A multi-governmental experience for the prevention and control of deforestation in the Brazilian Amazon: roots and long-term results

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Abstract

At the begin of the 21st century, the Brazilian Amazon, a region larger than the European Union, had more than 25.000 Km² deforested annually. During the first mandate of the worker's party of President Luis Inácio Lula da Silva (2003-2006), tackling deforestation took a central place in the presidential agenda. The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm) came up through an interministerial working group composed of 13 federal agencies, led by the chief minister in the Brazilian government. As part of PPCDAm, each institution proposed strategic actions in relevant areas to prevent and control deforestation. This led to a more than 50% decrease in deforestation rates from 2004 to 2008 and the plan has been renewed continuously since. We analyze PPCDAm by paying attention to the institutional and political roots that favored its launch, and its results and changes in the long-term. The presentation is part of CIFOR's global research into multi-stakeholder forums, carried out in Brazil through mixed-method interviews with PPCDAm participants, organizers and other relevant stakeholders, supplemented with research on official documents and third-party evaluations. The results show that PPCDAm changed Brazil's approach to deforestation in different ways. Firstly, organizing multi-institutional command-and-control actions supported by remote sensing techniques worldly recognized. Secondly, by promoting access to public services as compensation for the economic impacts after command-and-control actions. Thirdly, by raising awareness that land-use planning can optimize resources, including the creation of conservation units in deforestation hot-spots. The results also appoint that the budget prioritization for implementing PPCDAm activities and the coordination in the Civil House were important factors regarding the multi-institutional adherence to the plan. However, States and municipalities were not enough involved in the planning stages, although many actions focused on their territorial performance. Thus, PPCDAm proved to be an expensive and less effective plan in the long-term. Over time there has been greater involvement through the development of State plans, although these tend to have technical and budget limitations. Another challenge is that command-and-control actions were more successful than sustainable uses and land-tenure clarification. Finally, after more than one decade, recently PPCDAm has played a marginal role regarding a wider shift in development policies due to the predominance of conventional development paradigms and alliances with economic elites and traditional policies. At the same time, illegal deforestation has been re-shaping its patterns to overcome the remote sensing control. As a result, Brazil has shown increases in deforestation rates after 2014. In the long-term, therefore, the PPCDAm is becoming worn out, either because the deforestation problem was considered over control, by changes in the political practitioners, or because of rearrangements in national and international pressure and priorities.

Keywords: Panel ID 232, multi-institutional cooperation, command-and-control actions, forest-based development, land-tenure clarification

1. Introduction

At the end of the 20th-century deforestation on tropical forests all over the world generated social and environmental mobilizations pressuring national governments to develop practical responses. The protectionist perspective was the first practical response, largely based on the "Tragedy of the Commons" hypothesis proposed by Hardin (1968), who argued that humans always seek to improve their well-being or maximize their utility at the expense of the collective good. In this perspective, the State must regulate individual interests in order to achieve collective goals such as avoiding overexploitation. In practical terms, this understanding was operationalized in two ways. First, through the creation of protected areas in which the ecological and conservation value of the forest was considered as incompatible with human occupation (Galetti, 2001; Redford and Stearman, 1993; Terborgh, 2000). Second developing tools avoiding illegality and regulating forest uses through a set of environmental norms, rules, procedures, and standards to be followed, accompanied by a set of punishments (Margulis, 1996).

Nevertheless, social movements in the tropics reached out cooperation with international agencies to pressure governments to recognize their rights to access and use of forest resources (Colchester et al., 2006). There are many examples of these movements in Latin America (Allegretti, 2002; Amaral and Amaral Neto, 2005; Espinoza and Arenas, 2007; Garibay, 2007; Hammen, 2003). Considering that forests play important role in the livelihoods of peoples who often live in poverty (Bakkegaard et al., 2016), these movements argued that some social groups have countered resource degradation by developing and maintaining self-governing institutions (Ostrom, 2000). Therefore, local forest management represents an alternative to reconcile forest conservation and poverty alleviation (Colchester, 2000; Schwartzman et al., 2000) and the State should foster sustainable forest management for local benefits. In this case, forest legislation should not only be in harmony with the economic and social progress of the country but also shall induce such progress (FAO, 2006).

Among tropical countries, Brazil is seen as one of the most advanced when it comes to forest regulation. Historically the Amazon forest was seen as an obstacle to overcome in order to establish colonization projects for agricultural activities (Becker, 1990). During the 1990s, internationally embarrassed, Brazil assumed international commitments to reverse deforestation (Araujo and Viana, 2009). In 1992 Brazil hosted and had a central role in the United Nations Conference on Environment and Development - the Rio Earth Summit. After it, and the subsequently implemented Pilot Program for Tropical Forest Protection (PPG7), Brazil plays a central role in international efforts for forest conservation, being the world leader in projects for Reducing Emissions from Deforestation and Forest Degradation (REDD+), followed by Indonesia, Peru, Colombia and Congo (Simonet et al., 2015).

The Brazilian success in forest management is commonly linked with the drastic fall in deforestation rates since 2005. This fall, in turn, is often recognized as a result of the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm). The PPCDAm somehow tried to address both the protectionist as well as the forest-based development

perspectives and it has been worldwide presented as a success show-case. This article analyzes PPCDAm, first by describing its proposal, then analyzing its political roots and the institutional architecture. The effectiveness is evaluated regarding the main policies and actions as well as its key benefits and challenges. Finally, some recommendations are pointed out. In analyzing we will stress some different points of view linked to the interviews representing different perspectives evolving the plan. The data collection description is presented below.

2. Methodology

This research was conducted as part of CIFOR's global research into multi-stakeholder forums (MSF), carried out in Brazil through mixed-method interviews. In the first step, the scoping study was carried out by analyzing the four published plans supplemented with research on official documents and third-party evaluations, articles, and books. After a roadmap regarding the PPCDAM features and stakeholders was built and all the CIFOR research tools were adapted since PPCDAM is a set of policies and actions put together by a multi-governmental forum. The fieldwork was conducted between June and September 2018. In total, 28 interviews were carried out, twelve interviewees were female and sixteen male representatives. A Theory of Change (ToC) questionnaire was applied with three PPCDAm conveners/organizers, two from the Civil House and one from the environment ministry (MMA), the current organizer. The Participant Questionnaire was conducted across 18 government actors that worked or still work on PPCDAm through public institutions. Eight participants represent the environmental land use interests, such as the protection and conservation goals, and ten represent production interests, including indigenous and traditional peoples, mining, agriculture, and rural development interests.

When selecting the interviewees, we considered the need to cover all the different PPCDAm phases, including the planning period between 2003-2004. The majority of the interviewees is composed of coordinators or managers in their respective department while interacting with PPCDAm. In general terms, they are mid-level bureaucrats who play an intermediate role in public bureaucracy: managing street-level bureaucrats and making the link between implementers and the formulators, they represent a central set of actors in the processes of implementation of public policies (Lotta et al., 2015). It is important to highlight that, depending on the position the interviewee is currently in charge, it seemed like they felt uncomfortable speaking critically about the government, especially when talking about the recent phase of the plan. Apparently, they were careful about the possible consequences of their statements once the prevalent feeling in the Brazilian federal government nowadays is linked with harassments when public servers assume a political position against the government in power. As a result, interviewees who were not an active public worker at the moment gave more critical statements when analyzing the current phase of the plan. In all cases, it is interesting to point out the general nostalgia feeling of the interviewees when talking about the first PPCDAm phases.

The key context questionnaire was applied with seven experienced and knowledgeable actors occupying positions at the University, NGO, Private Company and the current

representative of the Governors' Climate and Forests Task Force. In general terms, the information brought from the key context interviews is not colliding with the context information found in the assessment presented in the first plan and in the evaluation inserted in the other phases. However, the key context interviews notably contributed to ponder more critically the direct effect of the PPCDAm on deforestation rates, for example.

2.1. Case study

Amazon is the largest remaining tropical forest in the world and Brazil hosts approximately 63% of this biome. The region is composed of a mosaic of different forest ecosystems, with a complex drainage network and the highest biological diversity reserve in the world (Ab'Sáber, 2002). Legal Amazon, in turn, is a geopolitical region established by Federal Law 1,806/1953 (**Figure 1**). It covers an area larger than the European Union, representing 59% of the Brazilian territory, distributed in nine states, contains 775 municipalities and over 20.3 million people (IBGE, 2010).

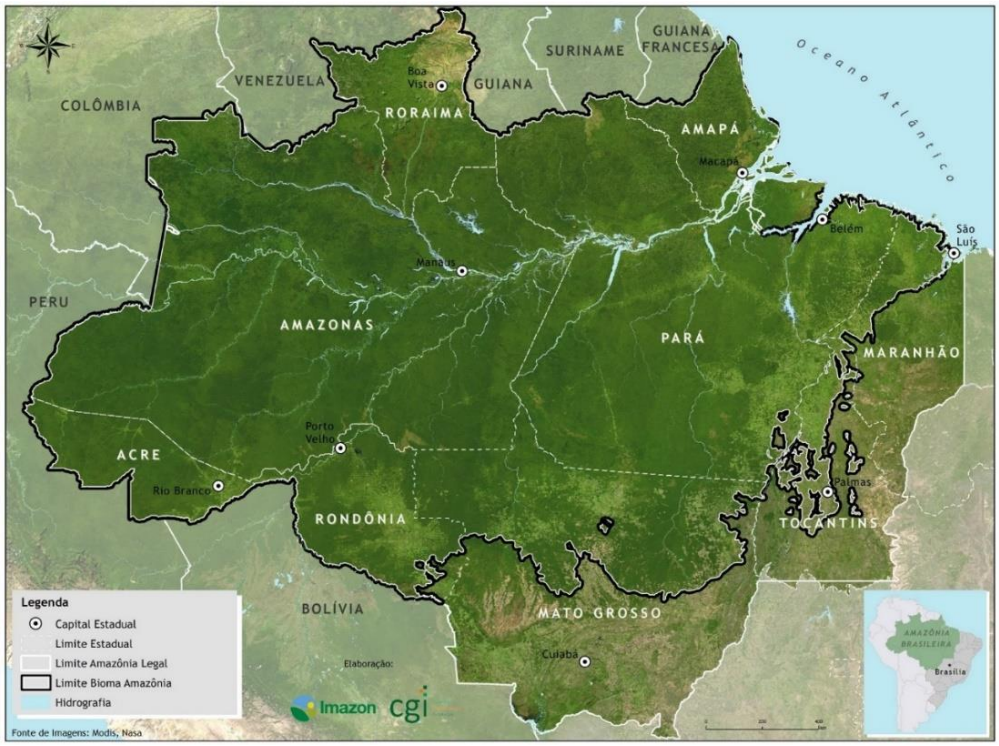

Figure 1. Brazilian Legal Amazon.
Source: Imazon[1]

Box 1 below reproduces a summary of the main deforestation vectors and features identified by the assessment that preceded the first PPCDAm published in 2004. All the key

[1] Available in: https://imazon.org.br/mapas/amazonia-legal/

context interviewees' quotes agreed to the official assessment on the general deforestation causes and features. Just one of them added a different factor that is the 80% restriction on land use through the Legal Reserve in the Provisory Law 1,511/1996 which stifles the possibility of development vectors in the region, encouraging illegal markets and activities (BRA-PPC-NAT-NGO-PRO-MAL-026-NP).

Box 1. PPCDAm assessment on deforestation in the Legal Amazon:

- Most of the **deforestation has occurred without authorization** by the competent agencies. For example, the total area with authorizations issued by IBAMA corresponds to 14.2% of the total deforested in the Legal Amazon in 1999 and 8.7% in 2000.
- **Livestock** was responsible for near 80% of all deforested areas in the Legal Amazon, benefiting from the availability of cheap land and, in several cases, for lack of compliance with environmental and labor legislation
- The deforestation is related to **public land grabbing practices** and reflects: i) the lack of adequate supervision by the Public Authorities on land-tenure registries, which often recognize illegitimate land transactions, ii) weaknesses in the processes of legitimacy of securities, and iii) political-electoral interests, typically with the support of land agency officials and promoting occupations encouraged by future promises. Land grabbing is also often linked to other illegal acts, such as illegal possession of weapons, violations of labor rights, tax evasion, illegal logging, money laundering, etc.
- The **soybean** area increased by 57.31% in the Arc of Deforestation in 1999-2001. As a result of the growing demand for soy in globalized markets and the availability of cheap land in the Amazon, this expansion was concentrated in areas of flat topography, with favorable soil, climate, vegetation, and transportation infrastructure conditions.
- It is estimated that **unsustainable logging** reaches up to 90% of all timber extracted from the Amazon forest. Clandestine creeks by loggers in isolated areas of the Amazon have facilitated public land grabbing practices and squatters. Many times the logging is carried out without good management practices, making the forest vulnerable to fire invasion from grazing and clearing in neighboring areas.
- Investments in **infrastructure**, such as highways, tend to provoke a strong appreciation of land in its area of influence. The expectation of major infrastructure projects encourages processes of land speculation, land grabbing, migration, and disordered occupation of space, opening deforestation fronts.
- The Amazon region has been prioritized to rural settlements projects, where agriculture and extensive livestock farming have been the predominant activities. In poor conditions of survival, many farmers leave their areas and the buyers usually are local merchants, loggers and, ranchers, including more successful settlers, acquires land through informal transactions. As a result of this process of **land (re)concentration in agrarian reform settlements**, there are tendencies to increase deforestation, associated with the expansion of extensive livestock farming.
- **Deficiencies and contradictions in public policies**, such as the implementation of highways and other infrastructure works with strong impacts, conflicts between environmental legislation and land policy, and the lack of prioritization for the best use of already deforested areas as well as for timber and non-timber forest products management, and for the provision of environmental services.
- **Conservation Units and Indigenous Lands** have played an important role in the conservation of extensive contiguous forest areas, although they are under pressure mainly associated with the mining, logging and land grabbing.

Source: Brasil, 2004.

In this picture, the federal Ministry of the Environment (MMA) is responsible for the formulation of forest policies and standards, IBAMA is the main agency of enforcement and

inspection of forestry activities, the Chico Mendes Institute (ICMBio) deals with conservation units and the Brazilian Forest Service (SFB) conducts sustainable management at public forests and is responsible for the forest development topic. Nevertheless, local governments have many similar responsibilities, especially since the complementary law 140/2011, which states about the common competence of the Union, the States, the Federal District and the Municipalities for the protection of the environment, natural landscapes and the preservation of forests, fauna, and flora. However, the institutional vulnerability of several states and municipalities coupled with low social capital have been challenging the implementation of such law (Scardua and Bursztyn, 2003). In this picture, non-governmental organizations (NGOs) are also important players in the Brazilian Amazon. Playing a role beyond social control, NGOs often work together with the governments, who often delegate the generation of data, the evaluation processes and even the implementation of programs and activities.

2.2. The PPCDAM proposal

Representing a consolidation of proposals developed by thematic subgroups, the PCDAm proposed actions distributed in four different components: (i) Land and Territorial Planning, dealing with territorial planning instruments focusing on land policy, conservation units and sustainable local development strategies; (ii) Monitoring and Control, leading instruments for monitoring, licensing and inspection of deforestation, fires, and logging, (iii) Promotion of Sustainable Productive Activities, running rural credit and tax incentives, technical rural assistance and extension, and (iv) Infrastructure, focused on infrastructure policies, mainly in the transportation and energy sectors. The 4-year plan included emergency measures, with the potential to generate impacts in the short term, and actions that require longer deadlines to generate effective impacts. A preliminary proposal was presented and distributed in working meetings with the governors of the Amazon States and non-governmental organizations representatives. The comments and suggestions were received by the Civil House until December 2003 and were incorporated into the planned actions as possible (BRA-PPC-NAT-GOV-PRO-FEM-012-ToC).

The actions foreseen in the territorial and land tenure management component included, for example, the creation of conservation units, as well as efforts to regularize undesignated public lands. In the scope of monitoring and control, a real-time deforestation detection system was developed (DETER) and the implementation of integrated enforcement operations was coordinated between IBAMA, the defense ministry and the federal police department in the prioritized municipalities, among other initiatives. The development component for sustainable productive activities included the elaboration of territorial development plans in areas with recent deforestation trends, such as the Sustainable BR163 Highway Plan, the elaboration of Law 11,284 of 2006, which provides for the management of public forests for sustainable production, establishes the re-creation of the Brazilian Forest Service (SFB) and the creation of the Amazon Fund (Decree 6,527/2008), among other actions. A deeper analysis of the main policies and actions are presented in the effectiveness assessment session.

The Infrastructure component was later dropped from the plan through a government decision. It happened because there was a kind of salvage of the regional development experiences from Celso Furtado's approach to national planning; 'It was not that we were repeating that idea from 1950, but there was some effort in that sense' (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).

> *Those are poor regions, where people are abandoned by the State. It is difficult to bring public policies to low-density population areas anywhere in the world. So, what made a difference was working on the infrastructures, which in the beginning was considered a contradiction. We followed, for example, the construction of the BR 163 Highway, and other major infrastructure projects such as hydroelectric dams. The employment generated helped relieving the pressure on deforestation. Having the economy circulating created a situation where people didn't need to keep the deforestation as their only source of income. In the last years, those jobs disappeared and the deforestation has increased* (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).

Indeed, the more infrastructure does not reach the Amazon settlements the more the settlers are subject to farmers' influence and the forest conversion in livestock becomes a matter of survival (BRA-PPC-NAT-GOV-ENV-FEM-008-P). Therefore, there was a strategic change to insert the infrastructure issue in the Amazon Sustainable Development Plan (PAS), which later on was not implemented due to political changes in the National Integration Ministry. Nevertheless, the concern with the deforestation associated with infrastructure was somehow addressed by the creation of protected areas and improving the requirements for implementing the infrastructure projects (BRA-PPC-NAT-GOV-ENV-FEM-008-P).

2.2.1. Convener/organizer

Between 2004 and 2013 the PPCDAM was coordinated by the Chief of Staff Office (Civil House), a body directly linked to the Executive Branch, responsible for monitoring and advising the roles of the Presidency of the Republic. In comparative terms, the role of political coordination performed by the head of the Chief of Staff Office would be similar to the prime minister in parliamentary governments. As the arena for coordinating government policies, all the organizers interviewed agreed that the Civil House does not have the purpose of implementing long-term State policies. Then, considering the drastic and stable decrease in deforestation rates, as well as a context of changes in political priorities and the relative replacement of the emphasis on combating deforestation by the climatic issue at the national and international levels, in 2013 the PPCDAM coordination was transferred to MMA. Currently, it is one of the sectoral plans for mitigation and adaptation in the umbrella of the National Policy on Climate Change (Law No. 12.187/2009).

There is a unanimous assessment that the coordination transition has affected the degree of commitment of some sectors since the MMA has less political weight within its peer ministries. There is, in this sense, an evaluation that the PPCDAM was a victim of its own success (BRA-PPC-NAT-GOV-ENV-FEM-002-P). An additional interpretation, however, is the difference in President Lula's way of governing compared to Dilma's. With Lula, the Civil House had a role in

coordinating the ministries and preparing the president's decisions but under Dilma's mandate reduced the intermediation role of the Civil House. Dilma preferred to keep direct contact with the ministries and some interprets that Dilma worked like as in the dictatorship regime when clandestine organizations had to work with a high level of confidentiality (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).

2.2.2. Stakeholders

Considering the team cited in the published plans, the PPCDAM had nearly 40 institutions formally inserted (**Box 2**). Considering the technical and executive staff published in the four plans, 296 participants have been engaged, 211 male representatives against 77 female representatives. Nevertheless, 88% of them has participated in only one phase of the plan, fifteen individuals (5%) participated in two phases, five individuals participated in three different phases and no one has officially participated in the four phases of the PPCDAM.

Box 2. Institutions represented in the published plans

Organization		LULUC Priority	Sample	Note
ABIN	Brazilian Intelligence Agency	PRO	No	
ANA	National Water Agency	ENV	No	
Casa Civil	Civil House of the Presidency of the Republic	PRO	Yes	Organizer up to 2013
CENSIPAM	Operational and Management Center of the Amazon Protection System	ENV	No	
CONAB	National Supply Company	PRO	Yes	
DPF	Federal Police Department	ENV	No	
EMBRAPA	Brazilian Agricultural Research Corporation	PRO	No	
FBMC	Brazilian Forum on Climate Change	ENV	Yes	Civil society
FN	National Force	ENV	No	
FUNAI	National Indian Foundation	PRO	Yes	
GIZ	German Society for International Cooperation	ENV	Yes	Donor
GTA	Amazon Working Group	PRO	No	Grassroots
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources	ENV	Yes	
ICMBio	Chico Mendes Institute for Biodiversity Conservation	ENV	Yes	
IMAZON	Institute of Man and Environment of the Amazon	PRO	No	NGO
INCRA	National Institute of Colonization and Agrarian Reform	PRO	Yes	
INPE	National Institute of Space Research	ENV	No	
IPAM	Institute of Environmental Research of the Amazon	ENV	Yes	NGO
IPEA	Institute of Applied Economic Research	PRO	No	
MAPA	Ministry of Agriculture, Livestock, and Supply	PRO	Yes	
MCTIC	Ministry of Science, Technology, Innovation, and Communication	PRO	Yes	Former Science and Technology Ministry
MD	Ministry of Defense	ENV	No	

MDA	Ministry of Agrarian Development	PRO	Yes	Extinguished by the provisional measure n ° 726 / 2016
MDIC	Ministry of Industry, Foreign Trade, and Services	PRO	No	
MDS	Ministry of Social Development	PRO	No	
MF	Ministry of Finance	PRO	Yes	Included in 2010
MIN	Ministry of National Integration	PRO	No	
MJ	Justice ministry	ENV	No	Through FUNAI
MMA	Ministry of the Environment	ENV	Yes	Organizer after 2013
MME	Ministry of Mines and Energy	PRO	Yes	
MPA	Ministry of Fisheries and Aquaculture	PRO	No	Included in 2010
MPOG	Ministry of Planning, Budget, and Management	PRO	No	Included in 2004
MRE	Foreign Ministry	PRO	No	Included in 2004
MT	Ministry of Transport	PRO	No	
MTE	Ministry of Labor and Employment	PRO	No	
SEAD	Special Secretariat for Family Agriculture and Agrarian Development	PRO	Yes	Created by the decree Nº 8780 / 2016
SAE/PR	Secretariat for Strategic Affairs of the Presidency of the Republic	PRO	No	permanent guest – included in 2010
SFB	Brazilian Forest Service	PRO	Yes	
SUDAM	Superintendence of the Development of the Amazon	PRO	No	
SUFRAMA	Superintendence of the Manaus Free Trade Zone	PRO	No	
TNC	The Nature Conservancy	ENV	Yes	NGO

2.2.3. Decision making

The sectoral actions were mainly defined by the technical team of each ministry. Most of the actions already existed and gained strength when they were linked to the PPCDAm. There is a general feeling that the Civil House made a fair job of hearing equally all involved perspectives. When an organization's action conflicted with the objectives of another one, for example, the creation of conservation units and the interest in mining exploration, the debate was taken to the political arena among ministers mediated by the Civil House. If a consensus was not reached and the conflict remained, the decision making involved directly the presidency of the republic. In the long-term, however, there were changes in this institutional equity aspect.

> *In the beginning, the Civil House managed to contain the discrepancies between ministries with unequal political power. But over time, especially when Dilma took over the presidency, this mediation was loosened. The Belo Monte dam is an example since it flooded an area that was expected to create protected areas* (BRA-PPC-NAT-GOV-ENV-MAL-027-P).

By the States point of view, however, participation in decision-making was smaller and, in practice, they were induced to develop their jurisdictional plans, often without adequate technical staff and in some cases without having a political will at the state level.

> *The Civil house had an idea that Pará and the Mato Grosso States were the villains. So, we went to talk with them, we wanted to know if the States governments would collaborate within the federal effort but there was certain arrogance in our approach. The Pará secretary of development received us and said "You are coming with a wrong premise; do you think that opening new areas is good for the Para government? It's not. For every area that is opened, another little village is formed and it's another infrastructure request, another request for social politics, and we can't handle that"* (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).

The municipalities had even fewer opportunities to express their consent, although on several occasions they were the main impacted by command and control operations, as well as in the creation of conservation units.

> *Initially, the municipalities faced their name on the blacklist and the mayors did not understand because they thought the deforestation problem was MMA and IBAMA responsibilities. The Paragominas mayor went to Brasilia to understand how to leave the list and the proposers had not thought of it. A new algorithm was quickly developed to guide how municipalities would be taken off that blacklist* (BRA-PPC-NAT-GOV-ENV-FEM-002-P).

Regarding civil society, the actions' definition and prioritization were closed in the government sector but there were NGOs specialists incorporated in public offices, especially in the MMA. The civil society also was represented by experts and NGOs invited to participate in workshops and meetings. Around 2008/2009 there were technical seminars that were important events for strategic discussions in a wide sense, including the civil society contributions (BRA-PPC-NAT-GOV-ENV-FEM-002). The incorporation of the civil society contributions, however, presented some limits.

> *There were technical and scientific seminars where the civil society could discuss specific matters, for example on the way to estimate deforestation. But a government representative always has a commitment with its official body and the Civil House shall consider the INPE estimation since it is the government body responsible for technical decisions on the issue* (BRA-PPC-NAT-GOV-PRO-FEM-012-ToC).

2.2.4. Funding

The organization of the commissions is a meeting of public officials and does not involve a relevant cost. The operational plan of the first plan (2004-2008) included a budget forecast of detailed expenditures by activities in each component. The second plan (2009-2011) presented a matrix consolidated by macro strategic actions and complementary actions by thematic component and the third plan pointed to the total planned budget by thematic components. The current phase of the plan does not present financial information. According to the current organizer, the financial

information of the plan is not easily measurable and presents methodological difficulties of dissociating data related to the remuneration of public officials, for example (BRA-PPC-NAT-GOV-ENV-MAL-013-ToC). In the history of PPCDAM, therefore, there are budget numbers but nobody can specify the financial resources objectively employed in the plan (BRA-PPC-NAT-GOV-ENV-FEM- 002-P).

In all cases, it is notable that the PPCDAm implementation was carried out for the most part with government resources. A survey carried out by the MMA points out that the donations received by the Amazon Fund represent about 15% of the total invested by the government between 2009 and 2017 in the main PPCDAm final actions (BRA- PPC-NAT-GOV-ENV-MAL-013-ToC). Nevertheless, a donor representative highlighted that international donations represented few contributions quantitatively but it is a strategic resource to expenses that are difficult to pay through the government bureaucracy (BRA-PPC- NAT-GOV-ENV-FEM-002-P). More recently, after the political and economic crisis that resulted in Dilma Rousseff's impeachment, this international resources started to be used to support IBAMA actions, one of the institutions that suffered budgetary contingencies in the environmental agenda.

3. Results

3.1. PPCDAm roots and the long-term changes

In June 2003, the National Institute for Space Research (INPE) released data showing an increase of 25,396 km² of the deforested area in the Legal Amazon. In May 2004, Brazil announced deforestation of 27,772 km² and, under the pressure of national and international non-governmental organizations, added to the appeal that the Amazon carries with Brazilian society in general, the newly elected President Lula and his first minister of the environment Marina Silva requested an assessment on the deforestation tendencies. The first conclusion regarded the concentration in an arc superimposed on the agricultural frontier. In 2000-2001, nearly 70% of Legal Amazon deforestation occurred in about fifty municipalities in the Mato Grosso, Pará, and Rondônia states, some municipalities deforested 80-90% of its total surface area (Brasil, 2004).

> *Brazil elections occurred in a strong political campaign. There was external pressure from national and international non-governmental organizations against deforestation. In that context, there was an environment flag, with a very sharp eye to the Amazon. When PT assumed the power, Marina Silva and Lula wanted to leave a mark, they wanted to do something with a national and multidisciplinary vision as well as with a good international flag. There was a political will to make a plan addressing all the pressure that was coming (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).*

In this context, the first PPCDAm had an executive approach, with the direct involvement of the Civil House and the ministers, with the leadership of Marina Silva from the environment ministry and Ciro Gomes, the minister of national integration (BRA-PPC-NAT-GOV-ENV-FEM-002-P). In order to ensure that the initiatives foreseen in the plan were not contingent, a PPCDAm

agenda was created within the Ministry of Planning, Budget, and Management (MPOG) and inclusion in the Multi-Year Plan (PPA) allowed direct access to resources for the execution of the planned actions, avoiding that the financial transfers would be diverted by other internal priorities of each ministry (BRA-PPC-NAT-GOV-ENV-MAL-028-P). MPOG demonstrated this budgetary priority for PPCDAM initiatives because it was a government strategy to combat deforestation (BRA-PPC-NAT-GOV-ENV-FEM-008-P).

> *It became an important issue because it was the desire of the society who voted at that time and consequently those who won had to honor that commitment. It is like the winning candidate honoring the agenda of those who elected him. Consequently, they didn`t do anything more than to represent the interest of the society at that time* (BRA-PPC-NAT-GOV-PRO-FEM-021-P).

In 2006, Marina Silva came into dispute with Dilma Rousseff, the Civil House minister, which accused Marina of delaying environmental permits for strategical infrastructure projects (May et al, 2016). In 2008 Marina Silva refused to adopt a flexible posture in order to remain in the government and resigned followed by the MMA's executive secretary and the IBAMA's president. In a public letter to the president, Marina Silva said her resignation stemmed from the difficulty of maintaining the federal environmental agenda, especially due to the increasing resistance from important sectors of government and society (Thuswohl, 2008 apud May et al, 2016). Carlos Minc assumed the MMA and assigned the PPCDAm's second phase. During his administration, he signed decrees to create seven new protected areas while over the same period IBAMA authorized 152 licenses and 108 authorizations for legal deforestation to development projects associated with the Growth Acceleration Program (*Programa de Aceleração do Crescimento* – PAC) (May et al, 2016). In the PAC scope, for example, the area of influence of the BR-163 highway became the stage for the Belo Monte and Tapajós hydroelectric construction, both considered projects conflicting with the guidelines of the former Sustainable BR-163 Highway Plan.

The second phase of PPCDAm was launched in November 2009 with the slogan "Towards zero illegal deforestation". In the first chapter, there is a summary of the 1st phase evaluation. This evaluation was carried out through scientific technical seminars with experts and representatives of federal and states governments, and some civil society organizations (Brasil, 2009). Besides the technical aspects of the adopted strategies, the evaluation gave recommendations in terms of participative aspects, such as the need of more involvement of the States' governments and better communications processes inside the government departments and within civil society (IPEA-GIZ-CEPAL, 2011).

The PPCDAM's third phase was published in June 2013, during 1st Dilma's presidential mandate, stressing the need for sustainable uses for the conservation of the forests. In the written document the government assumed that the greatest impact on the deforestation decreases came from the Monitoring and Control actions, at the same time recognized changes in the pattern of deforestation to smaller and dispersed polygons below the detection threshold (Brasil, 2013). In order to deal with such a complex challenge, the government built a logic model connecting the

actions with the objectives of the plan. Facing this roadmap, the Civil House determined that for each deforestation cause, of more than 100 detected, must have at least one planned action addressing it.

> *It was a way of improving the criteria but the strategy of having an action for each cause proved to be flawed over time. This multiplicity of actions generated more than 200 goals, which makes it difficult to monitor the results, further aggravated by the diversity in the scale and complexity of each goal. Besides, cause-and-effect relationships are complex to establish* (BRA-PPC-NAT-GOV-ENV-MAL-013-P).

The fourth PPCDAm (2016-2020) was launched precisely in the political and economic crisis that resulted in President Dilma Rousseff's impeachment. In the current phase, it was concluded that the deforestation causes remain the same as identified in 2012 and the executive committee was unified with the Plan for the Prevention and Control of Deforestation in the *Cerrado* (PPCerrado). *Cerrado* is the second largest Brazilian biome, covering about 25% of the national territory, and during 2010-2016 its deforestation rates were 60% higher than in the Amazon forest (INPE, 2018). There is an evaluation that the increase of deforestation in the *Cerrado* may be a leakage in response to command and control actions in the Legal Amazon (BRA-PPC-NAT-NGO-PRO-MAL-026-NP). The unified commission meets every six months when the ministry and entity participants monitor and evaluate its implementation proposing corrective measures. The composition of the Executive Committee follows the established in the 2003 decree. The Executive Secretariat is operationalized by MMA on a permanent basis, responsible for the analysis and monitoring of the indicators and for the dialogue with the Working Groups. The 4th phase also included an Economic and Normative Instruments component, seeking to address issues related to the formulation, improvement and revision of standards and economic instruments, such as credit for sustainable management, public procurement of legal and sustainable supply chains, and sectoral pacts, such as the soybean moratorium (Brasil, 2016).

As noted above, the federal government has been renewing the PPCDAm continuously since 2004 (**Figure 2**). In general, the coordination makes some bilateral meetings explaining the objectives of the new phase and/or the new component and there is an earlier internal preparation in the PPCDAm participating bodies. The participating bodies propose their actions, determining what can be developed and what the goals are for that period. This is done in conjunction with several areas of each institution and it is validated in the consolidation meetings of that PPCDAm phase. Once a phase is built and validated, the process of monitoring its implementation begins, thus the meetings are focused on monitoring and updating, where all the actions are reported and evaluated through reports and spreadsheets (BRA-PPC-NAT-GOV-ENV-MAL-003-P).

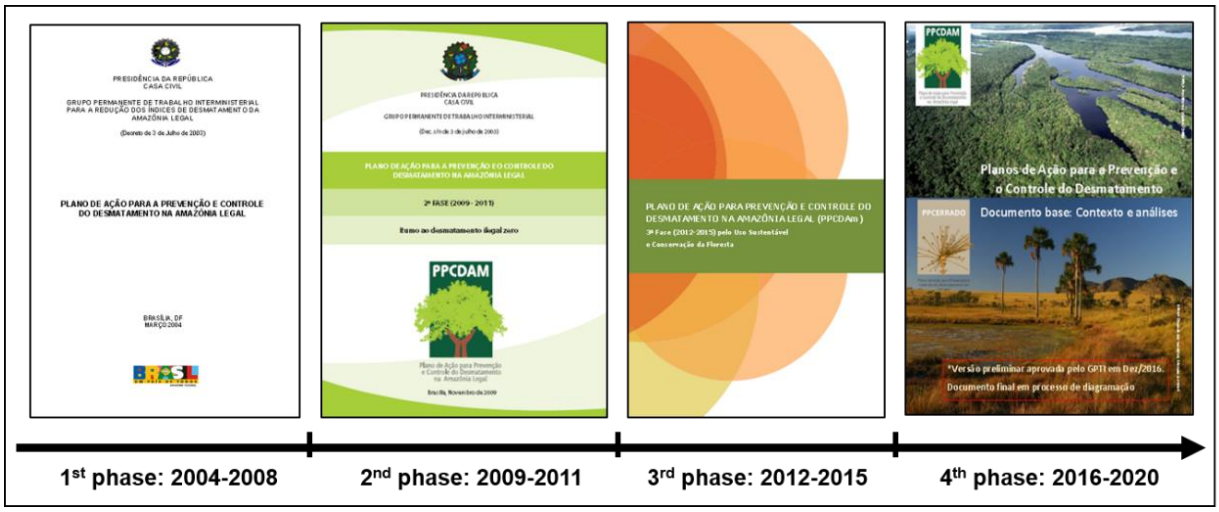

Figure 2. Timeline of PPCDAM phases.

However, there are conflicting interpretations regarding what extent the plan was still fully operational. Some say that the Brazilian government effectively abandoned the plan due to the recent predominance of conventional development paradigms and alliances with economic elites and traditional policies, resulting in a marginal role of the MMA regarding the development policies (May et al., 2016). In 2018, many interviewees agreed with this perspective, although it is not clear if it is a cause or a consequence of the change in the PPCDAm coordination (BRA-PPC-NAT-GOV-ENV-MAL-003-P). "*Nowadays there are some attempts. The movement of calling meetings is done by the MMA but it`s very lonely and isolated from what is happening in the political and economic national context. So, it's like a little boat trying to row against the tide and has a little practical effect"* (BRA-PPC-NAT-GOV-PRO-FEM-021-P). In this sense, both of the former conveners from the Civil House presented a similar interpretation regarding the approach change to the climate agenda, which is not as broad as the PPCDAm purposes.

> *The MMA adopted the PPCDAM as one of the sectoral plans in the climate change policy, which seeks for the reduction of greenhouse effect emissions. It's a change of the way of thinking, with a different institutional arrangement and another policy approach. That's why they created that office, which is basically for the reduction of the deforestation. It's just police power, so PPCDAm lost its regional development vision* (BRA-PPC-NAT-GOV-PRO-MAL-017-ToC).

3.2. PPCDAm effectiveness

Considering the central objective of reducing deforestation rates, the results were effective already in the short term. The decline in deforestation in the Legal Amazon lasted from 2004 to 2012, when it reached the lowest index in the Brazilian historical series (**Figure 3**). The effective results happened mainly in the first phase when there were command-and-control actions fighting against large-scale deforestation. However, after 2012, when the New Forest Code showed a

contradictory signal, the deforestation tendencies became pulverized and more difficult to control (BRA-PPC-NAT-GOV-ENV-FEM-002-P). As a result, from 2013 onwards, deforestation has oscillated but it is still showing annual variations between six and eight thousand square kilometers deforested each year, which is about 70% below the 27,000 km² deforested during the PPCDAm launch in 2004.

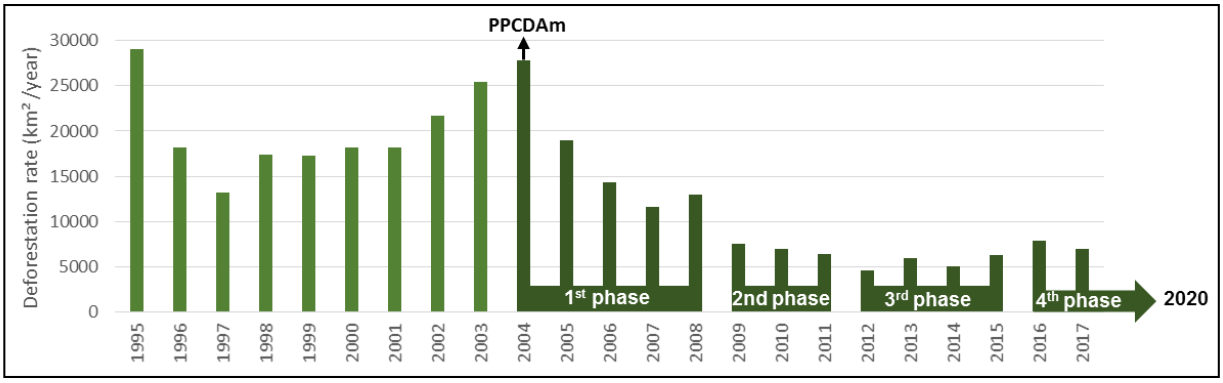

Figure 3. Deforestation rates in the Brazilian Legal Amazon (1995-2017) and PPCDAm phases. Source: PRODES.

The decrease in deforestation shortly after the PPCDAm is notorious, a result largely attributed to the plan, especially through its monitoring and control component. It is true for almost all participant interviewees in a greater or lesser extent. However, the key context interviewees pondered other relevant factors, such as the decrease in the price of agricultural commodities (soybean), the Soy Moratorium, the Cattle Ranching Agreement with the federal public prosecutor's office, as well as the favorable macroeconomic conditions for legal investments (BRA-PPC-NAT-NGO-ENV-MAL-001-NP). One key context informant was more critical highlighting that, in the overall balance, the PPCDAm and associated policies worked against the regional development of the Amazon, favoring economic development in other regions (BRA-PPC-NAT-NGO-PRO-MAL-026-NP). As a result, Amazon is still the region that concentrates poverty in the country (BRA-PPC-NAT-GOV-PRO-MAL-020-NP). However, considering the indigenous peoples and other communities that had their traditional land-use rights recognized, the creation of sustainable uses protected areas can be considered an advance towards equity.

> *Financial issues will always have greater weight but the Civil House pushed the PPCDAm agenda to a relevant status. So even when the environmental agenda had to give way, there were gains because we were there. Losing is part of the democratic game, social movements are made to yield at a certain point while advancing at others. Deciding to give in is better than not even being part of the decision* (BRA-PPC-NAT-GOV-PRO-FEM-021-P).

3.2.1. Territorial planning component

Main Players	Main policies and/or actions
• Ministry of the Environment (MMA) • Ministry of Mines and Energy (MME) • Chico Mendes Institute for Biodiversity Conservation (ICMBio)	• Creation of conservation units • Indigenous lands recognition • Terra Legal Program
Claimed results (Brasil, 2013): • Creation of more than 50 million hectares of conservation units • Homologation of more than 10 million hectares in indigenous lands • Inhibition of more than 60,000 rural property titles • Demarcation and perimeter signaling of the Conservation Units in the BR-319 highway influence area • Elaboration of the Macro Ecological-Economic Zoning (ZEE) of the Legal Amazon • Georeferencing of 25,618 rural holdings under the Terra Legal Program.	

Since the 1st PPCDAm, the government assumed that the legally protected areas, conservation units, and indigenous lands, play a fundamental role in the protection and sustainable use of forests, operating as protection against deforestation. Thus, the plan concluded that was fundamental to create new conservation units and consolidate the existing ones, as well as to implement the processes of identification, demarcation, homologation, and registration of indigenous lands (Brasil, 2004). Indeed, the main result of the land-use planning component was the creation of more than 50 million hectares of conservation units, mostly located in areas under deforestation pressure, besides the official recognition of more than 10 million hectares of indigenous lands. Concerning the Indigenous Lands, however, the FUNAI representative considers that the achieved result is not directly linked to PPCDAm actions.

> *There was no direct correlation between land management on indigenous lands and the PPCDAM. FUNAI had its own project, the Integrated Project for the Protection of Indigenous Peoples and Lands in the Legal Amazon (PPTAL). PPTAL was supported and financed by the German government through KfW and it had influenced the regularization of the indigenous lands in Brazil* (BRA-PPC-NAT-GOV-PRO-FEM-021-P).

Another important policy was the Terra Legal Program, an initiative of the Government that georeferenced, regulated and designated federal public lands in the Amazon region. According to the survey released by the Special Secretariat for Family Agriculture and Agrarian Development (SEAD), the Terra Legal Program issued 28,499 urban titles, from its creation in 2009 to 2017, corresponding to approximately 13,416,480 hectares allocated. Although the quantitative result is limited, Terra Legal's contribution is structuring (BRA-PPC-NAT-GOV-ENV-FEM-002-P).

3.2.2. Monitoring and Control component

Main Players	Main policies and/or actions
• Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) • National Institute of Space Research (INPE) • Ministry of Science, Technology (MCTI) • Federal Police Department/National Force	• Near real-time deforestation detection system (DETER) • Blacklist municipalities (Decree 6,321/2007) • Public Credit Restriction (BACEN Resolution 3,545/2008)

Claimed results (Brasil, 2013):

- Restriction of public credit to enterprises related to illegal deforestation (BACEN Resolution 3,545/2008)
- Creation of the near real-time deforestation detection system – DETER for deforestation alerts
- Improvement of PRODES
- Participation of the Army, Federal Police, Federal Highway Police and National Public Security Force in partnership with IBAMA in the planning and execution of surveillance operations in priority areas
- Execution of 649 integrated inspection operations in priority areas, totaling R$ 7.2 billion in fines, 864 thousand m³ of seized timber, approximately 600,000 hectares of embargoed areas, and more than 600 people who committed environment and public order crimes were arrested
- Training of 50 park guards for the protection of protected areas in the Legal Amazon
- Audit in the digital systems of control of forest products of 5 States in the Legal Amazon
- Creation and implementation of a central nucleus for coordinating investigation on environmental crimes
- Creation and implementation of the Interministerial Commission to Combat Environmental Crimes (CICCIA)

According to the majority of the interviewees, the monitoring and control component was the most successful component, especially since the creation of a nearly-real-time deforestation detection system (DETER), the improvement of PRODES, which since 1988 has been monitoring deforestation via satellite, and the development of DEGRAD, which since 2007 allows to differentiate native forest without human impact from those already degraded. The idea of creating a nearly-real-time alert system took place at IBAMA and was operationalized by INPE. INPE was challenged by IBAMA and developed the detection of the polygonal coordinates where deforestation was happening, available using the MODIS sensor. Before it, the monitoring was done by INPE technicians who visually analyzed images from year to year generating precarious and months delayed information. "(…) *when the surveillance team left Brasilia and actually get to the area, deforestation had already occurred and there was not much to do*" (BRA-PPC-NAT-GOV-ENV-MAL-011-P). DETER brought agility because the inspection was able to detect deforestation in the initial stage and send inspection teams before the deforestation gain greater proportions (BRA-PPC-NAT-GOV-ENV-FEM-008-P). Based on this data, IBAMA inspection began to work with more intelligence, inaugurating a new system of better planning and execution of enforcement operations in priority areas, with the participation of the Army, Federal Police, Federal Highway Police and National Public Safety Force in partnership with IBAMA.

The remote monitoring capability and the availability of technical information system by satellite image brought international recognition and visibility for Brazil in this sector. Nevertheless, there is research evaluating that a greater number of fines in a given year reduces

significantly deforestation in the following year but this effect dissipates over time and the greater application of the law has a strong effect on deforestation in the first year, a lesser effect in two years and no significant effect on deforestation after three years (Assunção et al., 2013). Still, monitoring efforts and law enforcement have preserved an average of 22,200 km² of forest per year between 2007 and 2011 (Assunção et al., 2013).

Another result was the annual publication of a blacklist constraining the municipalities that had deforested most considering the annual area deforested, the deforested area in the last three years, and increases in the deforestation rate in at least three of the last five years. Through the decree 6,321/2007, the federal government determined the blacklisted municipalities as priorities for prevention and control actions, and rural properties in these jurisdictions were temporarily unable to access public and/or private rural credit to finance rural activities.

> *The mayor was strategic in the initiatives to remove the municipality from the blacklist, either because they themselves were deforestation players or because they were able to talk to the deforestation players. Therefore, it was important to mobilize the mayors, but it only worked for a couple of years* (BRA-PPC-NAT-GOV-ENV-FEM-002-P).

The 3,545 Central Bank (BACEN) Resolution of 2008 conditioned rural credit in the Brazilian Amazon to the verification of compliance with legal and environmental requirements, restricting public credit for enterprises linked to illegal deforestation. The BACEN Resolution caused a considerable reduction in the rural credit concession in the Amazon Biome and the total deforested area was about 60% lower than it would have been in the absence of credit restrictions, with a stronger impact in livestock-dependent municipalities (Assunção et al., 2016).

3.2.2. Sustainable Production component

Main Players	Main policies and/or actions
• Brazilian Forest Service (SFB) • Ministry of Agrarian Development (MDA) • Ministry of Agriculture and Livestock (MAPA) • National Supply Company (CONAB) • Ministry of Labor and Employment (MTE)	• Forest concessions in public forests (Law 11,284/2006) • Citizenship access (Arco Verde Operation) • Policy to Guarantee Minimum Prices for Socio-biodiversity Products (PGPM-Bio) • Food Acquisition program (PAA/PNAE) • Sustainable agriculture (ABC Plan) • Amazon Fund
Claimed results (Brasil, 2013): • Implementation of Arco Verde Operation • The Public Forest Management Law (Law No. 11,284/2006), with the implementation of the Brazilian Forest Service and approximately 49,000 ha granted for sustainable forest management in public forests • The Socio-biodiversity Minimum Price Guarantee Policy (PGPM-BIO), totaling a subsidy of BRL 5,163,674.10 and 23,739 rubber, babassu, Brazil nut, and piassava fiber collectors benefited from 2009 to June/2011 • Creation of the BR 163 Highway Sustainable Forest District • Improvement of financing and credit instruments for environmental and forest conservation	

- Establishment of Sector Agreements with the business sector aiming reducing deforestation and socio-environmental responsibility of production chains (Soya Moratorium, Legal Timber)
- 533 environmental permits filed for agrarian reform settlements in the Legal Amazon
- 13,852 settlers assisted in projects aiming the recovery of the Permanent Preservation Areas and Legal Reserve, as well as the adoption of sustainable production practices

There were 142 activities planned in the sustainable activities component, which probably had little effect due to their dispersion and varied main objectives (BRA-PPC-NAT-NGO-PRO-MAL-015-NP). Nevertheless, due to the complexity and differentiated nature of their response time, even if the implementation of these policies did not generate evident results, the shift in philosophy and the accumulation of acquired learning are relevant (BRA-PPC-NAT-GOV-ENV-FEM-002-P). The main result was the Law 11,284 of 2006, which provides for the sustainable management of public forests. The forest concessions provided have a 40-year permit for the exploitation of contractually-specified forests products and services, in a georeferenced perimeter following a sustainable management plan, hiring local labor among other rules set forth in each bidding document. According to the Brazilian Forest Service estimates, there are 22 million hectares of federal public forests eligible for forest concession, with the potential to produce 6.7 million m³/year of tropical timber (Roma and Andrade, 2013). According to the National Register of Public Forests, in 2017 there were 26 sustainable forest management units under concession, of which 17 are federal with 1.02 million hectares and nine the States areas representing 477 thousand hectares (SFB, 2018). Among the limits on the implementation of the concessions is the delay in the elaboration and authorization of the management plans, the fact that some areas have been invaded by illegal loggers and the finding that, while deforestation has decreased, degradation has increased, which can challenge the feasibility of the proposal (BRA-PPC-NAT-GOV-ENV-MAL-003-P).

Operation *Arco Verde* is also linked to the development component and sought to bring sustainable alternatives to 43 municipalities in the arc of deforestation, which accounted for 53% of deforestation in the Amazon. The initiative emerged as a response to the economic and social impacts arising from the monitoring-and-control of illegal activities. Considering the economic dependence of municipalities in relation to that illegal activities, the program involved efforts for environmental regularization, access to credit, specialized technical assistance, diffusion of technology and the dissemination of citizenship tools and services, such as the preparation of ID and worker documents, health campaigns, among others. The access to the citizenship services through the *Arco Verde* Operation had an impact on bringing the State in areas historically characterized by its absence (BRA-PPC-NAT-GOV-PRO-FEM-018-P). The National School Feeding Program (PNAE) and the Food Acquisition Program (PAA) are programs carried out by the National Supply Company (CONAB) in the whole country and enforced in the Legal Amazon through the *Arco Verde Operation*. PNAE began in the 1940s but the Law 11,947/2009 extended to the entire basic education public network. The Food Acquisition Program (PAA) Law 10,696/2003 has two goals: promoting food access and encouraging family farmers promoting the public acquisition of food with the intent of forming governmental stocks for donations to people

in a nutritional insecurity situation. There are a set of limitations in the implementation of those programs, such as the difficulty in issuing invoices, the delay in payment by city halls and the favoring based on the farmer political party choice. However, there are also positive effects such as the availability of a more nutritious and healthy school meal system and the commercialization of family farmers products that are not commercialized in the conventional market due to their low quantity and seasonality (Paula Filho et al., 2016).

The Policy to Guarantee Minimum Prices for Socio-biodiversity Products (PGPMBio), also lead by the National Supply Company (CONAB), is a policy that seeks to improve income and conditions in the supply of socio-biodiversity products, stimulating native species and ecosystems preservation. CONAB guarantees a minimum price for extractive products through the payment of a bonus when rural producers, individual or organized in cooperatives, prove their sale for a price lower than a minimum set by the Federal Government. Currently, CONAB guarantees a minimum price for 17 native products, almost invariably the result of native forest extraction.[2]

> *The MDA and CONAB brought this vision of production and market chains that the MMA was unwilling to adopt for ideological reasons. Not that these public purchase programs had great success results to present but the approach was different. The implementation of these policies did not generate the results we would like but the philosophic shift was relevant* (BRA-PPC-NAT-GOV-ENV-FEM-002-P).

Through the Amazon Fund (federal decree 6,527/2008), the National Bank for Economic and Social Development (BNDES) allocates non-reimbursable investments in actions to prevent, monitor and combat deforestation and to promote conservation and sustainable use in the Amazon biome. The Amazon Fund has a portfolio of 102 projects supported, in the total value of approximately BRL 1.9 billion, and it is considered the main international mechanism of payment by results of REDD+ (reduction of greenhouse gas emissions from deforestation and forest degradation). Between 2004 and 2017, Brazil secured a 75% decrease in deforestation in the Amazon, which raised more than BRL 3 billion in donations (Amazon Fund, 2018). This reduction is considered one of the main contributions to the fight against climate change. More recently, due to the political and economic crisis, the Amazon Fund is being used to fund end-of-life activities for some environmental agencies, for example, IBAMA's command and control inspections (BRA-PPC-NAT-NGO-ENV-FEM-006-NP).

The so-called ABC Plan is a public policy that presents the mitigation and adaptation actions to climate change for the agricultural sector and points out how Brazil intends to comply with its international commitments to reduce greenhouse gas emissions in this sector. The Plan is a coordinated work by the Civil House, the Ministry of Agriculture, Supply, and Livestock (MAPA) and by the Ministry of Agrarian Development (MDA). After more than a year and a half of discussions to compose the commitments of the agricultural sector, the ABC Plan was approved in May 2011. In general terms, the plan works in the Recovery of Degraded Pastures; crop-

[2] See: https://www.conab.gov.br/precos-minimos/pgpm-bio

livestock-forest integration and Agroforestry Systems, with the Direct Planting System, the Biological Nitrogen Fixation, Planted Forests, the Treatment of Animal Debris, in addition to bringing Transversal Actions and Adaptation to Climate Change (Brasil, 2012). The Central-West and Southeast regions are the ones that most captured resources from the ABC Program, with 31.0% and 22.7% of the total contracted, but the North region has gained participation rising from 9.6% in 2014-1 to 19.5% in 2016-17 (Observatório do Plano ABC, 2017).

4. Conclusions

The national context of a government transition to the first Worker's Party election associated with the national and international pressure regarding the impressive deforestation rates favored that deforestation problem was placed on the agenda of the presidency of the republic. As a result, PPCDAm was able to bring together technical experts and leaders in a common agenda while there was a political convergence between the authority of the President, the Minister of the Civil House, the Minister of the Environment, and the Minister of National Integration. PPCDAm coordination given to the Civil House, a chief-ministry directly linked to the presidency of the republic, was essential for the engagement of sectors historically recognized as deforestation vectors. The budget prioritization for implementing PPCDAm activities was another important factor regarding the massive institutional adherence to the plan.

The Amazon States and municipalities were not involved enough in the planning phases, although many actions focused on their territorial performance. In the long-term, it proved to be an expensive and less effective strategy, leading to greater involvement of the states through the development of jurisdictional plans. The states, however, tend to have technical and budget limitations, and sometimes there are political barriers.

The command-and-control actions revealed disastrous socioeconomic impacts at the local level since there were municipalities strongly dependent on illegal activities. As a response, a positive agenda was developed, providing access to citizenship services and rights. Even though these concentrated efforts did not continue strengthened in the long-term, it meant a change on the way to deal with deforestation. However, the PPCDAm was unable to propose an alternative forest-based development. On the contrary, the monitoring and control component developed more than the other components and over time the patterns of deforestation have been altered with deforestation in smaller polygons and increasing degradation. The PPCDAm, therefore, brought much learning but did not contain the causes of deforestation, which affected its effectiveness in the long term.

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