Monitoring deforestation in Protected Areas in Pará

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Pará has 55% of its territory designated as Protected Areas (Indigenous Lands and Conservation Units). Those areas are, in part, exposed to the threats of deforestation and logging since their protection is incipient and enforcement of the environmental crimes law is low. That occurs because of the delay in detecting deforestation and the lack of material evidence to characterize that type of environmental crime. In this *The State of the Amazon*, we present the results of the partnership between Imazon and the Federal Public Prosecution Service (*Ministério Público Federal* - MPF) in Pará to speed up actions for combating illegal deforestation in the Protected Areas for the period of August 2007 to December 2008. We used the Deforestation Alert System (*Sistema de Alerta de Deforestation* - SAD) developed by Imazon for almost real time detection of illegal deforestation in Protected Areas. The Public Prosecution Service, for its part, uses that information to require environmental agencies to verify deforestation in the field and follow up the process of determining liability for environmental crimes in those areas.

Protected Areas in Pará

Creation of Protected Areas in the Amazon region, besides being one of the mechanisms for preservation and conservation of natural resources, is also considered a strategy for territorial organization. In December 2008, Protected Areas in Pará totaled 55% (684 thousand square kilometers) of its territory (Figure 3). Of those, 284 thousand square kilometers (41%) were Indigenous Lands, 195 thousand square kilometers (29%) were federal Conservation Units and 205 thousand square kilometers (30%) were state Conservation Units. Around one third of the total protected area was established in 2006, notably some 150 thousand square kilometers created by the Pará Government with technical support from Imazon.

Despite the efforts for creating Protected Areas in the State, many of those units have not yet been implanted. For example, of 20 Conservation Units analyzed by Conservation International in 2007 in Pará[1], the majority (60%) did not have a management plan[2] prepared and approved by the management agency. Additionally, effectiveness in applying the environmental crimes law that punishes cases of illegal deforestation in Protected Areas[3] is low. That is due both to delay in detecting illegal deforestation and to the lack of material evidence for characterizing that type of environmental crime and to the difficulty in locating the violators. Therefore, reducing deforestation in the Protected Areas and increasing the chance for effective punishment of environmental crimes in those areas depend on strategic and agile action in monitoring, enforcement, control and assigning liability.

Monthly Deforestation Monitoring

The monthly deforestation monitoring in the Protected Areas[4] was performed using SAD, a system that employs images from the Modis sensor (*Moderate Resolution Imaging Spectroradiometer*) with a capacity for automatically detecting increments in deforestation greater than 6.25 hectares every month. After detection, the areas (polygons) of deforestation are sent to ImazonGeo (http://www.imazongeo.org.br) – the geographic database for the Amazon directed towards the internet – where data are organized into interactive maps, graphs and reports. In ImazonGeo, the deforestation polygons in the Protected Areas are audited and validated by means of more detailed satellite images[5]. That procedure is necessary for the unequivocal confirmation of illegal deforestation, which would serve as a basis for beginning administrative and judicial proceedings. Next, the validated deforestation polygons are incorporated into representations[6] that are forwarded to the MPF (Figure 1). Each representation gathers the basic information from each Protected Area, as well as deforestation data and the satellite image used for validation.[7] Additionally, a figure of the Protected Areas is produced with localization of deforestation and satellite images for several years to show its evolution (Figure 2). All of the representations are disseminated on ImazonGeo.

Deforestation in Protected Areas

From August 2007 to December 2008, 389 square kilometers were deforested in Protected Areas in Pará. Of those, 182 square kilometers were sent to the MPF in the form of representations (Figure 3). That meant 145 representations (one for each deforestation polygon) distributed among 21 federal Protected Areas, of which nine were Indigenous Lands, another nine were Sustainable Use Conservation Units and three were Full Protection Conservation Units. The majority of deforestation was concentrated in the *Terra do Meio* region and near the BR-163 highway, area where the deforestation frontier is expanding (Figure 3).

Since 2008 there was a reduction in deforestation in Protected Areas, largely brought about by government

measures adopted early in 2008 against deforestation in the Amazon.[8] In Pará, there was a 72% reduction in deforestation in the Protected Areas from 2007 to 2008, when deforestation affected 574 square kilometers and 162 square kilometers, respectively. That reduction occurred in all classes of Protected Areas, principally in the Full Protection Conservation Units, where there was an 85% drop.

Protected Areas with the most Representations

The ten Protected Areas with the largest number of deforestation representations forwarded to the MPF (August 2007 to December 2008) are National Forests (Flona), Environmental Protection Areas and Indigenous Lands. The *Jamanxim Flona* (west of Pará) was the Protected Area that had the greatest number of deforestation representations (n=51), as well as the largest deforested area (58 square kilometers) detected by SAD (Figure 3). Among Indigenous Lands, *Xikrim do Cateté* presented the largest deforested area (37 square kilometers), followed by the *Kayapó* with 10 deforestation representations and a total deforestation of 29 square kilometers in the same period.

Process for Determining Legal Responsibility[9]

The objective of the deforestation representation generated by Imazon and forwarded to the MPF is to increase agility in adopting measures to punish or inhibit deforestation in the Protected Areas. With the deforestation representations, the MPF can make the on-site verification process more agile as it calls on the appropriate agencies to enforce actions in the deforested area. The objective is to halt deforestation that is underway and begin the process of punishing violators. Before cooperating with Imazon, the MPF received the infraction reports only after visits to the localities inspected by Ibama, which delayed the processing of assigning responsibility. For example, an analysis of 55 court cases for environmental crimes Pará done in 2003 demonstrated that on average there was a delay of 244 workdays between detection of the infraction by Ibama until formal charging by the MPF with the Federal Courts.[10] Furthermore, the MPF was not aware of all of the deforestation events in Protected Areas since it was restricted to information generated by Ibama enforcement actions. Beginning with the representations in December 2007, the MPF started several actions to combat deforestation in federal Protected Areas in Pará. After one year, the great majority (82%) of cases forwarded to the MPF are still in the investigation phase. The objective in that phase is to gather sufficient evidence to bring suits at the civil and criminal level. To do that, information is gathered by the MPF itself or by other agencies such as Ibama/ICMBio, Funai and Federal Police. In the other 18% of deforestation representation cases there was no information about the material forwarded until December 2008. That was because those representations had been sent to the MPF in October and November 2008, meaning that there was not enough time for the MPF to generate information regarding those cases.

Of the representations that are still in the investigation phase, only 6% of the total forwarded to the MPF reached the court level through filing of Civil Public Suits[11]. However, those actions were against another governmental agency and not against the violator, because the agency delayed in promoting on-site inspections. Those cases occurred in the *Xikrim do Cateté* Indigenous Land during the month of August 2007. After receiving the representations, the MPF called upon the control institutions (Ibama, Federal Police and Funai) for fighting environmental crime and, in this case, Ibama apparently had not made itself available. For that reason, the MPF brought a suit in Federal Court against that agency. However, in fact, Ibama had already carried out enforcement in the Indigenous Land even before being notified, but information regarding that action was not passed on to the MPF. In other words, there were miscommunications between the two institutions. The Ibama reports noted that it was not possible to locate the guilty parties for the environmental crime. Additionally, in some of those cases, deforestation was carried out by the Indians themselves in order to cultivate their subsistence crops (corn and manioc) and related to village divisions.

Next Steps

In April 2008, besides the State of Pará, the Federal and State Public Prosecution Services in Roraima and the State Public Prosecution Service in Amapá signed a partnership agreement with Imazon to develop the initiative presented in this publication. However, by December 2008 SAD had not detected occurrence of any deforestation in the Protected Areas in those States. The region that encompasses Roraima and Amapá remains under cloud cover for most of the year due to the Intertropical Convergence Zone (a cloud concentration that occurs in the equatorial region). That limiting factor complicates deforestation monitoring for several months in those two States.

The next step will be to replicate that partnership with the MPF/MPE in other Amazon States and forward the representations to State environmental agencies (Oemas), Ibama, ICMBio and Funai. Additionally, we will follow up the proceedings for assigning responsibility and widely disseminate the administrative and court gases generated via ImazonGeo on the Internet. We hope that initiatives such as that will strengthen the public sector so that it will act speedily in cases of environmental crimes in Protected Areas and, in that way may inhibit action by wrongdoers.

Recommendations for Public Policies

Creation of a Protected Area through a decree is not enough to protect the forests from deforestation, illegal logging and burning. Various measures are needed to effectively implant it, such as development of its management plan, investments in infrastructure and human resources, besides management strategies, monitoring and enforcement. The satellite monitoring used in this project for generating deforestation representations for the MPF is a major advance in the process of determining legal responsibility for environmental crimes in Protected Areas. For success in combating illegal deforestation in those areas, we recommend:

Integration among institutions. For greater efficiency and more agility in bringing suits and applying sentences, there needs to be integrated between the control and enforcement institutions, as well as among those responsible for applying the environmental crimes law. In the majority of cases, the weak communication between Ibama, MP and Judicial Branch represents a bottleneck for movement of the proceeding, which generates mistakes, delays and difficulty in finding the wrongdoer. One solution would be to develop a collaborative network to bring together information obtained from monitoring, control data and information on the progress and results of attributing responsibility. The network would promote a rapid exchange of information between the institutions. In that case, the information generated in (Imazon and Inpe) would be transferred to the control institutions, which could respond rapidly and thus contribute to responsibility process. One example of the integration initiative between institutions is the Integrated Police Intelligence Center (Cintepol) created in 2008 under the coordination of the Federal Police. One of Cintepol's purposes is to integrate the data bases and interoperability of the systems with the Public Safety Secretariats, Public Prosecution Service and Judicial Branch. Among the Legal Amazon States, Maranhão and Mato Grosso have already signed a technical cooperation agreement with the Federal Police.

Transparency of information. In order to the strategy for fighting environmental crimes in the Protected Areas to be a success, information from all stages (monitoring, enforcement and responsibility) needs to be transparent and allow follow-up by civil society and the institutions involved. It is also necessary for this information to facilitate restriction of market access for the violators. Data from deforestation monitoring in the Amazon are already widely disseminated (for example, SAD, Prodes and Deter), but there needs to be greater dissemination as to the situation of each environmental crime. Decree number 6.514/2008 determines monthly publication of administrative sanctions applied by the environmental agencies, but that dissemination has not occurred.[12] Nonetheless, other measures adopted demonstrate the importance of such transparency, such as: publication by Ibama of embargoed areas that were illegally deforested and of the list of the top 100 deforesters as well as market agreements against buying soya, beef and timber derived from illegally deforested areas.[13]

A

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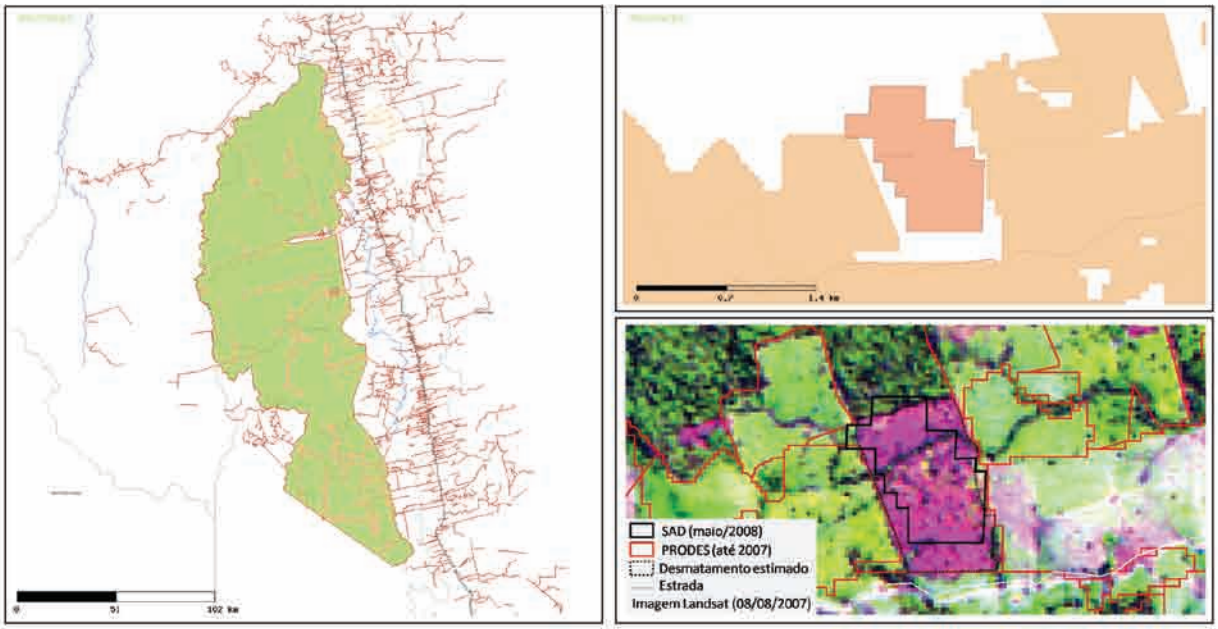
REPRESENTAÇÃO Nº 0037/2008

Belém, PA, 04 de julho de 2008

A Sua Excelência, o Senhor
Coordenador do Núcleo Criminal da
Procuradoria da República no Pará
Ministério Público Federal
Rua Domingos Marreiros, 690 - Umarizal
Belém - PA

O Imazon - Instituto do Homem e Meio Ambiente da Amazônia, instituição de pesquisa sem fins lucrativos e com qualificação de Oscip, cuja missão é promover o desenvolvimento sustentável na Amazônia por meio de estudos, apoio à formulação de políticas públicas, disseminação ampla de informações e formação profissional, com base no TERMO DE COOPERAÇÃO TÉCNICA Nº 001/2007, visando à obtenção de maior eficiência e tempestividade na adoção de providências voltadas à proteção do meio ambiente, por meio da utilização da ferramenta Imazongeo, vem formular a presente REPRESENTAÇÃO, noticiando a ocorrência de dano ambiental na área abaixo identificada:



Informações da área em análise

Município	Novo Progresso
Unidade de Conservação Federal	Flona do Jamanxim
Categoria	Floresta Nacional
Grupo	Uso Sustentável
Data de criação	13.02.2006
Área decreto	13011,20 km²

B

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Comentários

A Flona do Jamanxim continua sendo desmatada mesmo após a sua criação em fevereiro de 2006. O sistema PRODES (2007) detectou 142,8 Km2 (14.276,8 ha) de florestas desmatadas na Flona durante o período de agosto de 2006 a julho de 2007. Em maio de 2008, o Sistema de Alerta de Desmatamento (SAD) detectou uma expansão desse desmatamento. Esta expansão foi confirmada pelas imagens Landsat dos anos de 2006, 2007 e 2008 (ANEXO). Através da imagem Landsat (07/06/2008), foi estimada a área desmatada que alcançou o total de 1,03 km2 (103,33 ha).

Informações sobre a ocorrência

Tipo de ocorrência	Desmatamento
Sistema	SAD
Sensor/Satélite	MODIS/TERRA
Fonte	Imazon
Data da imagem	09.05.2008 a 09.06.2008
Data do desmate	09.05.2008 a 09.06.2008
Área afetada	0,748 km²
Lat / Long	-7.3804 / -55.6045
Imagem de satélite	TM/LANDSAT 07/06/2008

Figure 1 (A e B). Representation of deforestation in Protected Area in the State of Pará sent to the Federal Public Prosecution Service.

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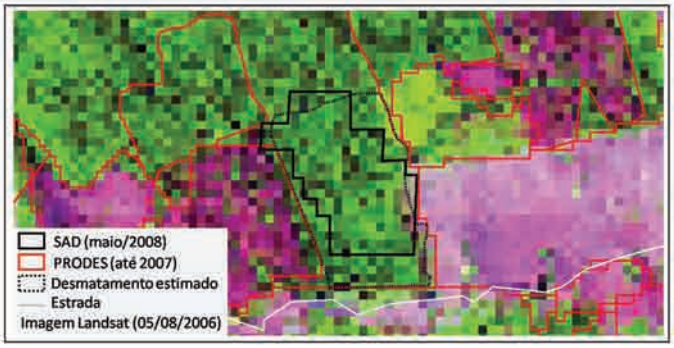
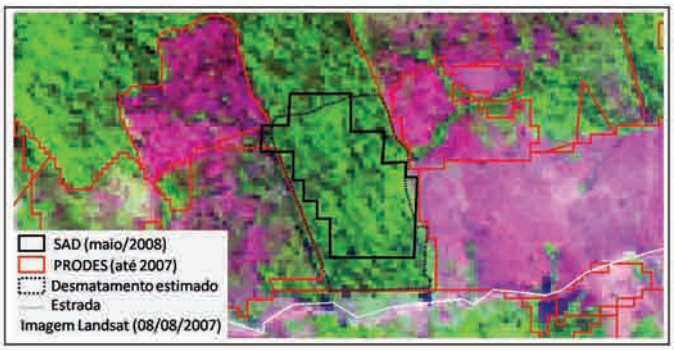
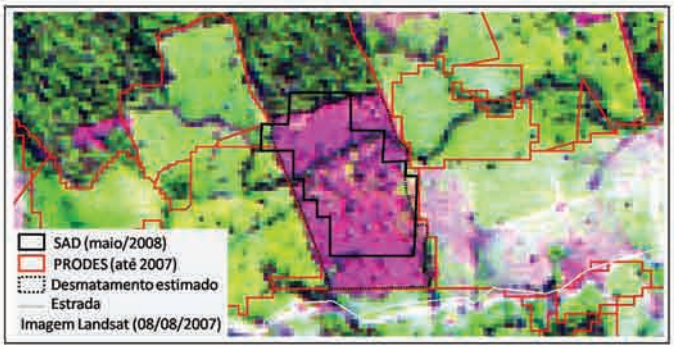
Anexo



Satélite	LANDSAT
Sensor	TM
Data	05/08/2006
Órbita ponto	227/065

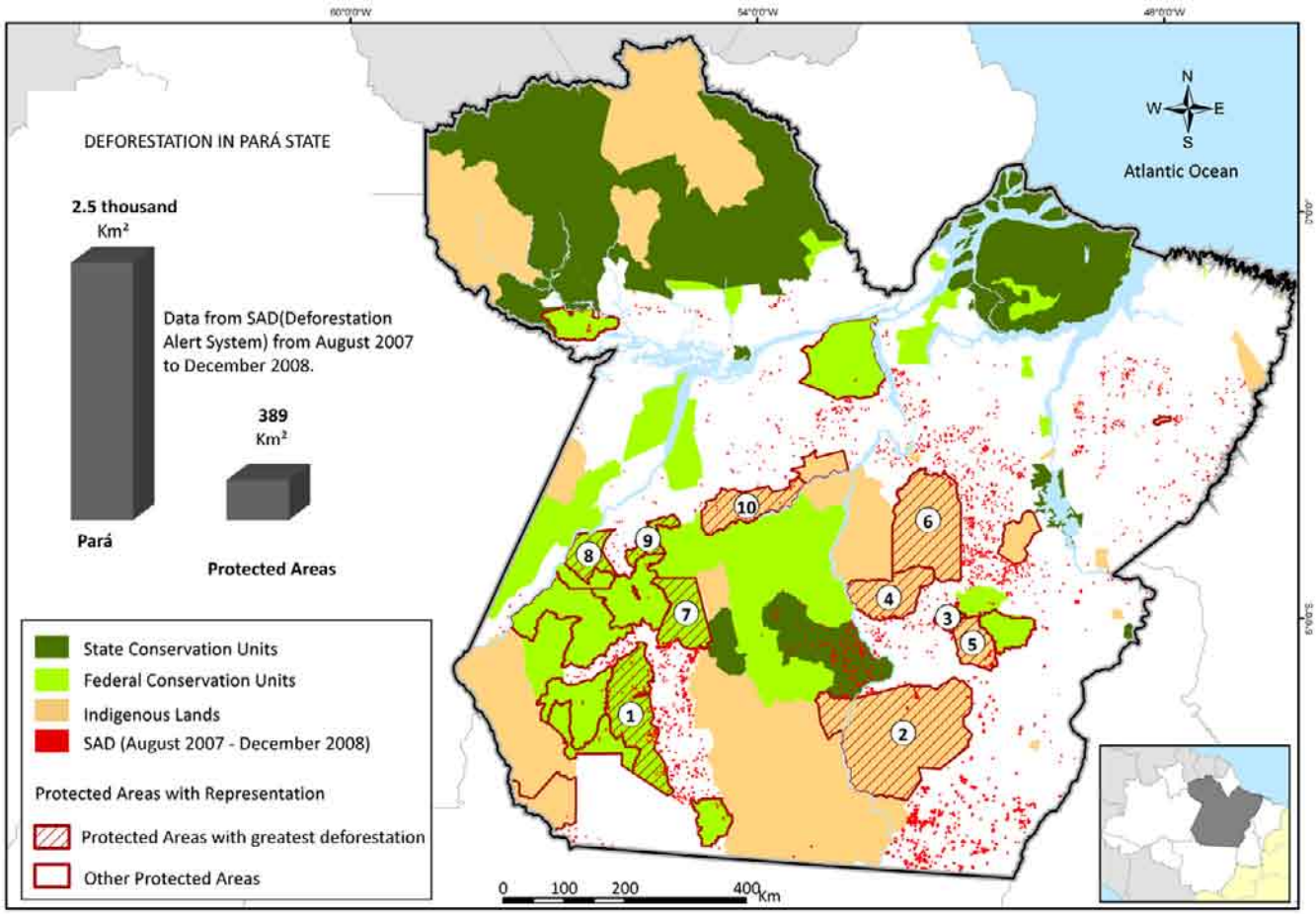


Satélite	LANDSAT
Sensor	TM
Data	08/08/2007
Órbita ponto	227/065



Satélite	LANDSAT
Sensor	TM
Data	07/06/2008
Órbita ponto	227/065

Figure 2. Appendix of the deforestation representation with temporal series of satellite images for following up evolution of deforestation.



	Protected Areas	Category	Municipality	Creation	Total/Area nº	Km²	Deforestation after creation (Km²) Data from Prodes (Inpe/2008)
①	Flona do Jamanxim	UCF	Novo Progresso	2006	51	58	323
②	Kayapó	TI	Tucumã	1991	10	29	131
③	Apterewa	TI	São Félix do Xingu	2004	9	6	251
④	Flona de Itacaiúnas	UCF	Parauapebas	1998	9	5	193
⑤	Xikrin do Catete	TI	Ourilândia do Norte	1991	8	37	188
⑥	Flona de Altamira	UCF	Trairão	1998	7	6	57
⑦	Trincheira/Bacajá	TI	Senador José Porfírio	1996	7	5	140
⑧	Cachoeira Seca do Iriri	TI	Uruará	2003	6	2	235
⑨	Flona de Itaituba II	UCF	Trairão	2000	6	2	10
⑩	Flona do Trairão	UCF	Trairão	2006	6	5	40
	Outras				26	28	
	Total				145	182	

Figure 3. Representations made by Imazon on deforestation in Protected Areas for the Federal Public Prosecution Service in the State of Pará.

We would like to thank the support of the David and Lucile Packard Foundation in Developing the Deforestation Alert System and the Gordon and Betty Moore Foundation for development of ImazonGeo. We also thank Elis Araújo and Marília Mesquita (Imazon) for their timely help with the section on responsibility for environmental crimes.

NOTAS

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1 Borges, S.H.; Iwanaga, S.; Moreira, M. & Durigan, C. C. 2007. Uma análise geopolítica do atual sistema de Unidades de Conservação na Amazônia Brasileira. *Política Ambiental* 4: 1-42.

2 According to article 27 of Law number 9.985/00 that institutes the Snuc (National System of Conservation Units), Conservation Units should have a management plan encompassing the unit area, its buffer zone and the ecological corridor, and should also include measures for promoting its integration into the economic and social life of neighboring communities.

3 Brito, B. & Barreto, P. 2005. Desafios da Lei de Crimes Ambientais no Pará. *O Estado da Amazônia* 4:1-4.

4 According to the National Strategic Plan for Protected Areas, decree number 5.758 of 4/13/2006, Protected Areas are: Conservation Units, Indigenous Lands and the lands occupied by remnants of the *quilombos* (descendants of escaped African slaves). However, in this publication we are considering only Indigenous Lands and Conservation Units.

5 The Modis images utilized by SAD have a moderate spatial resolution (each pixel: 250 m x 250 m), but with good temporal frequency (daily images), characteristics that are necessary for rapid indication of the area that is still undergoing the deforestation process. However, to validate deforestation it is necessary to use satellite images with better spatial resolution such as Landsat images (each pixel: 30 m x 30 m) and Cbers (pixel: 20 m x 20 m), utilized in this work.

6 Representation is every notification of irregularity that is provided to the Public Prosecution Service. Any citizen may make a representation to the Public Prosecution Service, and may do so it writing or personally at the Attorney General's office. The representation may also be made by legal entities, private entities, class entities, civil associations and public administration agencies. The representation is the starting point for an investigation by the Public Prosecution Service.

7 The data on the Protected Areas included in the representations are: name, municipality(ies) where it is located and date of creation. As for deforestation data, they include the system utilized for detection, the sensor/satellite, data source, date of detection, affected area and geographical location.

8 Barreto, P.; Pereira, R. & Arima, E. 2008. A pecuária e o desmatamento na Amazônia na era das mudanças climáticas. Belém: Imazon. 40 p.

9 In Brazil, determining responsibility for environmental crimes may occur at three levels: civil, administrative and criminal. The Public Prosecution Service works at the civil and criminal levels, while administrative determination of administrative responsibility is done by the environmental agencies.

10 Brito, B. & Barreto, P. 2005. Desafios da Lei de Crimes Ambientais in Pará. Série *O Estado da Amazônia*, 4:1-4Belém: Imazon.

11 A Civil Public Suit is a procedural instrument, provided for in the Brazilian Federal Constitution and in infra-constitutional laws, that the Public Prosecution Service and other agencies with standing can use to go to court with the intent of protecting the public and social heritage, the environment, the consumer and to demand reparation for the damages caused.

12 Mesquita, M. & Barreto, P. 2009. Análise da Eficácia da Punição de Infratores Ambientais em Áreas Protegidas da Amazônia. Belém: Imazon. In press.

13 See note 8.