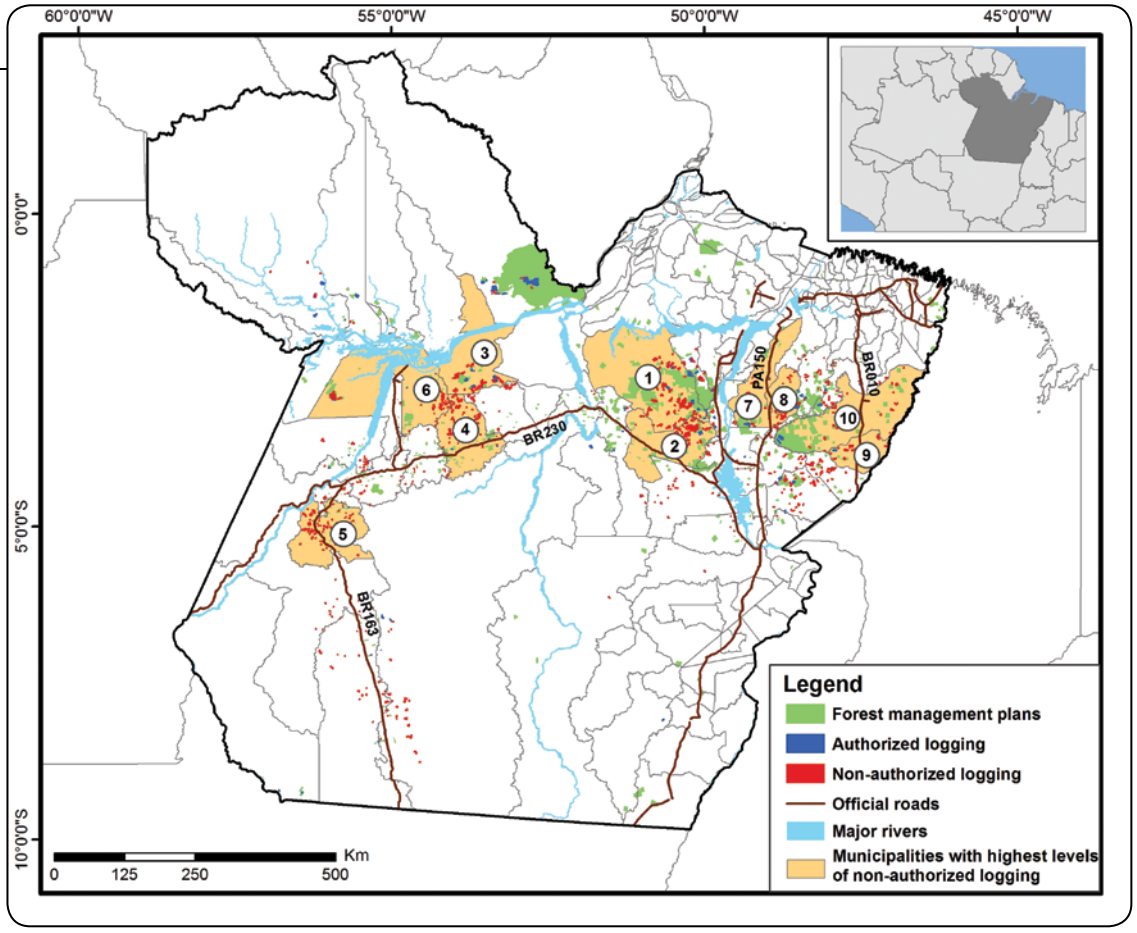


Figure 4.

Location of the ten municipalities with the largest areas logged without authorization in the State of Pará from August/2011 to July/2012.

(Source: Imazon/Simex).

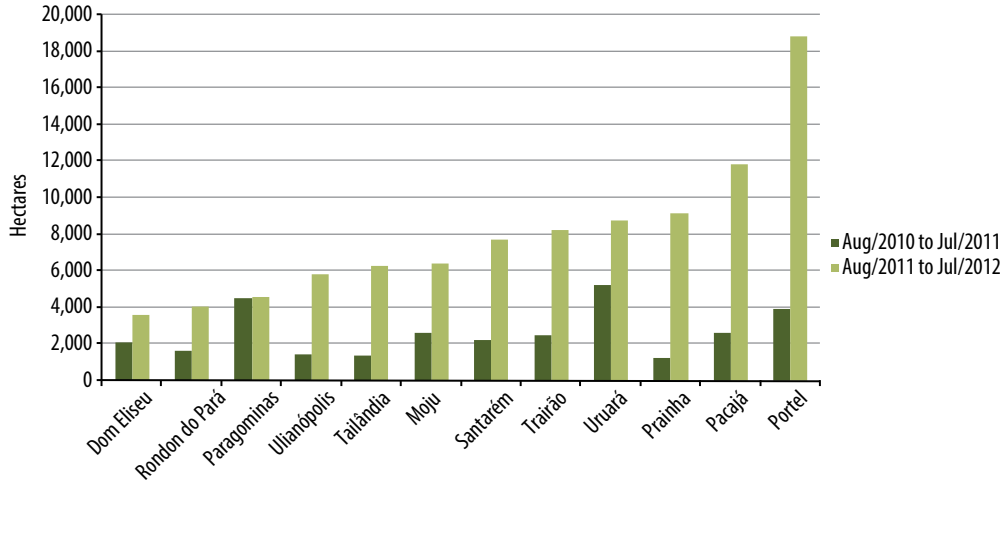


In comparison with the previous period (August 2010 to July 2011), we verified an increase in illegal harvesting in all of the 10 municipalities singled out, most significantly in the municipalities of Prainha (648%), Portel (384%), Pacajá (347%), Tailândia (350%), Ulianópolis (298%), Santarém (246%) and Trairão (231%) (Figure 5)..

Figure 5.

Comparison of municipalities with the largest areas logged without authorization in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012.

(Source: Imazon/Simex).



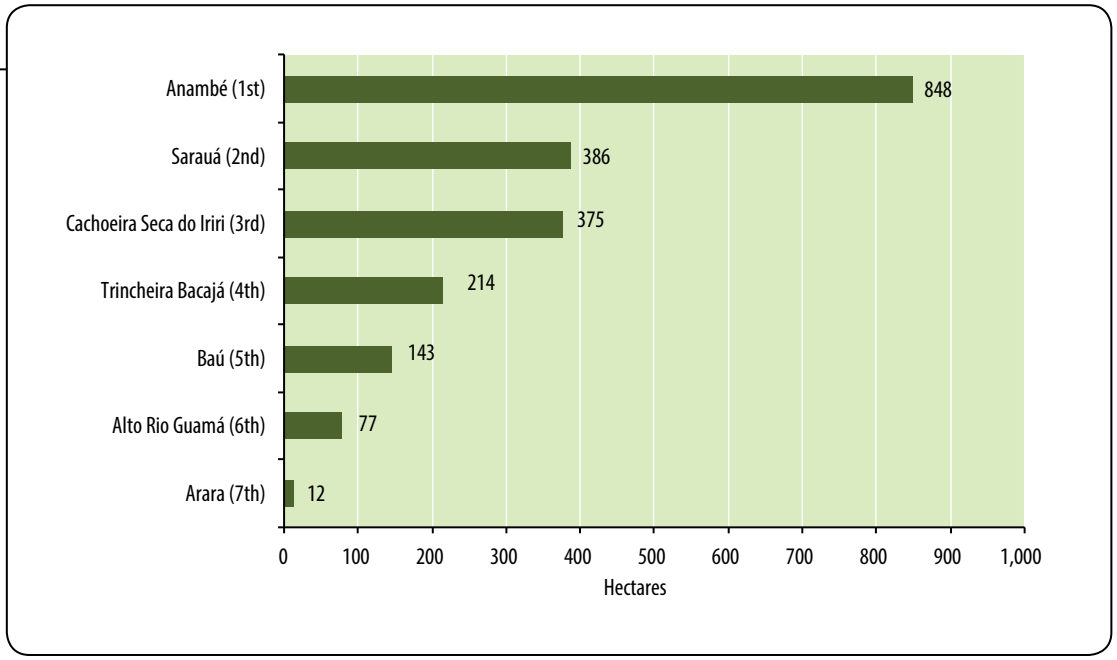
PROTECTED AREAS

We detected a total of 2,055 hectares of illegal timber harvesting in seven Indigenous Lands (TIs) in Pará from August 2011 and July 2012. The TI Anambé, situated in the municipality of Moju, concentrated 41% of that total. The remainder was detected in the TIs of Sarauá (19%), Cachoeira Seca do Iriri (18%), Trincheira Bacajá (10%), Baú (7%), Alto Rio Guamá (4%) and Arara (1%) (Figure 6).

Figure 6.

Indigenous Lands with the largest areas logged without authorization in the State of Pará from August/2011 to July/2012.

(Source: Imazon/Simex).

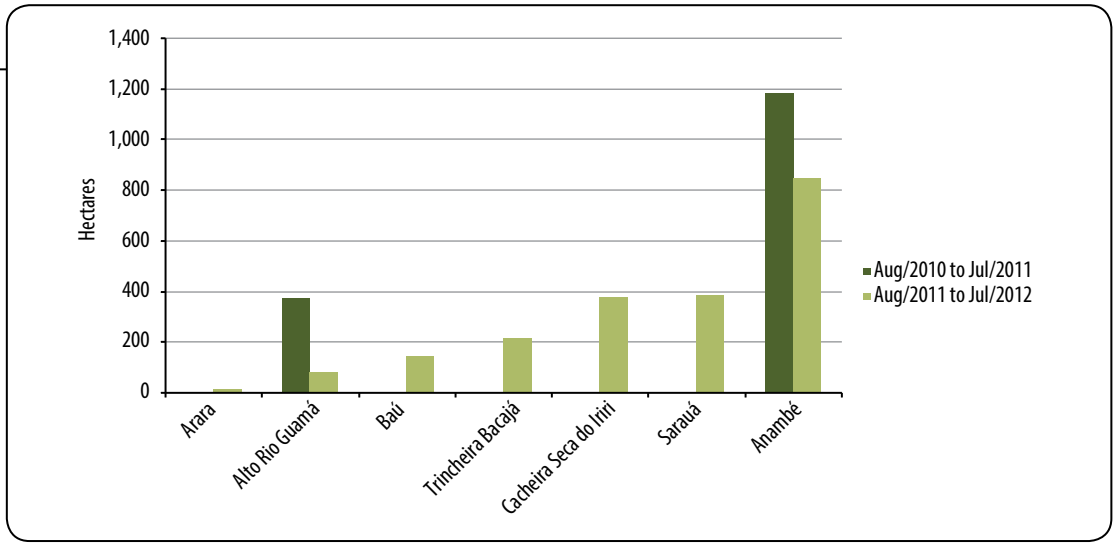


Illegal timber harvesting in Pará TIs for the period analyzed increased when compared with the previous period. The TIs of Sarauá, Cachoeira Seca do Iriri and Trincheira Bacajá showed significant increases of illegal harvesting. The TIs of Sarauá and Cachoeira Seca do Iriri went from no occurrence of logging in the previous period to respectively 386 hectares and 375 hectares in the more recent period, while the Alto Rio Guamá TI showed a reduction of 79% for the more recent period (Figure 7).

Figure 7.

Comparison of the Indigenous Lands with the largest areas logged without authorization in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012 .

(Source: Imazon/Simex).

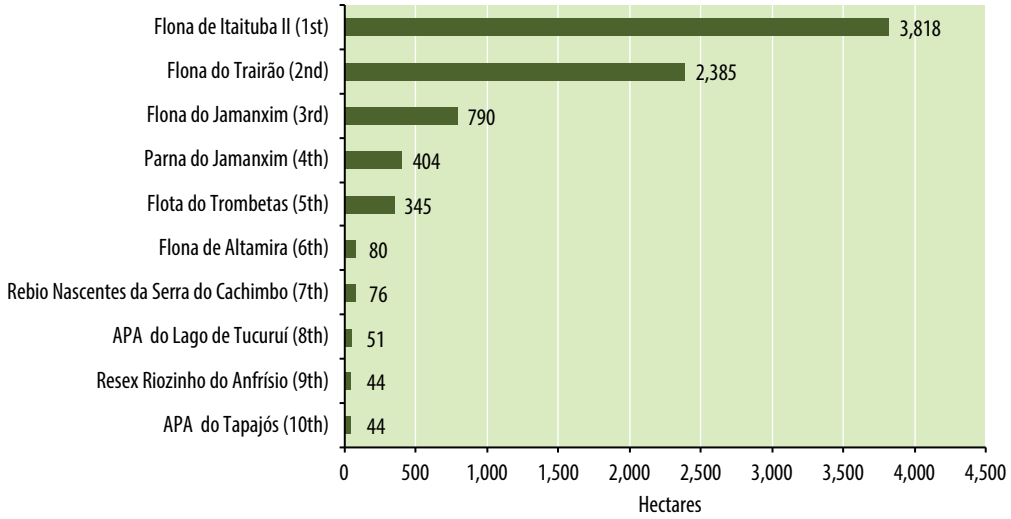


In the Conservation Units (UCs) of Pará we detected a total of 8,037 hectares of forests logged illegally for timber extraction from August 2011 to July 2012. Those most logged were the National Forest (Flona) of Itaituba II (48% of the total detected), Flona Trairão (30%) and Flona Jamanxim (10%) (Figure 8).

Figure 8.

The ten Conservation Units with the largest areas logged without authorization in the State of Pará from August/2011 and July/2012.

(Source: Imazon/Simex).

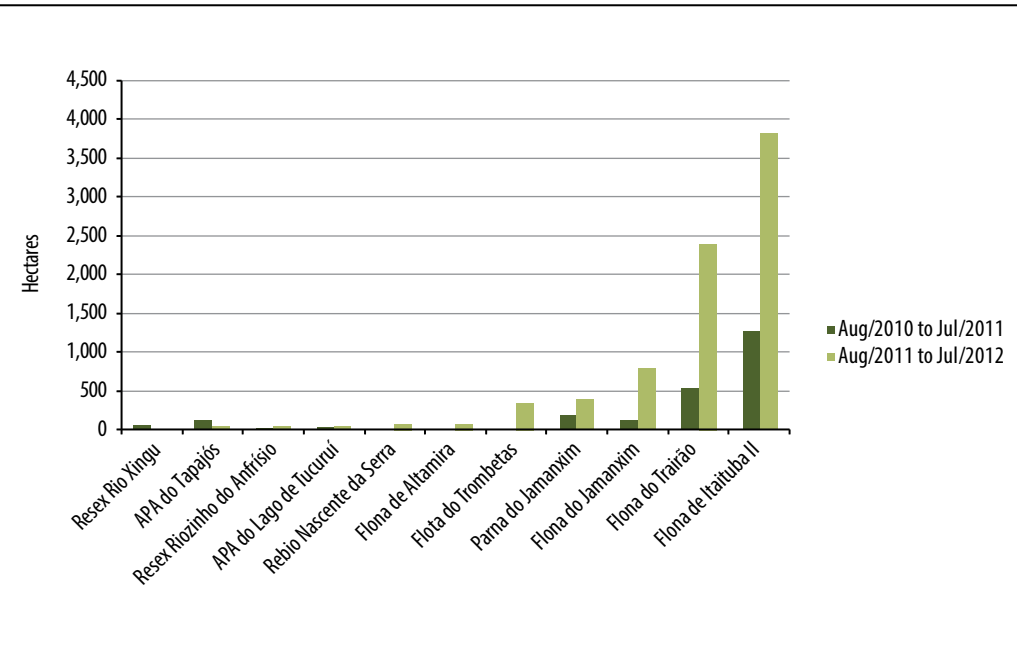


When we compared with the previous period (August 2010 to July 2011), illegal timber harvesting from August 2011 to July 2012 increased significantly in the Flonas of Jamanxin (507%), Trairão (340%) and Itaituba II (200%). In contrast, we observed reductions in that logging in the APA of Tapajós (-65%) (Figure 9).

Figure 9.

Comparison of the Conservation Units with the largest areas logged without authorization in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012.

(Source: Imazon/Simex).



SETTLEMENTS

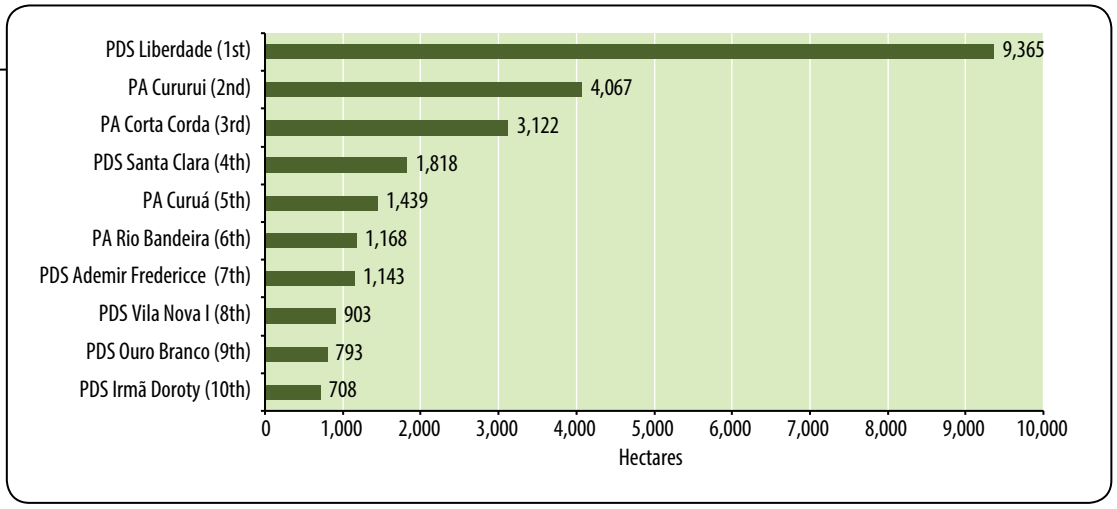
In the land reform settlements found in Pará, illegal timber harvesting affected a total of 30,825 hectares of forests from August 2011 to July 2012. Sustainable Development Project (PDS) of Liberdade (30%) and Settlement Projects (PA) of Cururui (13%) and Corta Corda (10%) were the ones most heavily harvested (Figure 10).

Among the settlements identified as having illegal logging, the following appear on the list of the federal government's[2] Green Settlements program: PDS Cupari, PDS Água Azul, PA Especial Quilombola Erepecuru and PA Especial Quilombola Área Trombetas.

Figure 10.

The ten land reform settlements with the largest areas logged without authorization in the State of Pará from August/2011 and July/2012.

(Source: Imazon/Simex).

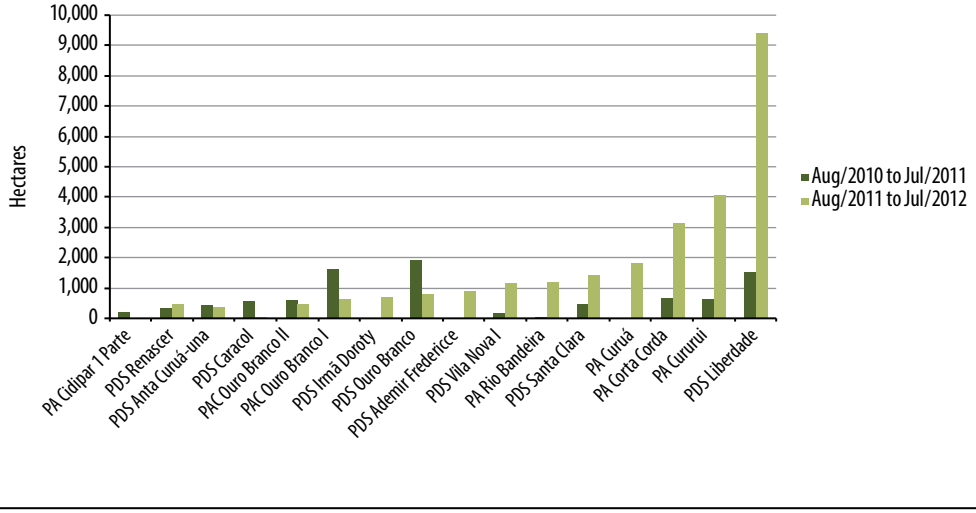


We observed significant increases of illegal logging in the majority of settlements for the two periods analyzed. The most critical increases were observed in PA Rio Bandeira (10.037%), PDS Ademir Fredericce (627%), PA Cururui (587%) and PDS Liberdade (517%) (Figure 11).

Figure 11.

Comparison of land reform settlements with the largest areas logged without authorization in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012.

(Source: Imazon/Simex).



[2] Administrative Ruling nº. 716, of November 27 2012.

LEGAL REGULARITY FOR AUTHORIZED AREAS

We evaluated the consistency of information contained in the Simlam Autefs and their respective timber credits granted by Sisflora in 2012 in order to verify the regularity of forest management areas authorized by Sema/PA.

In 2012, 160 Autefs were approved out of a total of 160 forest management plans covering 122,518 hectares. Of that total, we analyzed only the authorizations for timber harvesting in areas of native forest, which totaled 156 Autefs corresponding to 121,863 hectares. We observed that the great majority (87%) of Autefs were consistent, while 13% revealed inconsistencies[3], among which we emphasize (Figures 12 and 13):

i. *Area authorized greater than forest management area.* Area authorized for management greater than total area of forest management. We observed 13 cases, which totaled 2,164 hectares of area authorized;
ii. *Net area authorized Permanent Preservation Area.* The area referring to permanent preservation was not discounted from the net area within the area for forest management. 5 cases were observed totaling 1,672 hectares of area authorized;
iii. *Area authorized in degraded or deforested area.* Authorization for forest management in an area totally or partly degraded or without forest cover. We observed 4 cases, for a total of 3,054 hectares of area authorized.

Figure 12.

Assessment of consistency of information (number of cases) in Autefs and Autefs with timber credits for 2012 in the forest control systems at Sema/PA.

(Source: Imazon/Simex).

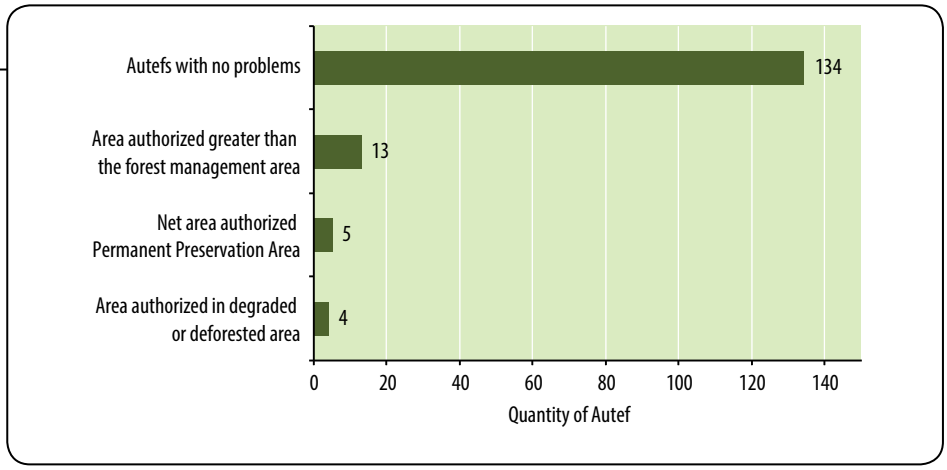
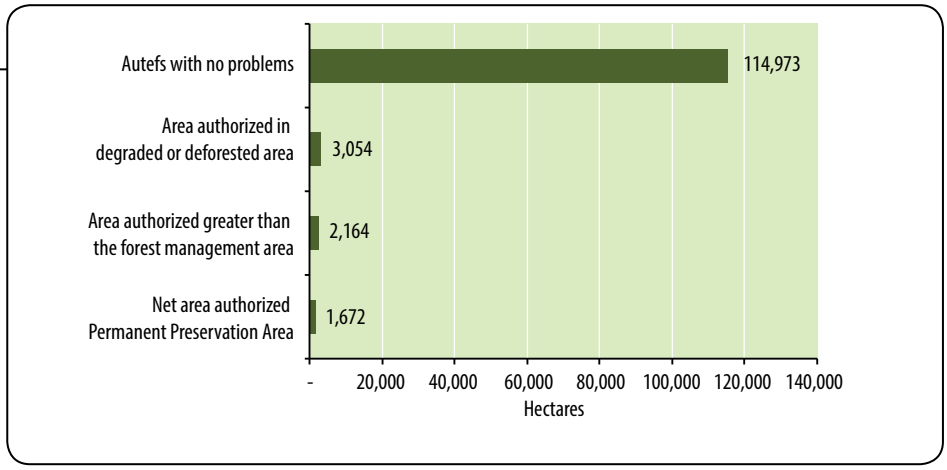


Figure 13.

Assessment of consistency of information (in hectares) in Autefs and Autefs with timber credits for 2012 in the forest control systems at Sema/PA.

(Source: Imazon/Simex).



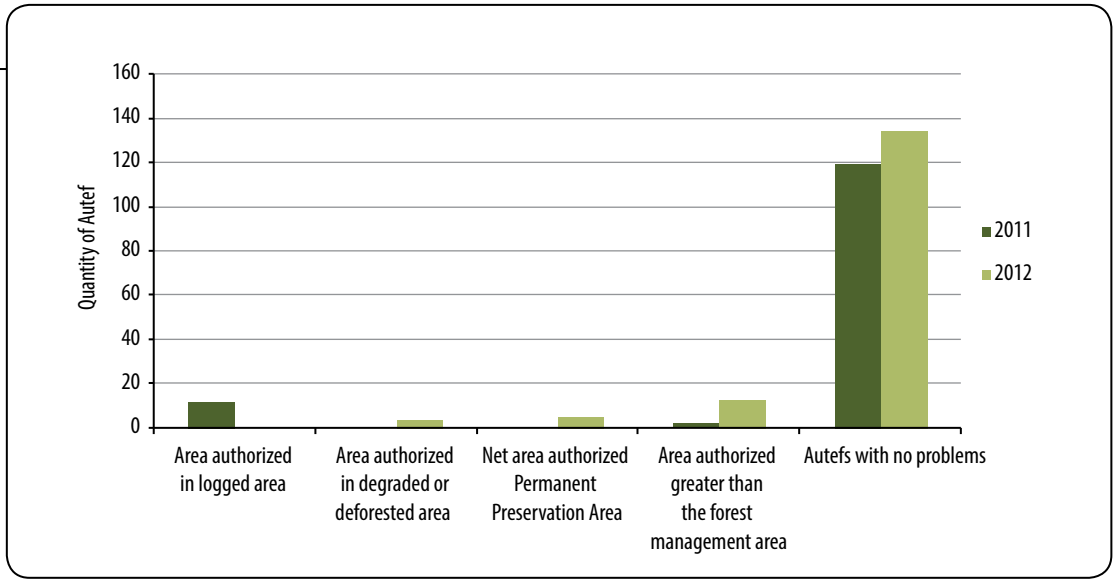
[3] According to a Sema/PA, those inconsistencies are due to errors or problems in filling out the Autef.

Comparing the number of inconsistent Autefs between 2011 and 2012, we observed significant increases for the majority of cases: area authorized greater than the forest management area from 2 to 13 cases; area authorized in degraded or deforested area from no occurrence to 4 cases; and net area authorized in APP from no occurrence to 5 cases. The exception was management authorized in logged area, which showed a considerable reduction from 12 cases to no occurrence (Figure 14).

Figure 14.

Comparison of the number of cases of inconsistency with Autefs and timber credits in 2011 and 2012 in the forest control systems at Sema/PA .

(Source: Imazon/Simex).



We also compared satellite images of the Autef areas active in 2012 with their respective authorizations considering a total of 273 Autefs[4]. Of the total of images, 44% (120 Autef in 78,197 hectares) could not be analyzed because they presented cloud cover; 53% (144 Autef in 117,217 hectares) did not present any inconsistency in the comparison; and 3% (9 Autef in 5,579 hectares) revealed inconsistencies[5] (Figure 15 and 16), such as::

i. *Area with no signs of logging activity*. Logging scars were not identified in the images for the period in which the Autef was valid. However, sale of timber related to that authorization was identified. We identified 6 Autef with this problem, totaling an area of 1,021 hectares.

ii. *Forest management executed before authorization*. In three Autefs harvesting was carried out before authorization had been issued. Those Autef totaled 4,558 hectares of area authorized.

[4] Autefs from previous years still active in 2012.
[5] The Sema/PA is evaluating those cases.

Figure 15.

Forest management situation (number of cases) in the State of Pará from August/2011 to July/2012, obtained by integrating information from the Sema/PA control systems with satellite images .

(Source: Imazon/Simex).

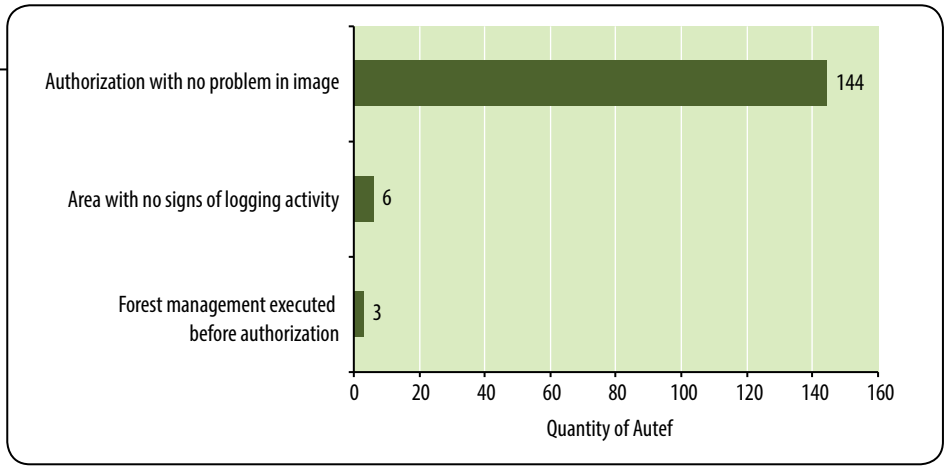
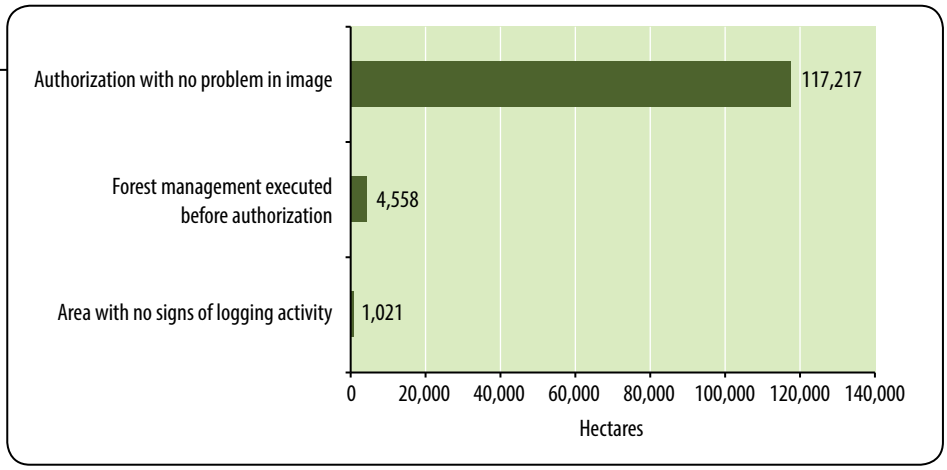


Figure 16.

Forest management situation (in hectares) in the State of Pará from August/2011 and July/2012, obtained by integrating information from the Sema/PA control systems with satellite images.

(Source: Imazon/Simex).

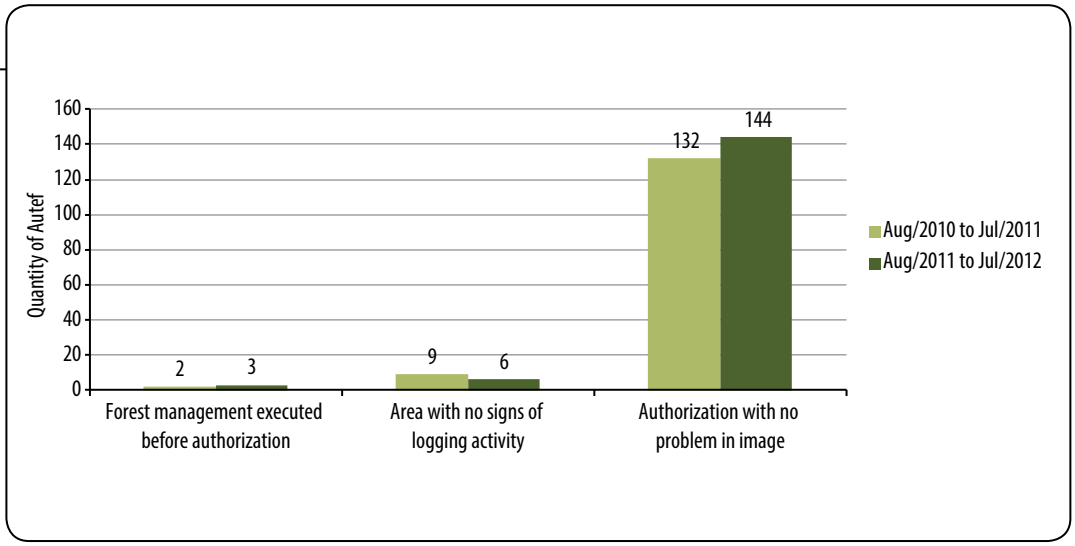


In comparing the forest management situation analyzed in the previous period with the current one we observed an increase in regular Autefs. We also observed a positive drop in the Autefs with no signs of logging (Figure 17).

Figure 17.

Comparison of the forest management situation in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012, obtained by integrating information from the Sema/PA control systems with satellite images.

(Source: Imazon/Simex).



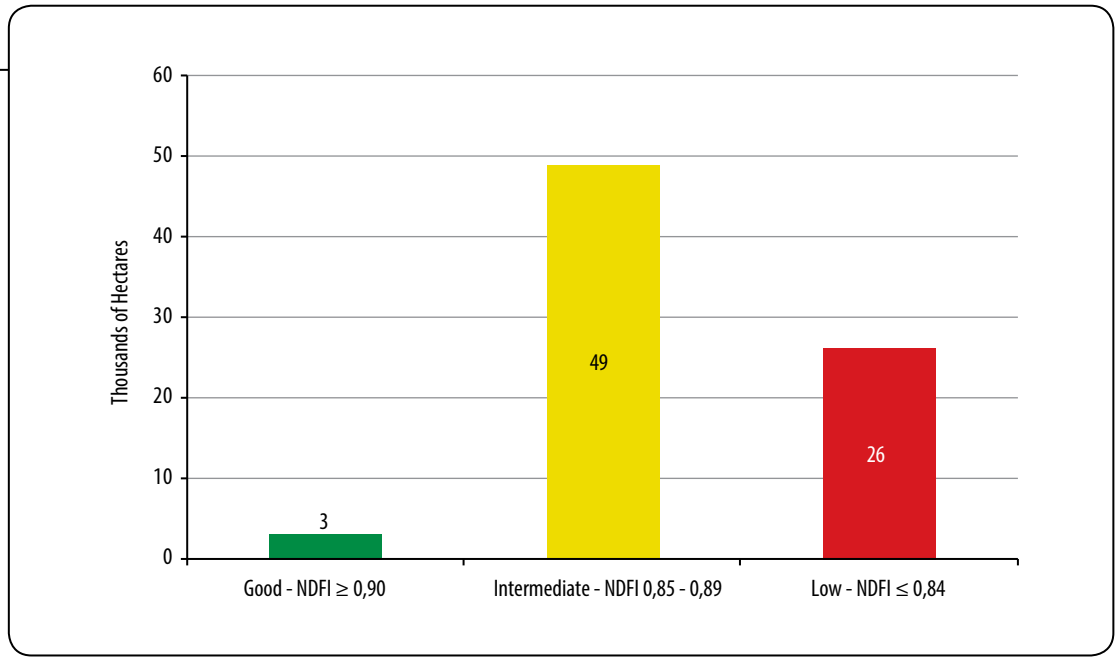
QUALITY OF TIMBER HARVESTING

We evaluated the quality of timber harvesting in the NDFI images (See method in Box 1), for which we determined thresholds[6], so that: NDFI ≤ 0.84 represents low quality logging (predatory logging); NDFI = 0.85-0.89, intermediate logging quality (there was an attempt to adopt management, but the configuration of roads, log decks and clearings reveals serious problems with execution); and NDFI ≥ 0.90, good quality logging, meaning that the configuration of roads, decks and clearings shows signs of managed logging.

Of the 160 operational management plans, we selected 78 (78,159 hectares) in whose images from 2012 it was possible to visualize scars from logging and assess their quality. Of the logging detected in those images, only 4% (2,966 hectares) presented good quality, 63% (48,832 hectares) presented intermediate quality and another 33% (26,361 hectares) were classified as low quality (predatory logging) (Figure 18).

Figure 18.
Quality of logging (in hectares) in 78 forest management plans in the State of Pará from August/2011 to July/2012.

(Source: Imazon/Simex).



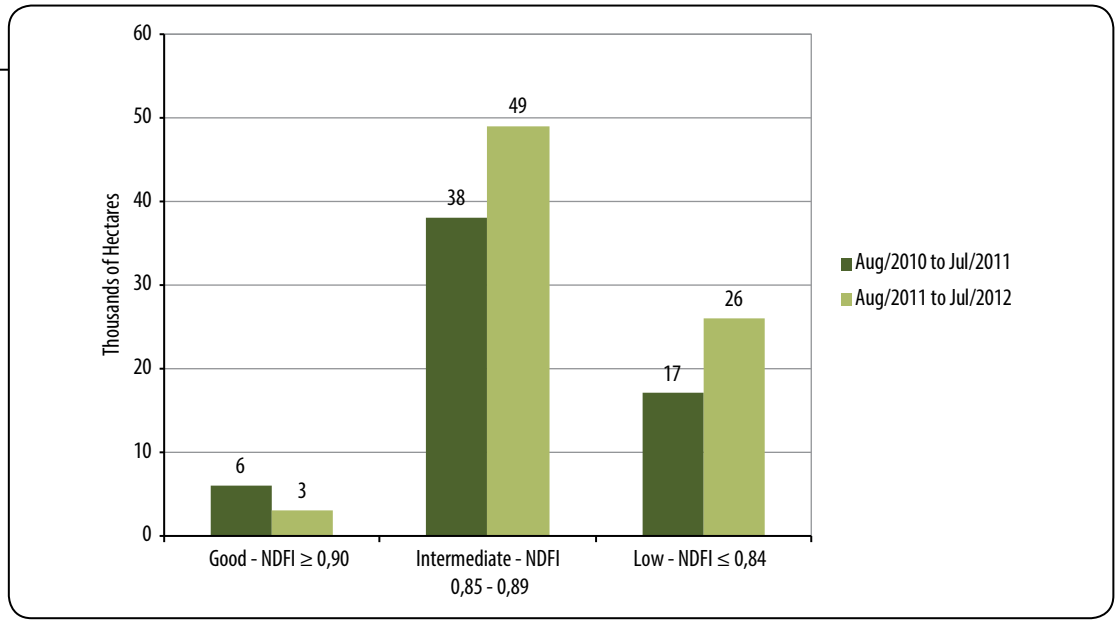
[6] Monteiro, A.; Brandão Jr., A; Souza Jr., C; Ribeiro, J.; Balieiro, C.; Veríssimo, A. Identificação de áreas para a produção florestal sustentável no noroeste de Mato Grosso. 2008. Imazon: Belém. ISBN: 978-85-86212-24-6. 68p.

In comparison to the previous period, the good quality class showed a reduction (-3,000 hectares). On the other hand, we observed increases in the intermediate (11,215 hectares) and low classes (9,144 hectares) (Figure 19).

Figure 19.

Comparison of logging quality (in hectares), in a forest management area in the State of Pará from August/2010 to July/2011 and August/2011 to July/2012.

(Source: Imazon/Simex).



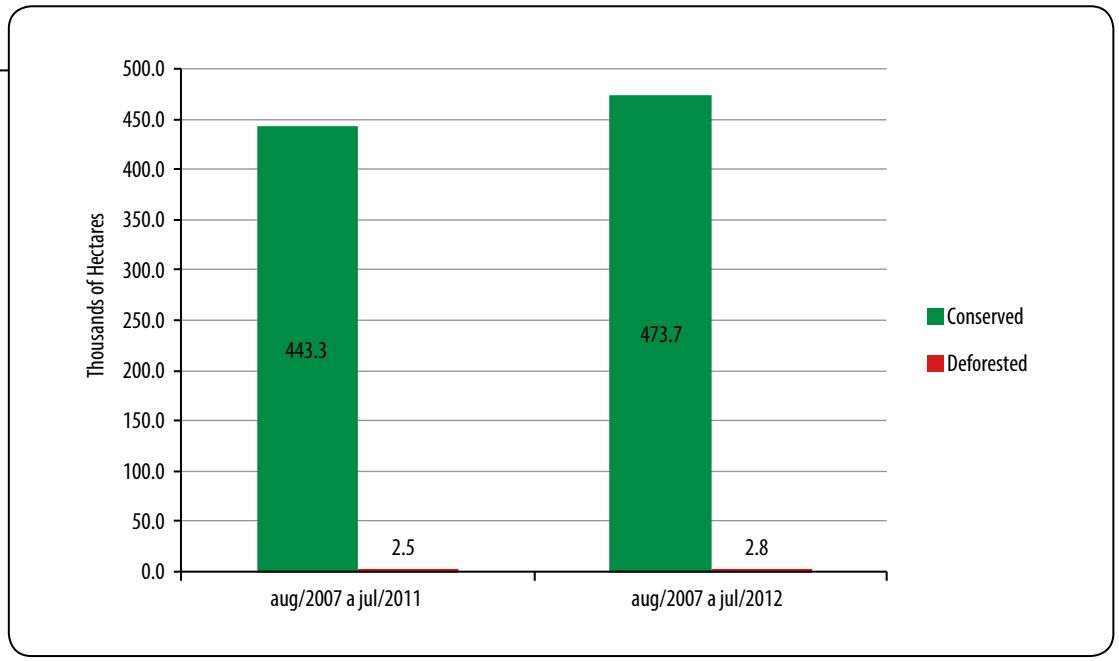
MAINTENANCE OF FOREST MANAGEMENT AREAS

We analyzed the 2012 satellite images to see if the areas with forest management plans operational from 2007 to 2012 are being maintained for the next cutting cycle. Of 715 timber harvesting authorizations evaluated in that period (476,454 hectares), almost all (99% or 473,662 hectares) continue being conserved, and only 1% (2,792 hectares) was deforested (Figure 20). In relation to the previous period, we observed a 300 hectares increase in deforestation in the forest management areas.

Figure 20.

Comparison of the conservation situation in forest management areas from August/2007 to July/2011 and August/2007 to July/2012 evaluated in the images from 2012.

(Source: Imazon/Simex).



BOX 1.
SYSTEM FOR MONITORING TIMBER HARVESTING - SIMEX

Simex was developed by Imazon to monitor forest management and unauthorized logging. The system uses Landsat 5 images and Resourcesat (with 30 and 23.5 meters of spatial resolution respectively) to detect selective timber harvesting, although it can be applied to other optic sensors (SPOT, ASTER and ALOS-VNIR).

The images are processed to generate a spectral mixture model (abundance of vegetation, soils and NPV (Non-Photosynthetic Vegetation) and to later calculate the NDFI (Normalized Fraction Difference Index), defined by:

$$NDFI = \frac{(VEGnorm-(NPV+Soils)}{(VEGnorm-(NPV+Soils)}$$

Where VEGnorm is the vegetation component normalized for shadow, determined by:

$$VEGnorm = VEG / (1-Shadow)$$

Information extracted from the satellite images is crossed with information from Simlam and Sisflora to evaluate the situation of the licensed management plans. First, documentation available in the control systems is analyzed in order to identify possible inconsistencies. Next, the forest management plans are evaluated by overlapping their boundaries with the satellite images. Later on, that information is associated with information from the forest control systems. In order to map authorized (legal) and not authorized (illegal and predatory) timber harvesting, we overlapped the boundaries of the forest management plans with the NDFI images. Simex makes it possible to evaluate the occurrence of: i) area authorized in a deforested area; ii) area authorized in an area already logged; iii) area authorized greater than management area; iv) credit commercialized greater than authorized; v) area without signs of harvesting; vi) area logged above the authorized limit; vii) area deforested before authorization; viii) management performed before authorization; and ix) plan overlapping a Protected Area. Simex makes it possible to identify indications of irregularity in licensing and execution of the forest management, in other words, the consistency of licensing and the degree of adoption of forest management. For example, plans with few inconsistencies and errors in licensing, but with evidence of low implementation of management practices, need to be verified in the field in order to identify problems with execution.

Team Responsible:
General Coordination: André Monteiro, Dalton Cardoso, Denis Conrado, Adalberto Veríssimo e Carlos Souza Jr.

Data Sources:
Statistics for timber harvesting are generated based on data from Imazon
Data from Sema/PA (Simlam and Sisflora)
http://monitoramento.sema.mt.gov.br/simlam/
http://monitoramento.sema.mt.gov.br/sisflora/

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Federal Public Prosecution Service in Pará (MPF)
State Public Prosecution Service in Pará (MPE)