FROM RED TO GREEN: ACHIEVING AN ENVIRONMENTAL PACT AT THE MUNICIPAL LEVEL IN PARAGOMINAS (PARÁ, BRAZILIAN AMAZON)

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Summary

A Red List of Deforestation was published by Brazil's federal government in 2008, listing 36 municipalities with the highest rates of deforestation in the Amazon as a policy measure to prioritize efforts to combat deforestation. Here, we examine the reaction of a municipality to the decentralization policy represented by the Red List. We analyze the case of Paragominas, a municipality in the state of Pará, in the eastern Brazilian Amazon. Since being removed from the Red List in April 2010 Paragominas has swapped infamy for fame, and has become widely renowned in Brazilian policy discourse and the public media as a successful example of controlling deforestation. In this study, we analyze the development of the *Green Municipality* or *Município Verde* (MV) project, a novel governance arrangement that brought together municipal, state, and federal government as well as local farmers Unions and Associations, and regionally active non-governmental organizations. We identify key actors and institutions involved in the process, and try to better understand the preexisting conditions that set the groundwork for the MV initiative. Finally, we evaluate the effectiveness of this policy in controlling deforestation and achieving environmental compliance within different social groups.

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1 Introduction

Annual rates of deforestation in the Brazilian Amazon declined by 77.5% between 2004-2011 (INPE/Prodes, 2012). Yet, the future of the Amazon forest is still uncertain and there remains an urgent need for environmental policies to be improved and strengthened in order to achieve conservation goals and sustainable development in the region (Nepstad et al, 2011a). Many factors affect deforestation dynamics, the main proximate driver being agriculture activity, and underlying causes including population growth and consumption patterns, international exchange rates, access to road and transport networks, and land tenure (DeFries et at, 2010; Fearnside, 2001; Garcia et al, 2006; Geist & Lambin, 2002; Nepstad et al, 1999, 2006; Soares-Filho et al, 2004). The relationship between many of these factors and rates of deforestation is mediated by policies and institutions. Thus far command and control policies have been more successful than incentives for sustainable land use (CEPAL et al, 2011). New hybrid and multi-level governance arrangements are emerging as part of ongoing efforts to promote compliance with environmental and social laws.

Brazil is organized as a federative system, divided into 26 states plus the Federal District, and then subdivided into municipalities. Environmental licensing and monitoring has traditionally been the purview of central government, but these responsibilities are gradually being delegated to states[6]. In turn, states may opt to reorganize activities and responsibilities at the municipal level, which in the Amazon can constitute enormous areas (for example the municipality of Altamira in Pará which spans some 160,000 km^2 or 65% of the territory of the United Kingdom). Under current legislation, municipalities have elected governments and some fiscal and financial flexibility to capture and

[6] http://www.planalto.gov.br/ccivil_03/leis/LCP/Lcp140.htm

administer resources. It also has obligations, especially in the health and education sectors (Scardua and Bursztyn, 2003).

Decentralization of environmental policies can be positive if it delivers more power to the hands of municipal actors, allowing for more flexibility and innovation in terms of partnerships in different social arenas, and constitution of social arrangements compatible with local needs. A significant number of case studies in different parts of the world demonstrate the effectiveness of participatory forest management (Sandbrook et al, 2010). Mexico offers an example of community forest management that was able to conserve biodiversity, forest productivity and forest cover over time (Bray et al, 2003).

Alternatively, decentralization can have negative environmental impacts if local governments lack the capacity for good governance, and traditional local powers have too much influence on what are often politically weak environmental departments, influencing enforcement of environmental legislation (Ribot, 2004). This was observed in Cameroon, with central government not willing to lose control over forest resources management by not fully transferring governance power to local actors. Moreover, local elites became interested in governing forests through management committees, hijacking communities (Oyono, 2004). This poses a question whether increasing the value of forests through the mechanism of Reducing Emissions from Deforestation and Forest Degradation (REDD+) can revert decentralization trends and promote a recentralization of forest governance (Phelps et al, 2010).

New institutional arrangements are emerging to govern natural resources, with state, market and society acting in partnership. These *hybrid* or *soft* forms of governance can be shared by state, markets and communities, involving one or more parties, each addressing

others' weaknesses and building upon others' strengths (Lemos and Agrawal, 2009). In the Brazilian Amazon, *hybrid* governance mechanisms may provide the conditions for novel conservation opportunities, as evidenced by the increasing role of the market in fostering environmental compliance and the adoption of good management practices (Nepstad et at, 2006, 2011). On the other hand, the reconfiguration of environmental governance is often focused on a restricted number of sectors, which may create governance gaps. It may also strengthen the power of single actors such as markets, thus perpetuating and even increasing social inequality in decision-making (Lemos and Agrawal, 2009).

In this study, we examine changes to environmental governance systems in the Brazilian Amazon by focusing on the municipality of Paragominas in the state of Pará, Eastern Amazon. During the last years Paragominas has developed a novel multi-partner governance arrangement at the municipal level, involving state, society, and market actors. The municipality went from being the main timber-producing region in the country in the late 1980's and a case of remarkable deforestation to becoming a national reference in municipal-level anti-deforestation policy. Faced with strengthened command-and-control policies from central government, landowners and political leaders of Paragominas built a pact for zero deforestation and improved environmental compliance.

This paper is structured in five parts, that 1) present Paragominas as our case study, 2) give an overview of recent environmental policies in the Brazilian Amazon, and the build-up of the Brazilian federal government's Red List of most deforesting municipalities; 3) consider the way in which the market has played an important role in

developing the conditions that motivated compliance among rural producers; 4) describe the methods and framework used for this study, before 5) present our results, which describe i) the process of building the *Green Municipality* or *Município Verde* (MV), identifying key actors and institutions ii) the conditions that enabled the process, and iii) the effectiveness of the project by addressing the shortcomings of the process so far, risks and the work remaining.

2 Context

2.1 Paragominas

Paragominas is a municipality located 217 km south from Pará's capital Belém. The original land cover is humid tropical forest, but in 2010 Paragominas had only 51.56% of its 1,945,200 hectares covered by forests (INPE/Prodes, 2012). Moreover, work by Nepstad et al (1999) showed that only one tenth of the area classified as forests by official classifications (forest/non-forest) correspond to undisturbed forests, the rest having been previously logged and/or burned.

The region was initially home to three indigenous groups, the Tembé, Amanayé and Ka'apor. The occupation by non-Indians started with extrativist populations along the Gurupi, Capim and Uraim rivers in the late 1940's. In 1960 the federal highway BR 010 was inaugurated, connecting the recently built capital Brasília to Belém. The town of Paragominas was founded in 1965 along the Belém-Brasília highway (Figure 1), with the federal government enabling access to land and credit, specifically for cattle ranching, which in turn attracted investors from the southern states of Brazil. The road also allowed for other waves of migration, as workers from the northeastern states of the country and other regions of Pará state (Barros, 2003).

[Figure 1]

Figure 1. Location map of Paragominas.

The agricultural practices used in the cattle pastures, often inadequately adapted from other regions, soon exhausted the fragile Amazonian soils of Paragominas, which are mainly comprised of oxisols and ultisols (Veríssimo et al, 2002). In face of the national credit crisis facing cattle ranching and the decline of timber production in other parts of the country, timber extraction rapidly became a very profitable activity. In 1989-1990, Paragominas was the main timber-producing region in Brazil, with a total of 238 sawmills (Veríssimo et al, 2002).

In the late 1990s, timber became scarce, many people were left without work, and the municipality was infamous for urban and rural violence. Hoping to launch a new economic cycle, a small group of farmers invested in an experimental soy field in a private farm. In 1995, a partnership between the municipal and state governments, and agricultural research and extensionist institutions (e.g. Embrapa – Brazilian Agricultural Research Corporation) inaugurated Paragominas as a grain center. Employing new machinery and agriculture technology, Paragominas quickly achieved high yields in soy, corn, rice and cotton, attracting investment and companies (Barros, 2003; Paragominas, 2012).

Currently, 78.2% of the 97,819 residents in Paragominas are urban (IBGE, 2010). Paragominas's economy is responsible for 2.3% of Pará's GDP and relies on agriculture and cattle ranching (14.6%), industry (32,4%), and services (54.0%) (IBGE, 2009). According to IBGE (2006), private rural properties in Paragominas make up 31.3% of Paragominas, of which 46.7% are >500ha and 40.1% are <100ha (IBGE, 2006).

2.2 Environmental policies in the Amazon and the build-up to the Red List

After a history of promoting deforestation as a means for occupation and development of the Amazon, in recent years the federal government has undertaken a markedly different path. In 2004, the federal government launched the Action Plan for Prevention and Control of Deforestation in the Brazilian Legal Amazon (PPCDAm). It consisted of a set of policies structured around three objectives: (i) regulating land tenure and zoning land use, (ii) monitoring land conversion, and (iii) incentives for sustainable activities. There is some evidence that PPCDAm has been at least partially successful, especially in the application of command and control policies (CEPAL et al, 2011). Thus, PPCDAm has been attributed a significant positive role in contributing towards recent declining trend in deforestation rates (Figure 2) (Barreto and Araújo, 2012).

[Figure 2]

Figure 2. Deforestation rate in the Brazilian Amazon. Source: INPE/Prodes, 2012.

A sudden increase in Amazonian deforestation in 2007-2008 (Figure 2) triggered the federal government to react with a series of policy measures. In December 2007 and January 2008, the federal government issued new legislation (Presidential Decree 6321/2007 and Portaria MMA 28/2008) that focused the fight against deforestation to selected municipalities in the Brazilian Amazon (Guimaraes et al, 2011). A Red List was published based on three criteria that evaluate the historic dynamic of deforestation at the municipal level: (a) total area deforested, (b) total area deforested in the previous 3 years, and (c) an increase in deforestation rates in at least 3 of the previous 5 years. Thirty-six municipalities entered the list and became a priority for policies for preventing and monitoring illegal deforestation. Despite representing only 6% of all municipalities in the

Amazon biome, the 36 municipalities accounted for >50% of the deforested area in 2007, and all were located in the "arc of deforestation"[7] (Alencar et al, 2004).

The Presidential Decree also established the conditions for exiting the list: municipalities must (a) have at least 80% of their territory on private lands georreferenced and land tenure re-registered, and (b) maintain their annual deforestation rate and area below a limit established by the Environment Ministry. Moreover, the Decree made anyone who buys, transports or sells products from properties under embargo for violating environmental laws co-responsible for the original crime. An amendment issued in March 2009 (Portaria MMA 103/2009) modified the criteria for exiting the list, which became the following: (a) have at least 80% of the territory on private lands monitored through rural environmental registration (Cadastro Ambiental Rural – CAR), by georreferencing of properties' boundaries, areas under permanent protection and legal reserves[8]; (b) 2008 deforestation be $\leq 40 km^2$, and (c) annual deforestation mean of the years 2007 and 2008 $\leq$60% of the mean observed in the 2004-2006 period.

This legal apparatus made possible a strong set of actions that fell under the name "Arco de Fogo" (Arc of Fire)[9]. This operation was launched in collaboration between state government, Federal Police, the Brazilian Institute for Environment and Natural Resources (IBAMA), and the National Army, targeting municipalities in the Red List. Actions were aimed at controlling activities linked to illegal deforestation previously observed through satellite monitoring.

[7] The "arc of deforestation" is constituted by 249 municipalities, representing an area of about 170 million ha.

[8] Legal reserves are a parcel of private land spared for conservation purposes, which varies in the Legal Amazon from 35% (in ecotonal areas of savannah) 50% (in consolidated areas under state-level environmental zoning) to 80% of the property (in forested areas). Areas under permanent protection are areas that must be covered with natural vegetation such as riparian forests and areas with steep slope (Forest Code, 1965).

[9] Arc of Fire refers to the fire used to deforest, but also conveys an idea of strength put into the control.

As a reaction to the command and control operations the government also implemented the “Arco Verde” (Green Arc) Operation, with the objectives of legalizing land tenure and creating positive incentives to promote sustainable activities. Actions and activities were defined case-by-case in each municipality, with a common focus on helping rural landowners clarify and legalize land tenure. Nevertheless, “Arco Verde” was not as successful as “Arco de Fogo” in the more immediate term, in part because it was inherently more complex and demanded the continuous presence of the state (CEPAL et al, 2011). Also in 2008, the federal government launched the Sustainable Amazon Plan, which proposed an integrated set of strategies and recommendations for the sustainable development of the Brazilian Amazon, and with investment from the Norwegian development agency, created the Amazon Fund, a fund with the aim of financing actions against deforestation and promoting the sustainable uses of forests.

The combination of the PPCDAm, the establishment of the Amazon Fund, and support from the Environment Ministry created the basis for state governments to elaborate state-level plans for prevention and control of deforestation (Brasil/MMA, 2011). In 2009, the state of Pará approved its Plan for Prevention, Control and Alternatives to Deforestation, in which it established targets for decreasing deforestation and commitment to implementing activities following the structure of PPCDAm and overarching framework of PAS.

2.3 Market forces

Non-state market-driven governance systems can have impacts on social and environmental standards, forcing producers to comply with certain criteria (Cashore, 2002). Among other strategies, market pressures can lead to a boycott of certain products,

demand that “good practices” be adopted, and the creation of certification schemes for ensuring that standards are met (Brannstrom et al. 2012). Could these non-market pressures explain the drop in deforestation in Paragominas?

There is little evidence to suggest the establishment of the Amazon soy moratorium in 2006 (Greenpeace, 2006) altered deforestation practices in Paragominas. Although major soy export associations signed the moratorium, the land-cover of soy in Paragominas (10,000ha in 2006; IBGE, 2007) is very limited compared to pasture for cattle (210,983ha in the same year, support nearly 455,000 cattle according to IBGE, 2008). However, even if a direct effect cannot be recognized in Paragominas, it is very likely that the soy moratorium increased awareness among farmers about the market force and its consequences

Non-state market forces may have affected the cattle industry, which is held to be responsible for the majority of deforestation in the Brazilian Amazon (Margulis, 2003; Alencar, 2004). Pará has the second largest cattle herd in the Legal Amazon after the state of Mato Grosso. In 2009, the Public Attorney of Pará state (MPF) together with the Brazilian Institute for the Environment (IBAMA) adopted a new strategy for promoting environmental compliance in cattle producing farms. By investigating the supply chain of the meat industry, a number of farms and slaughterhouses were sued for not following the environmental legislation. Supermarkets and industry were oriented not to buy meat from the sued slaughterhouses, under the risk of being sanctioned. As a result, the association of Brazilian supermarkets started demanding a certification of origin for Amazon-origin meat products (Barreto & Araújo, 2012).

2.4 Paragominas in the Red List

In January 2008, Paragominas joined the Red List of most deforesting municipalities, and in April 2008, the "Arco de Fogo" Operation arrived in Paragominas. From a central office based in the town, the joint forces targeted the extraction and commercialization of illegally logged timber, irregular sawmills and coal production sites. The most dramatic impact was through the shutting down of illegal sawmills, which had a direct effect on the urban economy and jobs.

The inclusion of Paragominas on the Red List of deforestation triggered initiatives for promoting more sustainable land-use practices that were already under discussion amongst political leaders in municipality. With the shared goal of exiting the Red List, the municipal government in Paragominas initiated a series of meetings with rural landowners, as well as developing partnerships with Instituto do Homem e Meio Ambiente da Amazônia (Imazon, a national NGO working in Paragominas since the 1990's) and The Nature Conservancy (TNC, an international NGO), resulting in a pact for zero deforestation and definition of an action plan.

Collectively, the group developed rules to regulate management practices that were then institutionalized through the MV initiative. The main objective of the rules was to meet the criteria for exiting the Red List, which had essentially two components: decreasing deforestation, and georreferencing properties under the CAR. In order to address both components, the MV was constituted of three main strategies: (i) a pact for zero deforestation, (ii) monitoring deforestation, and (iii) CAR of properties. Additional goals were set for optimizing production within sustainable landscapes, marked by compliance with environmental legislation and increased productivity. These aspects were voluntary,

and more aspirational to improve image of the municipality and respond to market demand.

3 Methods and framework

This study was conducted within as part of the *Sustainable Amazon Network* (Rede Amazônia Sustentável, RAS, in Portuguese), a multi-institutional research project evaluating the social-ecological sustainability of different land uses and agricultural management in the eastern Brazilian Amazon. As part of this wider project, we conducted 235 structured interviews in 2011 with landowners throughout the municipality of Paragominas, ranging from agrarian reform settlements to cattle ranching and mechanized farming. These interviews allowed a close communication with individual landowners for understanding their perspectives on conservation initiatives like MV. The 5 months spent in Paragominas provided rich background information about the MV program through informal conversations with landowners, political leaders, NGO representatives and others, as well as by frequently reading local newspaper and listening to radio programs.

Contacts with stakeholder in Paragominas started in 2008, with frequent visits to data collection sites in private lands, as well as various meetings and interactions with different groups of farmers. These initial contacts coincided with the emergence of the MV, which allowed the observation of important aspects of the process.

At the beginning of RAS the research coordinating team organized meetings with key stakeholders involved in the rural development of the municipality, including the MV initiative. Meetings were organized with the mayor of Paragominas, the Union of Rural Producers (SPRP), Union of Rural Workers (STTR) and other key leaderships in the

municipality. RAS also works in close relationship with the two non-governmental organizations involved in the implementation of MV (TNC and Imazon), which allowed an integration and consultation about the initiative since its early stages.

We also continue in close relation to the field since the end of formal data collection period through additional research studies focused on agrarian reform settlements.

In addition, we collected extra data on the MV initiative through open-ended interviews with researchers, representatives of the federal government, representatives of NGOs, and local stakeholders and farmers in Paragominas. We also attended a large number of meetings and events in Paragominas and Belém related to the development and implementation of the MV. The analysis presented in this study was enriched by relevant secondary data about the institutions and processes of building the MV.

To aid analysis we employ the theoretical framework proposed by collective action theory. Classical theory for solving social dilemma argues that individuals seek to maximize individual benefits, leading to a tragedy of the commons (Hardin, 1968). However, several cases of natural resources management demonstrate that under certain circumstances, collective action prevails over individual benefits (Poteete & Ostrom, 2008, Ostrom, 1990). Communication and sanction capacity are important factors for cooperation (Janssen et al, 2010), as well as monitoring and enforcement of rules (Gibson et al, 2005; Ostrom, 2009). Other micro-situational variables known to play important role in creating the environment for collective action are marginal rate of return, reputation, long time horizon, capacity to enter and exit the group, assurance that all will contribute, group size, availability of information, heterogeneity of participants (Ostrom, 2005), dependence of user on resource, type of benefit sharing, trust and reciprocity,

autonomy of the group, and previous organization experience (Jansen & Ostrom, 2001). Leadership also increases the likelihood of self-organization (Ostrom, 2009).

4 Results

4.1 Building the process

The MV initiated with meetings for defining the objectives and goals of the pact. Meetings were called and led by the municipal government (under the leadership of the mayor), and were attended by representatives of different rural Unions and Associations, which responded for the majority of rural producers, as well as NGOs. Once the basis of the pact was established, public meetings were used to communicate the strategy. Dissemination and mobilization was achieved through announcements in the media (banners, radio, newspapers, etc), as well as by representatives of the Unions and Associations with the farmers they represented. Representatives of federal and state government were also present in meetings in order to clarify the conflict and negotiate possible solutions.

The basic rules contained in the pact were the commitment to reducing deforestation and registration of rural properties under the CAR. Negotiation with farmers that had previous authorization to deforest was done in a case-by-case basis, led by the mayor. In case where the rules were violated (identified by satellite information or denunciation), the municipal government investigated the violation and tried to solve it locally by gathering a group of landowners and talking to the violators. In cases where informal solutions were unsuccessful, they either sought support from the state government, or found legal means for solving the conflict.

Several partnerships were established, assuming different roles in the project. In addition to the mayor's office three of institutions were central to implementing the project. Imazon led capacity building workshops with agents of the municipal government in order to allow them to interpret and use the monthly reports of deforestation in Paragominas sent by Imazon to the mayor's office, allowing for sanctioning of occasional violations of the pact. The SPRP was responsible for mobilizing and informing medium and large-scale (>c.200 ha) landowners of the project, as well as to encourage them to register their properties under CAR. The Union headquarters became the focal point for information and meetings. TNC was responsible for organizing the CAR with SPRP, and at subsidized cost for the farmers. Instead of costing as much as R$ 5000, the CAR cost about R$ 250 for each farmer in 2010 (Guimaraes et al, 2011).

It is important to note that while the Union of Rural Producers was an active part of the MV, the Union of Rural Workers participated of the initial meetings, but was marginal to the process. Moreover, in order to achieve the 80% of the territory registered, in the first moment small properties were not included in the CAR process.

There were several reasons why landowners were attracted to participating in the MV. First, participating in the project provided legal security to the landowner, by coming into compliance with environmental legislation and clarifying land tenure. Another key reason was the perception of providing preferential access to national and international commodity markets, such as the meat industry. Finally, the federal government gave priority to municipalities that exit the Red List for access to credit and federal programs and projects that aim to incentivize sustainable activities such as forest plantations,

agroforestry, and sustainable agriculture and cattle ranching (Portaria MMA 67/2010; Guimaraes et al, 2011).

4.2 Conditions that enabled the process

Geographic location, infamy and attraction of scientists and NGOs. The fact that Paragominas once was the main timber-producing centre in Brazil, coupled with its proximity to the Belém-Brasília highway led scientists, NGOs, and private companies to analyze from an early stage the impacts of business-as-usual timber extraction and propose alternative models such as sustainable management (Nepstad et al, 1991; Uhl and Vieira, 1989; Uhl et al, 1997; Veríssimo et al, 2002). The presence of scientists working in farms in Paragominas in the late 1980s brought national and international attention to the region and provided landowners with leadership in the region with an early awareness and interest in the potential for alternative management practices. Indeed this pioneering research led to the creation of Imazon in 1990, and it has been extremely active in the region since then. Also in 1992, the international NGO Tropical Forest Foundation (TFF) launched a demonstration project of reduced-impact (RIL) forest management in Paragominas, which has since become the textbook example of RIL for the entire Amazon. The Instituto de Pesquisa Ambiental da Amazonia (IPAM), an active national NGO, also grew from a base in Paragominas, in 1995.

Political leadership and Vale. The process was also assisted through continual entrepreneurial leadership in Paragominas. In 1996, Sydney Rosa was elected mayor of Paragominas. He came from the timber industry and had an interest in maintaining the timber sector and creating incentives for reforestation. He invested in the town and brought Vale (one of Brazil's largest companies and one of the biggest mining enterprises

in the world) to Paragominas, which later would result an important source of finance to support new policies and infrastructure such as roads, buildings, and schools. Vale's activities in Paragominas initiated with the exploitation of bauxite, and more recently Vale became an important investor in the expanding plantation forestry to supply iron smelting factories in other parts of the country. In 2009 was established the Vale Fund for Sustainable Development, a third-sector organization that invests in sustainable development projects in the Amazon. The Fund has been an important supporter of the MV initiative, providing funds for TNC, Imazon, and the SPRP.

Agency and entrepreneurship. Sydney was re-elected, and his then deputy, Adnan Demachki, was elected in 2004, and re-elected in 2008. This political continuity and the adoption of policies that attracted significant investment to the town transformed Paragominas in less than a decade from being a place notorious for violence to the new centre of rural growth in Pará. In addition to Vale the second major source of investment was from the mechanized agricultural sector with Paragominas quickly establishing itself as the largest producer of grains in the state of Pará, and more recently in the form of a chipboard factory to be supplied by a rapid growth in planted forests. At the same time as the establishment of the Rosa-Demachki political power-base, a strong leadership arose in the presidency of SPRP, and included in its directorate individuals with significant previous involvement with scientific research and NGOs, and had already started to develop differentiated land management practices in their own properties.

Exhausted forest resources. An additional, critically important factor that contributed to the emergence of the new governance arrangement in Paragominas was the fact that its previously lucrative forest resources had been severely exploited. This meant that there

was little merchantable timber left to be harvested, and a large proportion of grain and cattle farmers in Paragominas were once leading loggers. This well-established and wealthy elite had interest in increasing valuation of their rural properties.

In summary, Paragominas had a unique collection of factors that contributed towards developing the enabling conditions for MV. Figure 3 presents a flowchart describing the previous conditions and context that led to the implementation of the MV project, the key elements in the process building of the MV, and the results achieved by this political process.

[Figure 3]

Figure 3. Key elements in conceiving and developing the MV, and the main results achieved by the project

4.3 Effectiveness of Município Verde in Paragominas

Deforestation

The MV achieved a key component of its stated goal by diminishing deforestation to 21 km^2 in 2009 (Brito et al, 2012) and registering nearly 690 properties, or 94% of the territory outside of reserves under CAR. In April 2010 Paragominas exited the Red List.

According to INPE data, the rate of deforestation in Paragominas has slowed but has not halted (Figure 4). Imazon's Risk of Deforestation report indicated Paragominas' region still as an area with high risk of deforestation based on projected rates from historic spatial patterns and other variables such as distance from roads and rivers, topography, distance from protected areas and economic reach (Sales et al, 2012).

[Figure 4]

Figure 4. Deforestation rate in the municipality of Paragominas. Source: INPE/Prodes,

2012.

A study conducted in Mato Grosso state concluded that georreferencing properties' boundaries did not result in deforestation control as expected. Instead, it became an act of "institutional subversion", in which the initial goals were contradicted by the outcomes of the policy: properties georreferenced even increased deforestation, by gaining official permits to deforest and favored by poor monitoring and law enforcement (Rajão et al, 2012). Considering this, it is probably still too early to draw conclusions about the effectiveness of the MV on long-term maintenance of forest cover.

Leakage can be an unintended consequence of focusing the combat against deforestation at the municipal level. An example occurred after command-and control actions in Tailândia, a municipality in Paragominas' region, which resulted in leakage of illegal logging to the neighboring municipality of Moju. Tailândia was inserted to the Red List in March 2009, and Moju entered in May 2011.

The MV focused on stopping deforestation and did not address forest degradation as it was not part of the Red List policy. However, forest degradation is a relevant issue in Paragominas and elsewhere in the Amazon (Asner et al, 2005) and point to the need of a systemic approach to conservation in order to secure the maintenance of environmental services (Nepstad et al, 1991, 1999, 2011; Veríssimo et al, 2002).

Social inclusion

The area where the MV has achieved the least progress is in securing the effective participation of the smallholder farmers in the municipality, who together make up the vast majority of the rural population in Paragominas. Smallholders in the region generally have little access to credit from banks, and/or may be burdened by high debts from earlier

government incentivized extension projects. As such the impacts of the Red List were not felt as strongly as was the case for medium and large landowners.

The Worker's Union represents around 5,000 small farmers, who were seen to be in great disadvantage with the establishment of the MV. As shown by our interviews, many of the small farmers were unable or not willing to abandon their traditional practice of slash and burn agriculture. Little alternative was given for stopping illegal deforestation and charcoal production, which would require capacity building and investments in new technologies and alternative activities. Previous experiences for introducing alternative production activities among smallholders have failed, result of lack of technical assistance, low quality inputs, and/or bad transport infrastructure. Many of the small farmers therefore saw little benefits from committing to zero deforestation.

However, small farms are an important piece for achieving the goals of a green municipality. While loggers may have increased the flammability of forests (Barlow et al. 2012), smallholders are often responsible for a large number of ignition sources through their use of maintenance fires in the region. These smallholders need to be included in the political process to ensure viable alternatives to slash and burn, or better fire management practices that minimize the risk of forest fires (Barlow et al. 2012).

Indigenous territories are not governed by the municipal government, and there is some evidence to show that the Rio Guamá reserve is the origin of a large share of illegally logged timber in the municipality. These flaws demonstrate the importance of a more integrated strategy towards sustainability across the municipality.

Several challenges remain for Paragominas becoming a green municipality. On the one hand, degradation and fire must be addressed, as well as the long-term observation of

deforestation patterns across Paragominas' region. On the other, the program must also address social minorities, such as small farmers.

5 Discussion

The results presented here identified key aspects of the development of the MV initiative, signaling actors, institutions and enabling preconditions present in Paragominas. Our analysis conclude that the MV was successful in achieving its goal to exit the Red List, though failed to involve smallholders and achieve zero deforestation. In light of our results, we discuss whether the Red List was a decentralization policy and identify lessons learned from the Paragominas case, and discuss the potential for extrapolation of its experience to other municipalities.

Decentralization of environmental regulation

The national-level policies of decentralizing efforts to combat and control deforestation in the Amazon through the Red List had varying results in different municipalities. Until April 2012, only two of the fifty municipalities that entered the List had exited: Paragominas, and the Mato Grosso State's municipality of Querência.

The small number of successful cases, exemplified here by Paragominas, indicates that specific conditions are central to solving the conflict caused by past deforestation and the arrival of the Red List, rather than the policy of decentralization being a widespread success. Indeed, it is useful to question if the Red List was a decentralization policy. Decentralization is often defined as the transfer of power from a central government to actors or institutions at lower levels in a political-administrative or territorial hierarchy (Agrawal and Ribot, 1999). In the case of the Red List, there was no strengthening of municipal-level power, rather there was a shift in the delegation of responsibilities and

the re-direction and expansion of punishments for illegal activities from a focus on individual farmers to the entire municipality.

In Brazil, the process of decentralization started with the 1988 Constitution, after a period of strong centralized government during military rule. The new Constitution opened the way towards shared responsibility for natural resource management across different levels of government. This shared responsibility created gaps and overlaps of power, but also made room for collaboration (Toni, 2006).

Until PPCDAm and the Red List initiative, few responsibilities for combating deforestation were assigned to states and municipalities in the Amazon. Only more recently have such responsibilities been explicitly transferred to state governments. That said, the goal of the Red List was not to transfer responsibility to the municipal level, but to straighten collaboration between government levels. The "Arco de Fogo" and "Arco Verde" operations were led by the federal government, and focused on delivering results at the municipal and property level.

Despite the initial goal of conditioning the exit from the Red List to land ownership regularization of properties, the difficulty of the federal government in conducting land tenure regularization caused the requirement to change. Instead, the CAR grants an identity to the property and attends monitoring purposes, but it does not denote land ownership. Every property with forestry, agriculture or cattle ranching activities should also have the Licenciamento Ambiental Único (LAR), which secures that productive activities are made without causing environmental damages. Despite its importance, Paragominas was yet not able to transition from CAR to LAR or Certificado de Cadastro do Imóvel Rural (CCIR, which gives definite land ownership).

Reasons for perceived success

Municipalities vary in their motivation to mobilize their actors and exit the Red List. One of the motivations for Paragominas to provide leadership in reverting the negative image bestowed by being on the Red List was to attract new investment to the town through a wide adoption of "good practices" in agriculture and cattle ranching. Legal Lucas, one of the inspirations for Paragominas' leaders, was triggered to implement "best practices" by market demand and sanctions from the soy industry (Brannstrom, 2012). In the case of Paragominas, we believe that the restrictions imposed on the meat supply chain, and to some extent the perceived effect of the soy moratorium elsewhere, played important roles in developing MV. This market-driven component of the process doubtless contributed towards the lack of participation of smallholder farmers as the perceived benefits of their collaboration did not exceed the costs from complying with the rules, which in this case would have meant sacrificing traditional agricultural practices.

The experience of Paragominas matches the Environmental Kuznets Curve, which predicts that environmental degradation has an inverted U-shaped curve relationship with economic development. Despite several critiques of this model (Angelsen and Kaimowitz, 1999; Stern, 2004), studies based on international datasets indicate that the theory can apply to deforestation (Battharai & Hamming, 2001), though applying the hypothesis to the case of Paragominas require further research. Part of the argument behind a Kuznet's curve is the rise of an environmentally conscious sector of society (due to negative feedbacks from degradation), and while this is evident to some degree in Paragominas, the legal and market demand sides seem to be much stronger.

The political and socio-economic conditions in Paragominas during the 1990s predisposed municipal actors towards developing and embracing a project such as the MV. In particular, our interview work indicated that the most important enabling factor may have been the agency and entrepreneurship of political leaders, who saw the situation as an opportunity for renewed growth and investment, and who held sufficient political capital to secure a critical mass of support. Moreover, it is likely that farmers agreed with the MV because Paragominas is part of an old frontier, and many of the property owners have an interest in staying there and investing in improving the city as well as their own production.

Extrapolation

In 2011 the state government of Pará launched the program *Green Municipalities* (*Municípios Verdes*), as an attempt to expand Paragominas' achievements to other municipalities throughout the state. The program is voluntary, and seeks to empower municipalities to improve the regulation and management of their natural resources through multi-sector partnerships and funding from the state and Fundo Vale. However, they are facing a series of institutional difficulties in operationalising the program. An important challenge is to overcome the lack of institutions and social capital capable of implementing and maintaining the often highly technical work of monitoring deforestation, registering properties, and giving technical assistance to farmers. Both TNC and Imazon have supported the presence of permanent, skilled staff members, and office facilities in Paragominas throughout the majority of the lifetime of the project. These NGOs filled the gap in technical capacity that is often highlighted as an explanation for the failure of decentralization policies (Fox and Aranda, 1996). All these

essential conditions are more difficult to be met in the agricultural frontier, in the most remote areas of the Amazon.

The establishment of new and multi-sector partnerships was key for the development of MV. Nevertheless, these same partnerships may also represent a weakness of the MV, given that voluntary partnerships can be vulnerable to political transitions and financing. Relying on such multi-sector partnerships may not be viable at the state level, because of the much greater scale of the challenge and the limited capacity of NGOs and other technical institutions to recruit and fund sufficient trained employees.

In a similar sense the strong leaderships in government, Farmer's Union, NGOs, and Public Attorney, so crucial to the development of MV, could also been seen as an inherent vulnerability as its maintenance is dependent on political context and the presence, interest and availability of particular individuals. Based on these arguments, it is unclear whether the MV can be replicated to other municipalities.

Currently, the MV is entering its second phase by promoting sustainable land uses at the property level, through efforts to achieve full compliance of rural properties with environmental legislation and municipality level ecological-economic zoning. As part of this phase, the mayor's office in Paragominas together with leading partners have established partnerships with Fundo Vale, University of São Paulo, State University of São Paulo, the private company Dow Agrosciences. RAS will give scientific support to the initiative through research on land-use sustainability in the region. In order to ensure that this hybrid governance and support system does not result in "short-term fixes and long-term ineffectiveness" (Lemos and Agrawal, 2009), the MV must continue investing in knowledge sharing and diminishing power inequalities, in particular with regard to

smallholder farmers.

6 Conclusions

Our analysis of the case of Paragominas demonstrates that hybrid governance arrangements can provide partially successful solutions for conflict situations involving private decisions regarding land-use. We also argue that the Brazilian Federal government's Red List of Deforestation was not a decentralization policy, but rather an attempt to share responsibilities between government levels and improve cooperation between them. The effectiveness of this response at the municipal level depends on several factors, with key elements being strong leaderships and reliable multi-sector partnerships to cover the predictable lack of technical capacity and social capital. We also suggest that these same elements are inherently vulnerable given their sensitivity to political and historical context and the dependency on key individuals.

Comparative analysis of the process that led Querência out of the Red List would enrich our understanding of the municipal capacity for political mobilization. Looking at other success cases can possibly indicate best ways to institutionalize the attribution of greater political capacity to municipalities There is also a need to look more deeply at failures to try to understand why other municipalities are still on the Red List and why/how have their efforts been inadequate.

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Figure 1

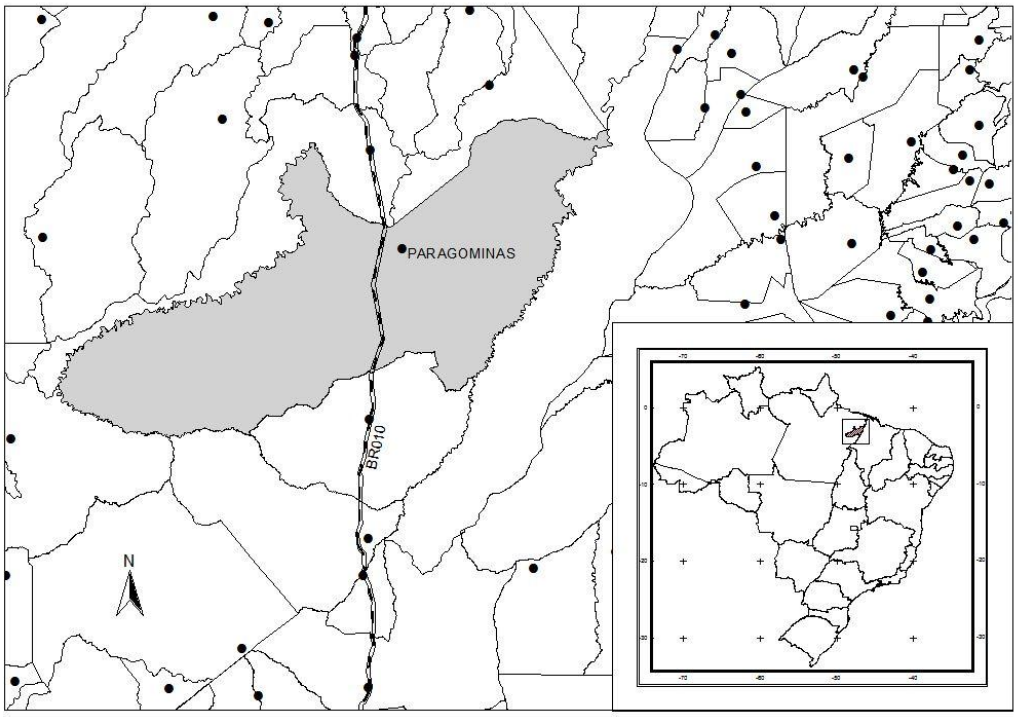


Figure 2

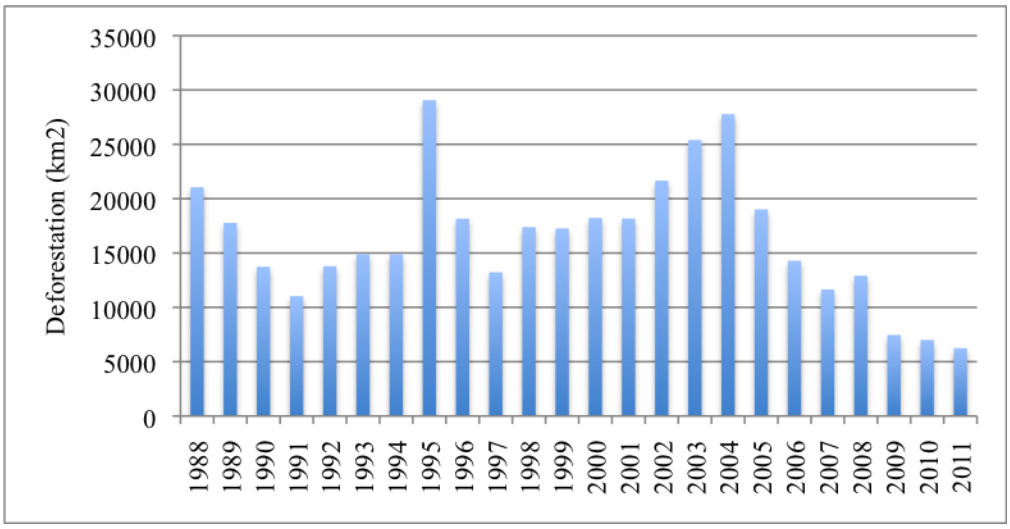

Deforestation (km2)
35000
30000
25000
20000
15000
10000
5000
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Figure 3

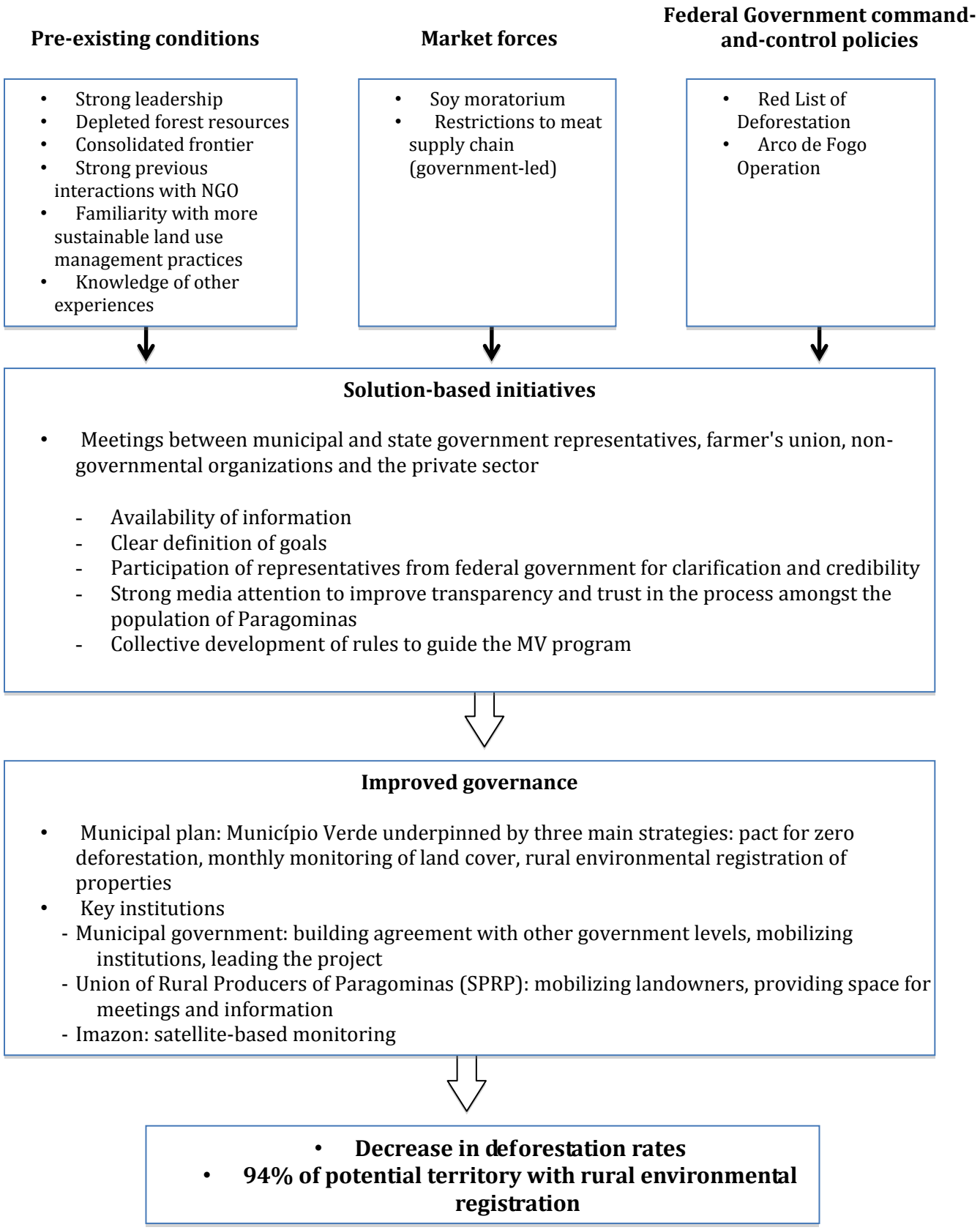
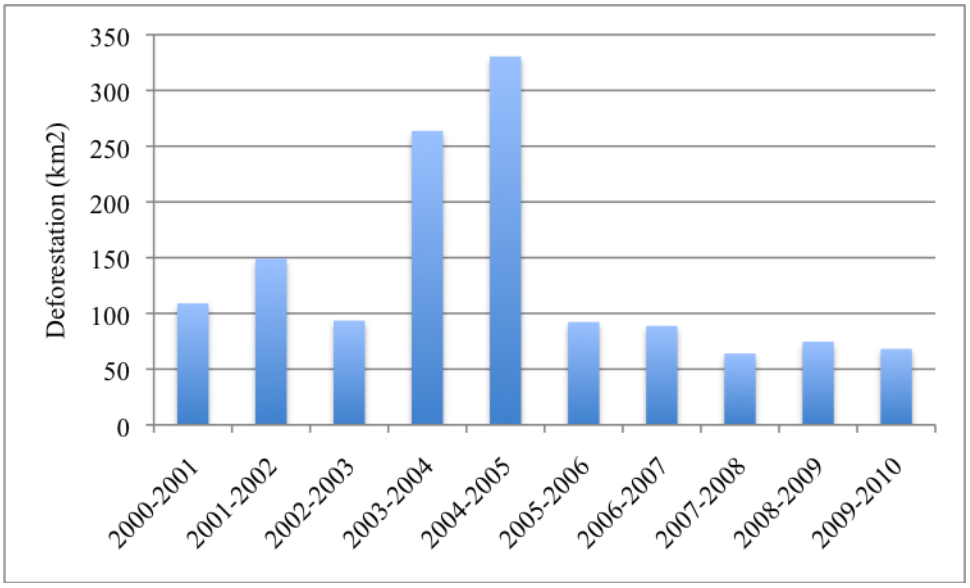

Pre-existing conditions
Strong leadership
Depleted forest resources
Consolidated frontier
Strong previous interactions with NGO
Familiarity with more sustainable land use management practices
Knowledge of other experiences
Market forces
Soy moratorium
Restrictions to meat supply chain (government-led)
Federal Government command-and-control policies
Red List of Deforestation
Arco de Fogo Operation
Solution-based initiatives
Meetings between municipal and state government representatives, farmer's union, non-governmental organizations and the private sector
Availability of information
Clear definition of goals
Participation of representatives from federal government for clarification and credibility
Strong media attention to improve transparency and trust in the process amongst the population of Paragominas
Collective development of rules to guide the MV program
Improved governance
Municipal plan: Município Verde underpinned by three main strategies: pact for zero deforestation, monthly monitoring of land cover, rural environmental registration of properties
Key institutions
Municipal government: building agreement with other government levels, mobilizing institutions, leading the project
Union of Rural Producers of Paragominas (SPRP): mobilizing landowners, providing space for meetings and information
Imazon: satellite-based monitoring
Decrease in deforestation rates
94% of potential territory with rural environmental registration

Figure 4


Deforestation (km2)
350
300
250
200
150
100
50
0
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010