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Between structural change and local agency in the palm oil sector: Interactions, heterogeneities and landscape transformations in the Brazilian Amazon

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ABSTRACT

Looking beyond a normative analysis of oil palm expansion, this paper offers a nuanced analysis of landscape transformations in the Brazilian Amazonian region of Tomé-Açu. Based on quantitative and qualitative data deriving from interviews with key stakeholders, focus groups and surveys with smallholders and migrant workers, contextualized and cross-checked with observations between 2011 and 2017 and secondary sources, we discuss the processes and outcomes of Brazil's Sustainable Oil Palm Production Program (SPOPP). Despite its participatory component and innovative design, simultaneously tackling environmental, economic and social dimensions, the program underwent rapid structural change and suffered from discontinuity. A new boom and bust cycle emerged in the region, however, both "boom" and "bust" periods were marked by mixed outcomes. Notwithstanding the current governance shift characterized by absent state, reduced participation and disinvestment, local agency has been able to reorganize the sector on the ground and a transformed landscape emerged. However, under the current setting if expansion recommences there is no guarantee the sector will be able to avoid many of the socio-environmental problems experienced in the past.

1. Introduction

The Brazilian Amazon has been the target of a series of economic development programs, strongly influenced by the confluence of national politics (e.g., frontier expansion, regional integration, geopolitics) and global economic trends (e.g., global demand for commodities) (Bunker, 1985). State-centred governance modes during the military period in the 1970s contrasted with processes of democratization, political decentralization and neoliberal restructuring in the 1990s, swinging the pendulum to self-governance modes, with a focus on market-based mechanisms (Castro et al., 2016). A significant body of literature has described the socioenvironmental impacts and landscape transformations emerging from these processes. These include (Margulis, 2004), land accumulation (Godar et al., 2012), migration (Browder et al., 2008), urbanization (Ludewigs et al., 2009), inequalities (Guedes et al., 2012) and conflicts (Schmink and Wood, 2012; Simmons, 2004).

The new century, however, was marked by the return of the state and emergence of a participatory governance mode as an alternative to the previous monolithic approaches (Castro et al., 2016). Although forms of resistance to development projects remained very much present among local actors (Pahnke et al., 2015), during this period numerous bottom-up initiatives as well as inclusive social and environmental policies in Brazil were implemented in order to address marginalization of rural populations and to promote more sustainable use of natural resources (Hecht, 2012). This seemingly progressive approach, however, was not free of contradictions. On the one hand, a range of advances have been consolidated such as territorial rights to ethnic groups (Bolaños, 2011; Marin and Castro, 1999), land distribution, credit lines and technical support for family farmers (Flexor and Grisa, 2016), governmental support to low carbon agriculture and forest restoration (Newton et al., 2016), and co-management systems (Pinedo-Vasquez et al., 2011). On the other hand, the agribusiness sector, which enjoyed increased power and privileges in the form of policies and access to credit, infrastructural development and subsidies, had major socioenvironmental impacts (Silva et al., 2008). It was in this context that the Sustainable Palm Oil Production Program (SPOPP) was designed.

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In this paper, we analyse the processes and outcomes of the program. In contrast to clear-cut social boundaries, monolithic drivers and contrasting interactions, we offer a nuanced analysis of landscape[1] change. The dichotomy between agribusiness and family farming conceal important distinctions between different types of private companies and smallholder families, and masks actors, such as rural workers and middle-scale farmers, who play important and differential roles in the process. Likewise, structural factors, such as commodity prices, national policies, international agreements and market demands are usually filtered down by local contextual factors such as traditional land use and tenure patterns, social organization, and ecological attributes, leading to a wide range of outcomes. Finally, assumptions of conflictive relations (Alonso and Costa, 2002), on one side, and win-win arrangements (Nepstad et al., 2014), on the other, overlooks their interplay and, sometimes, synergistic effects of these interactions. In order to take these complexities and dynamics into account, we use an environmental governance approach.

We define environmental governance as a social process mediated by power relations, in which both design and implementation of new practices are shaped by the interplay between structural factors and everyday practices by different stakeholders at multiple levels (Castro et al., 2016). In other words, multiple values, interactions, narratives and practices interplay with policies, formal institutions and broader social changes, leading to a wide range of pathways. Due to the dynamic nature of this process, a diachronic perspective can help reveal how structural factors and agency change over time, and shape landscape transformations. We argue that the analysis of landscape transformations must account for multiple narratives, perceptions, interactions and institutions shaping initiatives leading to contrasting effects on a range of local actors.

The oil palm program was designed in 2010 as a multi-purpose program to address rural development, sustainability and social inclusion in the Brazilian Amazon region. Under the influence of the commodity boom, vibrant economy, and strong political discourse of social inclusion and green energy (César et al., 2013), the program was built on three pillars: economic, social and environmental such as for example avoided deforestation, restoring degraded lands and promoting the inclusion of smallholders.[2] The oil palm program relied on a combination of general conservation, social and agrarian policies and procedures related to land tenure, forest legislation, access to credit and labor conditions (Villela et al., 2014).

In this regard, the initiative diverges from former regional development programs focused predominantly on economic development. While recent advances in agrarian, conservation and social policies initiated in the previous decade were developed separately, the oil palm program was unique in targeting all dimensions simultaneously. In addition, the program differs from other market-based green initiatives as production and commercialization were subsidized and mediated by the national government.

Despite the green and social narrative of rural development and sustainability, policy innovations such as SPOPP, relying on synergisms across different programs, are often designed under the influence of elite groups (e.g., technocrats, corporations, researchers) and their implementation is driven by complex procedures and asymmetric relations among multiple state and non-state actors (Boelens et al., 2010). Although smallholder grassroots organizations enjoyed a particularly strong political position during the design phase of this program, they have lost a lot of their influence during implementation. At the same time, social interactions, spatial and social heterogeneities and disputing procedures at the local level can be exacerbated by structural factors at broader scales which create unexpected outcomes. Multiple perspectives and interactions may reshape local relations, landscapes and production systems through mixed outcomes on the ground.

In this paper we shed light on how policies for oil palm expansion unfolded during a rapidly changing context involving multiple agencies on the ground. Our aim is to provide an analysis of the landscape transformations in the region of Tomé-Açu resulting from the interplay between structural changes and local agency during the implementation of the program. Using a diachronic perspective, we offer an analysis of change in narratives, perceptions, interactions, and institutional configuration, and respective responses from key actors in two periods (2008–2014 and 2015–2017), which correspond to a shift from optimism and criticism in the initial stage to disenchantment and adjustment, thereafter. After a description of the methods and study area, we describe the first and second waves of oil palm expansion in the region, followed by a discussion on the socioenvironmental implications of the oil palm expansion program, as well as its challenges and opportunities in fulfilling its various goals.

2. Methods

The analysis is based on extensive fieldwork in Tomé-Açu microregion conducted by the first author between 2014 and 2017, combined with annual short visits to the region by the second and third co-authors between 2011 and 2015. The data set includes qualitative and quantitative information derived from surveys, multiple interviews with key stakeholders and focus groups.

Two surveys were conducted (with migrant rural workers and contract farmers), in which questions on household socio-economy, sources of income, assets, land ownership, crop production, input use, and perceptions of wellbeing were asked. Sixty migrant workers were selected from two rural villages,[3] where migrant workers are highly concentrated. Ninety contract farmers were selected in three communities,[4] according to information provided by companies, community associations and municipal farmer unions.

Quantitative data was complemented by open interviews with key informants at different points in time between 2011 and 2017. These include 29 individual farmers, 27 interviews of representatives of the 4 companies operating in the region and their representative organizations, 40 community leaders and representatives of grassroots organizations, 26 representatives of municipal governments including agriculture and environment secretaries, 16 researchers and representatives of NGOs, 7 policy makers and 5 representatives of banks. Additionally 4 focus groups discussions were held in 2014. The dataset was contextualized and cross-checked with participation in relevant meetings and observation in farms, company plantations, communities and rural villages.[5] All this information is presented as supplementary info.

Interviews were coded according to perceptions such as optimism (ranged from over-optimistic to pessimistic); contextual factors such as interviewees' position (e.g., proponents or heavy critics) and circumstantial issues such as negative views due to delays in inputs delivery or positive views due to payments releases. Changes over time in the structure and performance of the oil palm expansion program were assessed by comparing observations and secondary data (demographic, economic, environmental and social indicators) as well as interpretations and

[1] We understand landscape as s a socio-ecological system that consists of natural and/or human-modified ecosystems, and which is influenced by distinct ecological, historical, political, economic and cultural processes and activities, a similar process as socio-ecological land systems – SELS proposed by Boillat et al. (2017).

[2] In Brazil, the Family Farming Law (Law 11.326/2006) defines smallholders as farmers who (1) own less than 4 fiscal modes (in Pará a fiscal mode ranges between 5 and 75 ha), (2) have income predominantly related to agricultural activities; and (3) rely primarily on family members to undertake farm activities.

[3] Forquilha (Tomé-Açu) and Palmares (Tailândia).

[4] Thirty farmers per community - Calmaria II and Arauaí in the border between Moju and Tailândia; and Forquilha in Tomé-Açu.

[5] Including visits to over 40 communities, 3 company facilities, some of them for several days, staying at farmers' houses and spending weekends in informal settings.

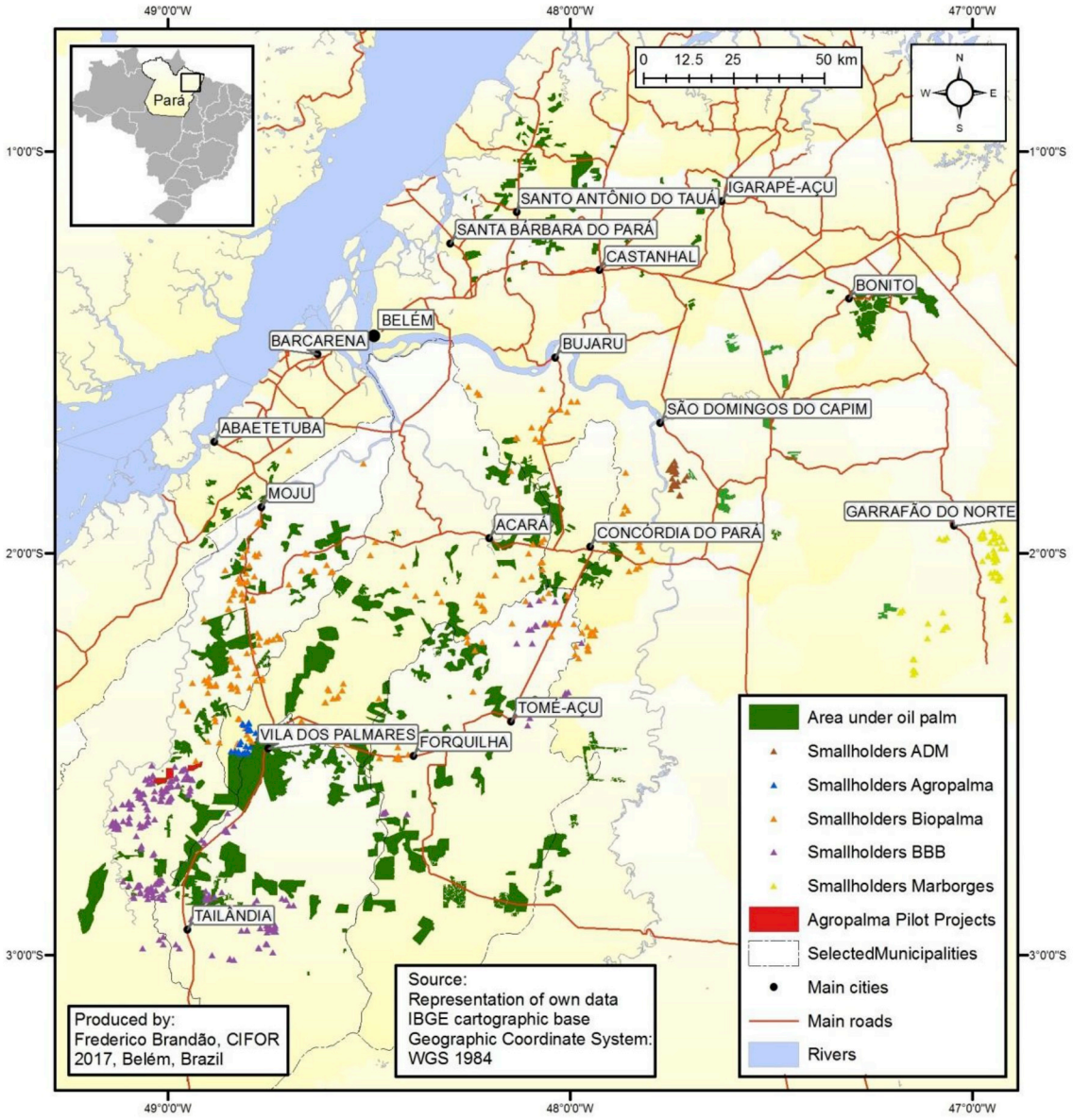


Fig. 1. Map of oil palm expansion in Pará (2017)

perceptions provided by relevant stakeholders between 2011 and 2017.

3. Study area

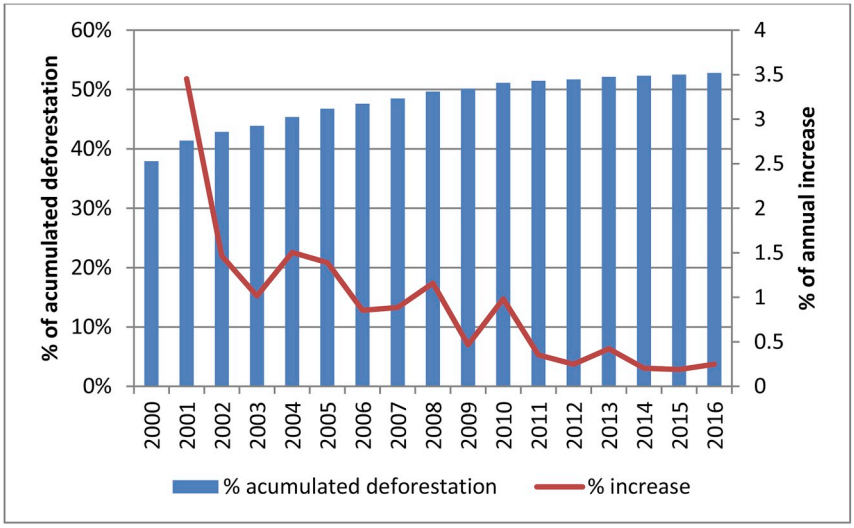
Oil palm production in Brazil is dominated by the state of Pará with nearly 88% of national estimated area under cultivation (207.252 ha) covering 37 municipalities in Northeast Pará (Lameira et al., 2015; Homma, 2016). The region underwent two waves of oil palm expansion – first between late 1960s and mid-1980s and more recently triggered by the Sustainable Palm Oil Production Program (SPOPP). This program addressed two major dilemmas that had emerged in previous development projects in the Brazilian Amazon: 1) to reconcile economic, social and environmental goals; and 2) to reconcile global, national and local agendas.

This paper focuses on the Tomé-Açu microregion of the State of Pará which comprises five municipalities: Tomé-Açu, Moju, Tailândia, Acará and Concórdia do Pará (Fig. 1). The region is where most oil palm expansion has taken place, encompassing 75% of the current planted area in the state (207.000 ha) (Abrapalma, 2017). It houses a few companies operating under various business models and land use arrangements, from oil palm smallholder farms to large-scale plantation systems, including approximately three quarters of the contracted smallholders and rural workers.

The Tomé-Açu microregion forms part of an old Amazonian frontier and encompasses heterogeneous demographic groups, including reminiscent ethnic groups such as indigenous and maroon (*quilombola*) communities along the rivers (Moju, Acará, Guamá and Capim) (Marin and Castro, 1999), migrant settlers who were granted land title through agrarian reform, land squatters with mixed backgrounds,[6] and middle-scale farmers' descendant from Japanese migrants. The latter group arrived in the region in the early XX century and has played a particularly relevant role in the land use and economy of Tomé-Açu since the 1950s for example introducing black pepper, which underwent a boom and bust cycle.[7] This prompted the development of agroforestry systems in the area (see (Yamada and Gholz, 2002) for detailed

[6] See Medina et al. (2015) for a discussion on family farming in Brazil or Vadjunec et al. (2011) on Amazonian identities.

[7] Black pepper quickly became the most important cash crop in Tomé Açu. However, in the 1970s, a disease began to spread among pepper plants, which led to the collapse of the sector (Homma, 2009).



Source: INPE (PRODES)

Fig. 2. Deforestation trends in Tomé-Açu microregion.
Source: INPE (PRODES).

explanation on this production system).

The region has undergone major deforestation and forest degradation primarily associated with expansion of cattle ranchers and logging, and to a lesser extent, with smallholders (Batistella et al., 2013). In 1977, the construction of the road PA150 crossing Moju and Tailândia, attracted new investors to the region, resulting in frequent land conflicts between newcomer investors and the local populations (Prado, 2006; Sacramento, 2012). Between 2000 and 2016 accumulated deforestation in the region increased from 38 to 52% of the total area and was particularly relevant in these frontier areas. Nevertheless, following the Brazilian Amazon's overall trend, deforestation has dropped significantly since 2004 and especially since 2010 as shown in Fig. 2.[8]

The timber sector has also undergone a boom and bust cycle. In 2008, Tailândia was targeted by a crack-down surveillance operation,[9] which led to the shutdown of illegal charcoal and timber industries. The impact on the local economy led to major social unrest and high unemployment rates.

Increased environmental monitoring in the region raised demand for alternative activities to fill this economic gap. In this context, the expansion of oil palm has become a major promise for the region's economy (Villela et al., 2014). However, oil palm is not new in the region. The first oil palm expansion wave started in late 1960s as part of a partnership between the Superintendence of Development in the Amazon (SUDAM) and the French-Brazilian Oil Crop Research Institute (IRHO). We describe this process in the following section in order to give a historical background for the new wave of expansion.

4. First oil palm wave (1960s – early 2000s)

Oil palm plantations in the Amazon were first established nearby the capital of the Pará state (Belém) in 1968. In the following decades, a number of domestic investments took place both near Belém and in the frontier municipalities of Tomé-Açu microregion (Homma, 2016). Plantations close to Belém were initially established by groups of Japanese migrant farmers, organized under cooperatives that transitioned out of black pepper monocrops after losing their crops to a pest outbreak in the 1970s, later incorporated into private companies such as Dentauá, Palmasa or Denpasa (Brandão and Schoneveld, 2015).

In contrast, in the Tome-Açu microregion oil palm cultivation was mostly driven private companies with support from state-centred governance grounded on fiscal incentives offered by SUDAM. Similar to other sectors (Schmink and Wood, 2012; Simmons, 2004), many of these investments were marked by corruption and other irregularities, resulting in several land conflicts (Sacramento, 2012)[10] and deforestation. For example, the oil palm company Agropalma estimates that 35% of its oil palm fields (13.767 ha) were associated with primary forest conversion between 1982 and 2002 (Agropalma, 2013).

In addition to local conflicts, the outbreak of bud rot (*amarelecimento fatal*), a devastating pest disease in Colombia, Brazil and Ecuador, had a major impact in the sector. First detected in 1974, the number of affected palm trees grew between 1984 and 1987 from 465 to 32.673 (Boari, 2010), wiping out most of Denpasa's and the nearby cooperative Codenpa's plantations.[11]

Local factors such as the bud rot, territorial conflicts and dominance

[8] However, despite the existence of large areas of primary forests (41%), it is likely that road building, selective logging, wildfires, and other disturbances have further reduced biodiversity in this region (Barlow et al., 2016).

[9] Arc of fire was an unprecedented major federal operation launched in 2008 to fight illegal logging in critical municipalities identified by satellite images. Tailândia was the first municipality to be targeted by the operation early in February 2008. Arc of Fire was run during 40 days and involved more than 1000 military, civil and federal police agents resulting in more than 7M USD in fines, confiscation of illegal logs, 14 sawmill, 25 charcoal companies and 1175 charcoal ovens dismantled, resulted in mass unemployment estimated between 11.000 and 12.000 people.

[10] The most notorious land conflict occurred between local communities in the region of Jambuaçu, in the municipality of Moju, and the oil palm company REASA, created in 1978. For several years, the conflict has fueled protracted retaliatory clashes, including death of several farmers and a city counselor. The situation calmed down in 1990, after a newly created oil palm company, Marborges, acquired the bankrupted REASA and made some efforts to resolve the land dispute. Only in 2014, however, were the final 500 ha of disputed lands returned to the communities.

[11] To date the origin of but rot has not been conclusively understood; however there is a correlation between incidence and high precipitation values. In the last decades, the development of new cultivars more resistant to the bud rot disease has become a priority for the sector attracting public and private investments. In 2009, Embrapa registered the hybrid BRS Manicoré, a cross of *Elaeis guineensis* and *Elaeis oleifera* species also known as African and American palms respectively, a result of 20 years of research in partnership with Denpasa (Cunha et al., 2010).

Table 1
Total area of oil palm planted in Pará per year. Source: Embrapa (Venturieri, 2011) and *Abrapalma (2017).

Year	Area (in ha)
1985	28160
1989	43997
1995	52058
1999	63174
2004	80430
2008	95293
2011	117689
2016*	207252*

of other economic activities kept the pace of oil palm expansion in the region slow between 1980s and 1990s (Table 1). Despite the emergence of political decentralization and neoliberal restructuring in the 1990s, favored extractive land use activities remained the main characteristics of the agrarian frontier at that period (Pacheco, 2012; Rodrigues et al., 2009). National development policies combined with global market demand supported expansion of cattle ranching and logging activities (and charcoal production) by the rural elite and migrant settlers while more traditional smallholder farmers focused on cassava cultivation. One particular feature of Tomé-Açu was the Japanese descendent middle scale farmers who were mostly engaged in agroforestry business (Piekielek, 2010). As a result, oil palm remained an incipient sector characterized by small-medium domestic companies operating under company owned plantations or through outgrowing schemes mainly with medium-scale Japanese descendant farmers.

At the turn of the century, however, this structural configuration changed. At the global level, oil palm became a popular source of trans-fat free oil, a requirement driven by new food labelling regulations (Downs et al., 2013), combined with its efficient per-hectare yields made palm oil the most traded vegetable oil in the world (Rival and Levang, 2014). In addition to the food sector, oil palm and its sub-products captured new emerging markets such as biodiesel and cosmetics.

Global pressure to counter the rampant deforestation rates in the Amazon also induced domestic action to strengthen monitoring and enforcement systems (Hecht, 2012; Nepstad et al., 2014); and create more sustainable alternative economic activities. At the national level, the onset of the left-oriented national government in 2003 brought the state back to the center of environmental and social governance in the region. In contrast to the authoritarian approach during the military government, a new participatory governance mode emerged, in which policies promoting access to new markets (e.g., governmental procurement programs such as PAA and PNAE[12]) and sustainable land use activities (e.g. delinking credit to deforestation, support agroforestry and agro-ecology), were combined with ambitious programs for commodity expansion.

In short, demands for economic growth, sustainable and inclusive production combined with the return of the state in the environmental governance and commodity expansion set the context for the second wave of the oil palm expansion in the Eastern Amazon, which has sped up the pace of landscape reconfiguration in the region.

5. Second oil palm wave (mid-2000s - present)

The second wave of oil palm cultivation was grounded in the Sustainable Palm Oil Production Program (SPOPP), a spin off program of the national Biodiesel Production and Use Program (PNPB) implemented in 2004. The PNPB aimed at reducing the country's dependency on imported diesel by increasing the production of biofuel feedstock. The program addressed the organization of the biodiesel value chain, new funding mechanisms, research and development, and regulatory provisions for blending (Andrade and Miccolis, 2010). The Biodiesel Law, ratified in 2005, specified national blending mandates for biodiesel,[13] and established a social certification scheme (Social Fuel Stamp - SFS)[14] which offered fiscal incentives to biodiesel producers to buy a minimum percentage of processed feedstock from smallholder farmers.

The PNPB was successful in fulfilling the increasing blending mandates but failed to diversify the biofuel feedstock and to promote economic inclusion of smallholders in the supply chain, particularly in North and Northeast Brazil. Despite the efforts to diversify, five years after the implementation of the program, most of the feedstock was supplied mainly by large-scale farmers (soybean) and slaughterhouses (animal fat) (Padula et al., 2012).

To tackle this problem and building on North's favorable agro-ecological conditions for oil palm cultivation, the federal government created the SPOPP. Inaugurated by former president Lula da Silva in Tomé-Açu in 2010, the SPOPP aimed to further diversify the biodiesel supply base, while providing mechanisms to ensure inclusive development and minimize negative environmental impacts (Villela et al., 2014). Socioenvironmental goals were particularly relevant due to the history of negative impacts of oil palm expansion elsewhere such as land disputes, deforestation, forest degradation and biodiversity loss (Wicke et al., 2011; Rival and Levang, 2014; Gunarso et al., 2013).

A few new instruments were integrated into an existing framework of social, economic and environmental policies. The Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon - ZAE-Palma - identified more than 12 million ha of agricultural land in the Pará State (excluding primary forest, protected areas and indigenous territories) (Filho et al., 2010). A new credit line created for oil palm smallholders - called PRONAF[15] Eco – which, together with tax exemptions and more favorable conditions in biodiesel auctions offered by the Social Fuel Stamp, established the framework to incentivize the integration of smallholders farmers (Andrade and Miccolis, 2011). Participation in decision-making process was promoted at three levels. First, national and state advisory boards were created – the Palm Oil Federal Chamber (POFC) in 2010, and the Palm Oil State Chamber (POSC) in 2012 - to influence implementation. Second, the contract farming model was inspired by a local company's long-term experience in the region with independent middle scale outgrowers since 1999 and a pilot program with smallholders. The latter, inspired by the Malaysian experience, included 185 families between 2002 and 2006 in Moju (César and Batalha, 2013). Third, the contractual terms between oil palm companies and smallholders were negotiated through the Agricultural Workers Federation (FETAGRI) in articulation with the Ministry of Agrarian Development (MDA), in charge of family farming policies, which assumed greater political relevance in the design phase of the program.

Under this regional and national context, three major corporations - the mining giant Vale, the national oil company Petrobras and the US-based grain company ADM - started their investment in the palm oil sector in Pará through their newly created companies - Biopalma, BBB

[12] The Program for Food Procurement (PAA) sought to improve smallholder market access by purchasing products directly from family farmers and distributing these to food insecure households, while the National Program of School Nourishment (PNAE) required all school canteens to source at least 30% of their produce from family farmers.

[13] Blending percentage has increased over time, from 2% by 2008, to 5% by 2013 and 7% in 2014.

[14] Since 2014, the minimum percentage of oil seed production by smallholders was set to 15% in the Amazonian region. SFS holders have exclusive access to 85% of the biodiesel auction carried out by the Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP). They are granted lower income tax rates and had more favorable financing conditions at the Brazilian National Development Bank (BNDES).

[15] PRONAF is the National Program for the Strengthening of Family Farming, a low interest credit program which became one of the cornerstones of family farming policies in Brazil.

Table 2
Total area of oil palm per company and business model in 2016.
Source: Abrapalma (2017) and Brandão and Schoneveld (2015).

Company	Total area under influence (ha)	Company managed plantations			Outgrowers plantations			
		Total area (ha)	Access to land	Year of first planting	Smallholders total area (ha)	Number of families	Medium and large producers total area (ha)	Number of medium and large producers
Biopalma	63315	56487	Purchase	2007	6543	657	285	2
Agropalma	50111	39042	Purchase	1982	1746	192	9323	49
BBB	41422	38021	Leasing	2010	3055	310	346	1
Mejer	15595	11450	Purchase	1994	0	0	4145	1
Marborges	8935	7761	Purchase	1981	770	78	404	16
Dentauá	7944	3554	Purchase	1980	0	0	4390	15
ADM	7550	5500	Partnership	2012	2050	268	0	0
Palmasa	6480	3002	Purchase	1985	30	3	3448	40
Denpasa	4667	1109	Purchase	1974	0	0	3558	57
Others	1234	1234	Purchase		0	0	0	0
TOTAL	**207252 (100%)**	**167160 (80.66%)**			**14194 (6.85%)**	**1508**	**25899 (12.5%)**	**181**

and ADM do Brasil, respectively. These companies adopted expansion strategies based on nucleus-outgrowing arrangements combining own managed plantations and contract farming with smallholders, the latter supported by the SPOPP framework. Their activities quickly challenged the regional leadership of the local company Agropalma, and had major effects on land markets, rural villages and smallholder farmers as detailed in the next section.

The new wave of expansion took place largely in the Tomé-Açu microregion and surrounding areas (see Fig. 1). By 2016 the sector engaged nine major companies, 1508 smallholder families and 181 middle-scale producers (Table 2). Despite efforts to include smallholders, the sector remains essentially dominated by company-managed plantations (80%) while smallholders contribute less than 7% of the cultivated area. This process was marked by two distinct moments: contrasting views of euphoria and criticism in the initial stage, followed by disenchantment and adjustment at a later stage.

5.1. Between euphoria and criticism (2008–2014)

Although the SPOPP was formally launched in 2010, some companies started their operational planning a few years earlier. Investors sought land access through leasing or partnership agreements[16] and direct purchase (Table 2). BBB targeted leasing agreements with medium to large landholders, mainly cattle ranchers. In 2010, this company leased nearly 37,000 ha in Moju, Tailândia and Tomé-Açu. According to one landowner, sale price was fixed at around 60 USD[17] per hectare per year for a period of 25 years, depending on several factors such as logistics, soil quality and environmental management.

No major issues or conflicts related to the land leasing schemes were observed, since landowners had access to information, knowledge and possessed bargaining skills. In contrast, several interviewees mentioned that the direct land purchase approach adopted by Biopalma, generated general apprehension among smallholders and triggered land disputes. According to municipal representatives and community leaders, the company not only purchased landholdings from medium and large owners but also from smallholder through commissioned intermediaries. Although the impact of this land acquisition strategy is hard to measure, industry insiders estimate that approximately one third of Biopalma's cultivated land is considered undocumented, and an INCRA report (Macedo and Sousa, 2015) estimates that 37% of the company's area in Concórdia do Pará were formerly owned by smallholders. Although land concentration through acquisition of small plots is not new in the region, the pace and extent to which it took place during this new wave has increased land prices, and triggered agrarian reconfiguration, changed demographic patterns and caused uncertainty among local communities, particularly those untitled.

A key strategy used by some communities to protect their lands was to claim territorial rights based on their traditional identity, such as *quilombola* territory, a special land tenure system for afro descendant rural population which grants permanent collective use concession. For example, a few communities located between Concórdia and Bujaru (see Fig. 3), requested their *quilombola* territorial rights with support of the Catholic organization Land Pastoral Commission (CPT), motivated by their perception of threat as explained by one of the leaders:

> "When we understood the company has been buying land considered inside *quilombola* territory, though not formally recognized as such, we decided to call all community leaders and decided we needed to do something to protect our land, and so we did".

Upon their collective territorial rights granted in 2009, the *quilombola* movement approved a collective statement that forbid land purchase from smallholders in neighboring regions and reject Biopalma's smallholder contract farming scheme within their territories. Informants from governmental organizations explained that this social mobilization also further pressured the federal government to halt land acquisitions in other regions.[18]

A small Tembé indigenous territory of 720 ha in Alto Acará is another example. The community claimed compensation for oil palm related water contamination in their rivers, a common complaint among

[16] Partnerships based on profit share schemes took place only outside the research area (São Domingos do Capim) between ADM and medium to largeholders. This arrangement was taken by foreign companies which were restrained to purchase or lease land in Brazil due to legal restriction.

[17] Converted from Brazilian real (BRL) at an exchange rate of BRL 3.2 per USD (1 June 2015).

[18] In more remote areas of Alto Acará, however, local communities were less successful. The acquisition of 8000 ha through intermediaries with fraudulent titles by Biopalma was marked by violence and death of a local leader allegedly related to the land deal. In 2009, the local population encompassing 1800 residents distributed in five communities formally claimed their *quilombola* collective title and occupied the land used by Biopalma. Although the contested area was granted to the communities and recognized as *quilombola,* the final territorial recognition is still awaiting approval. It is important to note that land transactions were not necessarily harmful for all smallholders. In Moju, for example, several interviewed smallholders claimed they have benefited from a boost in land prices driven by the purchase of contiguous landholdings to merge into a large plantation farm of 20.000 ha, the largest Biopalma property in the region.

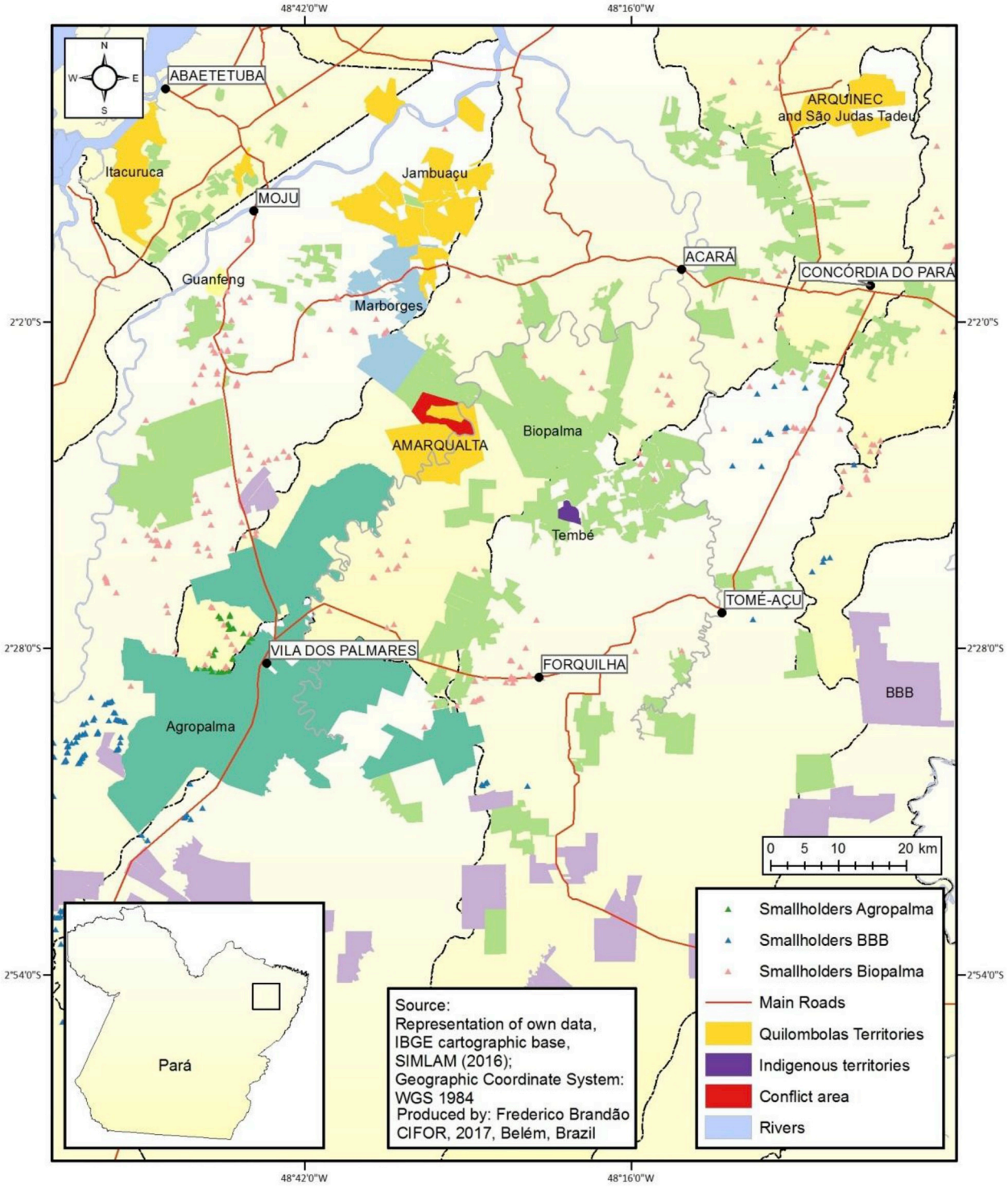


Fig. 3. Oil Palm landholdings: area of influence and surrounding communities.

other communities in the region. The company, on the other hand, claimed to be the victim of acts of retaliation such as the destruction of equipment by the indigenous group. Although water contamination cannot conclusively be linked to oil palm cultivation,[19] this case highlights some tensions between companies and local communities.

In addition to changes in land markets, this phase was characterized by the incorporation of smallholder families through contracts with oil palm companies. Under the SPOPP, mainly Biopalma and BBB signed contracts with nearly 1000 farmers in the studied region, according to secondary data from companies. The survey carried out with 90 contract farmers revealed a relatively similar land (45–50ha) and family (4–5) sizes across three regions. In contrast, socioeconomic strategies, political organization, and household head origins are more variable (see Table 3).

[19] A study by the Evandro Chagas Institute in 2014 confirmed that at 14 different locations sediments were contaminated with endosulfan, a banned toxic substance used in pesticides and dichlorodiphenyltrichloroethane (DDT), an insecticide used to combat malaria.

Table 3
Socioeconomic characteristics of contract farmers (2015).

Household characteristics	Arauaí (BBB) (n = 30)	Calmaria (Biopalma) (n = 30)	Forquilha (Biopalma) (n = 30)
Average land size (ha)	51.8	44.9	47.5
Migrant household heads	73%	97%	60%
Number of household members	4	5	5
Number of active members per family	2.60	3.00	2.57
Number of income sources	2.17	3.86	3.83
Number of market crops	0.60	1.31	1.77
Number of consumption crops	1.87	3.10	2.57
Number of inputs used	0.13	0.31	2.10
Member of community association	77%	59%	13%
Member of farmer union	37%	38%	43%
Owning livestock	23%	21%	17%

Smallholders usually planted around 10 ha of oil palm under a monocrop system. During this stage, companies' recruiting teams repeated a euphoric narrative assuring smallholders economic development, infrastructure improvement and better social services. Recruitment, however, was constrained by the eligibility rules set by the credit line PRONAF-Eco: not being black-listed as a credit defaulter, a minimum area available for oil palm cultivation, and a minimum annual income to prove ability to manage a credit sums (see Brandão and Schoneveld (upcoming)). Companies added a few criteria for economic viability (distance, logistics) and to ensure productive diversification (land and labor force to grow other crops).[20] This latter aspect was relevant to avoid criticism regarding alleged negative impacts on livelihood and food security raised by social movements in the early stage of the SPOPP. For example, the intercropping of oil palm (particularly with annual crops in the first three years) was forbidden by several companies. After heated debates within the existing platforms (e.g., SPOPP Workshops promoted by Embrapa), these tensions were reduced by the gradual acceptance of intercropping after productivity gains were observed across several (intercropped) oil palm experiments.

Interviews with contract farmers during this period revealed considerable satisfaction with their contractual terms with oil palm companies. Many stated their pride in their new position as a "business farmer", their new financial condition as "receiving steady payments" and their new role as "commodity producer", as highlighted by one farmer "now we received our payment according to the stock exchange". During this period contracted farmers emphasized their financial security and feeling valued.[21] These expectations were in part shaped by the successful discourse built around Agropalma pilot cases and the frequent references to income values of more than 1000USD per month after the initial years. As one of its contract farmers put forward:

> "I have been working as a farmer since I was a child with crops such as cassava, corn, beans, rice, banana and all that, and the first crop I have seen being able to provide opportunities for a better life is oil palm."

However, it was observed in some focus group discussions that not all farmers accepted this discourse, and chose not to participate in the SPOPP. For example one community leader in Moju summarized the debate at that time:

> "Do we all want oil palm? I don't want oil palm in my plot; others further ahead don't want it either. They are planting açaí and other crops. There are several willing to plant, yes … But I believe if they had a better orientation maybe they would change their minds. Some just think there are no problems; that life improves … but if you plant you can't change it afterwards and if the price drops you can't adjust."

These and other testimonies show how farmers were confronted with mixed information regarding the benefits and threats of this activity which was unfamiliar for many of them. In part that was reflected in the contrasting discourses of smallholder unions (STTRs in Portuguese) in different municipalities, more inclined to favor oil palm as an economic alternative to overcome their recent crisis in the timber and charcoal sectors in Moju and Tailândia[22] and more critical views of loss of autonomy on their land, production system and market strategy in Tomé-Açu and Concórdia do Pará. Notwithstanding the strong commitment of FETAGRI, the national government through MDA, and even the visit of the president Lula da Silva in Tomé-Açu, some municipal unions and some civil society sectors were still reluctant to adhere to the program. Fears of cooperating with the private sector, inherited from the peak of violent land conflicts in the 1980's and 1990's, were still present in their memories as numerous past top-down development interventions had favored the interests of elite groups, and increased the vulnerability of marginalized rural populations (Costa, 2005; Becker, 2009; Schmink and Wood, 2012; Hecht, 2011; Aldrich et al., 2012).

Similar to contract farmers, commercial sectors such as hotels, restaurants, supermarkets, and agricultural products benefitted from the constant stream of oil palm related professionals during this period, which was highlighted by interviews with hotel and shop owners. As the owner of one major hotel in Tomé-Açu explained: "the hotel was always packed with many people from oil palm companies". The enthusiastic position of outgrowers and some service sector informants was contrasted with the concern of other local actors. Concerns were mainly related to the demand for rural workers in company managed plantations, which hired nearly 13.000 rural workers in 2014 (Table 4).

According to the Social Observatory Institute (IOS, 2013), approximately 40% were migrant rural workers, which amounted to over 5.000 people.[23] Rural villages nearby companies' plantations and main roads rapidly grew, creating additional pressure on the limited social infrastructure. According to a survey carried out with 60 migrant workers from two villages, migrant populations were comprised mainly of young men coming from Northeast of Pará (e.g., Castanhal, Bragança, Irituia and Igarapé Açu). Initially promoted by companies and intermediates, called *gatos*, the influx was further maintained by the workers' networks including relatives and friends who migrated with

[20] For more details on production systems, labor demands, income and crops diversity, please see BRANDÃO, F. & SCHONEVELD, G. 2015. *The state of oil palm development in the Brazilian Amazon: Trends, value chain dynamics, and business models,* Bogor, Indonesia, Center for International Forestry Research (CIFOR).

[21] As part of the loan to be paid back by the farmers, PRONAF-Eco includes a performance based quarterly financial contribution for the first three years to compensate for family labor expenses and to encourage farmers to adopt good practices.

[22] Tailândia union, was particularly active in (together with other local institutions) attracting BBB to establish their operation center in Tailândia.

[23] This number excludes family members of workers.

Table 4
Employment generated in 2014.
Source: (Brandão and Schoneveld, 2015).

Company	Plantation jobs	Industrial	Administrative	Direct jobs
Agropalma	4.194	724	36	4.954
Biopalma	3.880	510	137	4.527
BBB	2.200	0	150	2350
Marborges	875	170	75	1.120
Total	11.149	1.404	398	12.951

them to the same village and even same company. Half of them brought their wives along but only 7% of women were able to find a formal job.[24]

Interviews with representatives of local municipal institutions and civil society organizations revealed that local residents connect rapid demographic change with economic and social disruptions. Their perception of increased prostitution, sexual diseases, alcoholism and violence since the migration of rural workers to the oil palm business in the region is supported by interviews with police officers and community leaders.

Despite this generally negative perception, the demographic change is not reflected in available official statistics, which do not capture temporary mobility. In the rural village Palmares, for example, while the local rural workers union estimated a population change from 9000 in 2010 to 12,000 people in 2015, the official census data shows only 4200 registered residents in both periods. Since the financial support from the state and federal government is based on official census, the municipal budget was inadequate and insufficient to meet social demands. The education system in Tomé-Açu illustrates this problem. According to estimates from the municipal education secretary, nearly 30 schools were closed in remote rural areas between 2009 and 2015 due to drop in student numbers while nearly 6000 students were left out due to school overcapacity in urban areas between 2013 and 2014.

Despite these social impacts, working conditions for migrant workers were adequate particularly when compared to other local alternatives as stated by union representatives in several municipalities and confirmed by published reports (IOS, 2013; Brandão and Schoneveld, 2015). In contrast to other sectors, well-developed institutional structures are in place to promote space for negotiation between unions and companies, leading to company-specific employment terms and conditions, including salary structures and extra benefits negotiated annually through rural worker unions. Aside from fixed monthly salaries, and several work benefits, workers were eligible to productivity bonuses which could double the base wage. As one of the union representatives explained:

> "In 2015 we negotiated a monthly wage of 252USD which is above the national minimum wage. In addition to that we have free transport, *hora in itinere* plus productivity for a maximum of 44 h per week. In total in the high season we are talking between 1000 and 1250 USD while in the low season income drops to values between 400 and 600 USD."

In short, euphoria driven by increasing global palm oil prices and demands for improved sustainable image among companies and the national government matched local demands for economic alternatives to fulfil the gap left by policies aiming at zero-deforestation and lack of jobs in the region. In the context of a government with a 'progressive' image, the implementation of the SPOPP was facilitated by policies addressing the environmental, economic, and social aspects of development. While some contract farmers and migrant workers were attracted by the benefits provided by contractual terms, salaries and perks, there was also resistance to this process. Many other smallholders, traditional communities and urban residents had concerns about the risks and uncertainties involved. These opposing perspectives were also evident in the emerging academic debate, as well as that of civil society groups. On the one hand, favorable views highlighted high productivity, income generation, job creation and conversion of degraded areas resulting in positive gains in carbon sequestration as promising benefits (Becker, 2010; Homma et al., 2014; César and Batalha, 2013). On the other hand, critique included issues of land conflicts, soil and water pollution, social problems associated to the influx of migrant workers and threats to smallholder livelihoods and food security (Glass, 2013; Backhouse, 2013; Nahum and Bastos, 2014). As time passed, however, the problems debated were combined with unforeseen challenges from major structural changes, as described in the next section.

5.2. Between disenchantment and adjustment (2015–2017)

Despite the early optimism and the existing framework to promote investments, absolute oil palm expansion rates have been somewhat lower than formerly anticipated. In 2016, the total area under oil palm cultivation in Pará was approximately 200.000 ha, which represents less than 2% of the suitable land mapped by the ZAE Palma (Table 2). If early estimates were overoptimistic and exaggerated (also as a result of the euphoria phase), it is also true that the performances of new investors were below the original plans, particularly regarding smallholder inclusion (see Table 5).

Several elements influenced the underperformance. At global level, palm oil prices declined from an average real value of 1014 USD per metric ton in 2011 to a minimum of 638 USD in 2015 (World Bank, 2017), which was considered below production cost in Brazil (Brandão and Schoneveld, 2015). At the national level, economic growth during the previous years turned into a recession, associated with a lengthy domestic political crisis, which had profound implications for investing companies. Petrobras, which held contracts with more than 300 families, became embroiled in a high profile corruption scandal while Vale experienced profit loss due to a drop in ore prices. Changes in the global and national economy and national politics further limited the capacity of biodiesel policies to become a viable market for oil palm producers. No significant palmdiesel was produced since SPOPP. Finally, according to interviews with company managers, environmental factors impacted oil palm production in 2015 and 2016, with severe water shortages causing losses of between 20 and 40% of total oil palm production.

The new context shifted the euphoric narrative from investors and policy makers in the previous phase to disenchantment and concern. The new federal government quickly dismantled the progressive social and environmental agenda by changing institutions, policies and programs. The Ministry of Agrarian Development (MDA), in charge of the social inclusion component of SPOPP, was relegated to a lower administrative level. As a result, its budget, operational capacity, and political influence have decreased significantly as noted by farmers and unions. This was particularly relevant in a context where companies, were facing problems related to their inadequate planning, mismanagement and over optimism in the early phase.

Smallholder inclusion plans were confronted with unexpected hurdles by Biopalma and BBB. As highlighted by bank managers and company representatives, high levels of credit blacklisting (resulted from overdue debts of previous PRONAF projects) turned into a major barrier for smallholders to apply for the PRONAF-Eco credit line. In addition to that, distrust among eligible farmers challenged companies' capacity to recruit enough families particularly outside the areas where the first wave of oil palm took place, as described by a smallholder:

[24] With exception of fruit foraging, which is a typical female task, work in oil palm fields is mainly male-oriented. Agropalma, for example, only had between 10 and 13% female labor force between 2011 and 2015.

Table 5
Plans announced by investors and numbers achieved by 2016.
Source: (Rossetto, 2010, BASA, 2012) Abrapalma (2017) and Brandão and Schoneveld (2015).

	Company managed plantations			Smallholders total area (ha)		
	Original plans (ha)	Achieved by 2016 (ha)	% Achieved	Original plans (ha)	Achieved by 2016 (ha)	% Achieved
Petrobras/PBIO[25]	24000	0	0%	12500	0	0%
Petrobras/Galp/BBB	50000	38367	77%	10000	3055	31%
Vale/Biopalma	60000	56772	95%	20000	6543	33%
ADM[26]	6000	5500	92%	6000	2050	34%
TOTAL	140000	100639	72%	48500	11648	24%

> "We were afraid to start to plant palm oil in our land … And we were afraid because we listened to other folks: If you plant palm oil it will ruin your land, you will no longer have a place for your own crops, and you won't produce your flour."

As a result, oil palm companies competed for the buy-in of the limited potential smallholders and tried to increase eligibility such as bypassing their requirements and pressuring governmental agencies and banks to simplify the bureaucratic process. Despite those efforts, Biopalma and BBB outgrowing schemes ended up dispersed across a large territory with scattered groups of farmers, compromising their economies of scale due to increased costs with delivery of technical assistance and inputs, and collection of the Fresh Fruit Bunches (FFB). As a result, the companies shifted their business strategies to divest from oil palm. According to informants, BBB has recently been restructured through a partnership with a local oil palm company (Dentauá), while Biopalma is keeping investment at a minimum.

With regards to rural workers, according to the National Association of Oil Palm Producers (Abrapalma), the number of direct jobs among their affiliates (8 companies) has decreased by 17% between 2014 and 2016. In Tomé-Açu and Concórdia do Pará, a more abrupt decline of 56% and 39%, respectively was observed according to the local rural workers unions. As a result, the influx of migrants has shifted to opposite trend in this period which significantly reduced the urban population pressure. Disenchantment towards labor security has also hit rural workers as many may not have been properly compensated by the companies according to labor legislation. For example in Concórdia do Pará, according to the local union, this problem has attracted a wave of representatives of several lawyer agencies to recruit rural workers to issue formal complaints against the companies.

Crisis and disinvestment by the private sector were not the only adverse outcomes of the new context. The years between 2015 and 2017 were crucial for the social performance of SPOPP since the bulk of outgrowers' projects were progressing towards maturity, phasing out credit support and stepping into self-financing. However, as our more recent visits to communities revealed, lower productivity due to water shortage in some regions, combined with delays in delivery of input and technical assistance by the companies constrained smallholders to pay off their debts. As some ongoing research posits, smallholders have had differentiated results ranging from very successful to near abandonment (Brandão et al., 2018). As one contract farmer mentioned:

> "25 years (the oil palm cycle) is very long and life changes. At the beginning I received the stipend and all was working, but after the third year I had to cover the costs by myself. I have two sons, but one left in the meantime and I wasn't able to continue. My project has stopped, I have no capacity. I have no capacity to pay for a tractor or to hire a daily worker and I am not harvesting a single fruit. In this region from 6 contract farmers, 2 are producing and 4 are having difficulties."

In addition to the production system, smallholder organizations have seen their access to resources and political influence significantly reduced by political changes at federal level. These challenges were further aggravated by the split of rural unions into rural workers and smallholder farmer organizations. As the bulk of the financial contribution comes from wage workers, traditionally powerful smallholder organizations (e.g., STTRs in Tailândia, Concórdia and Tomé-Açu) have seen their financial capacity significantly reduced. As a result, FETAGRI and STTRs, which were very politically active in the previous phase, have reduced their contact and articulation with oil palm contract farmers. This institutional gap has been filled by the recently created oil palm associations in some areas; however, limited human and financial capacity, and paternalistic relations created by companies, have reduced the capacity of smallholder representation both at municipal and state levels. This process was further accentuated by the lack of capacity of smallholders to be represented at the federal and state chambers which are now the main fora through which companies pursue their interests. Analysis of the minutes of these chambers and participation in some other relevant meetings show virtually no reference to smallholder issues.

Disappointment among local stakeholders and most farmers were mixed with some optimistic assessments. According to Tomé-Açu local bank, despite the difficulties, oil palm contract farming schemes have shown considerable low levels of default, especially when compared to other PRONAF credit schemes not involving partnerships with companies. As oil palm companies are committed to buying the harvest delivered, they make the payment directly to the bank to cover the outgrower's credit parcel. This arrangement ensures that credit parcels are paid off. Among farmers, better and worse off producers started to emerge; however, the reasons and consequences of this mixed outcome are still unclear. If the former find ways to accumulate more plots at the expense of the latter, more tensions in the agrarian structure might erupt as observed in other countries (McCarthy, 2010). As opposed to the previous phase, the crisis has triggered private sector willingness towards developing alternatives to monocrop systems and pilot activities with smallholder farmers starting to emerge.[27] Local investors in particular play a key role in this process as they are better adapted to the local context. The recent partnership between BBB and Dentauá and the expansion of new outgrower schemes by Marborges in Moju illustrate this new trend.

The last years were also crucial to assess the environmental performance of SPOPP. A recent study has identified low and declining deforestation rates associated to oil palm in Pará (Benami et al., 2018). Between 2006 and 2014 oil palm has mostly replaced pasture lands (91%), while direct conversion of primary forests has declined from 4%

[25] The PBIO project, which was mainly focused on smallholders, was abandoned by Petrobras in 2011 due to implementation difficulties and changes in the leadership of the company.

[26] Outside the researched area.

[27] Such as the Project SAF Dendê led by Natura and Agropalma experiments with agroforestry systems.

before SPOPP (2006–2010) to less than 1% since SPOPP (2010–2014). According to interviews with environmental experts, these results are in part a product of existing robust environmental frameworks along with local civil society and global pressure to de-link deforestation from commodity production.

In sum, the main outcomes of the new scenario are the withdrawal of the national level government from the process, and the reshaping of the palm oil sector on the ground in response to local and global drivers. What opportunities and challenges will emerge from this reshaping process remains to be seen.

6. Beyond enthusiasm and disenchantment

Designed under promising international, national and local economic and political contexts, the SPOPP is an example of a program shaped by participatory governance. Its innovative design, simultaneously tackling environmental, economic and social dimensions originally offered encouraging prospects for regional sustainable development. Yet, like other development interventions in the past, the program underwent rapid structural change and suffered from discontinuity which triggered a new boom and bust cycle in the researched region, this time with oil palm. In this paper, however, we have moved beyond the normative analysis that prevails in international debates on oil palm (Butler and Laurance, 2009; Tan et al., 2009), by arguing that both boom and bust periods were marked by mixed outcomes, from euphoria and criticism in the earlier stage to a mix of disenchantment and reorganization in the latter stage.

The dominant euphoric narrative attracted large investors seeking to increase their access to land and to a promising new biofuels market. This drove an expansion process leading to landscape transformation through land rush, the inclusion of smallholder farmers and a fast influx of migrant rural workers in the region. This rapid transformation led to apprehension and criticisms among some groups of smallholders, traditional communities and urban residents. Yet, in contrast to previous state-centred and self-governance periods, some marginalized actors such as contract farmers and rural workers, demonstrated optimism for economic and social development. Moreover, low and declining deforestation rates associated with oil palm were also encouraging outcomes.

The positive perceptions of participating farmers, rural workers and companies alike, swiftly transformed into disenchantment as the local, national and international contexts evolved into economic and political turmoil, resulting in the withdrawal of the state, reduced participation and general disinvestment of major oil palm companies. Although SPOPP's main goal was to connect companies with the biodiesel market, no single company has been willing or able to do so. Instead, companies have continued to benefit from previous incentives they would have acquired anyway without the program to invest in the Amazon (e. g. SUDAM). Since the federal government has reduced its general presence and operational capacity, procedures and practices are mainly regulated by CSR mechanisms. Although the contractual arrangement and labor legislation ensured the ongoing commitment of companies towards smallholders and laid off rural workers, the unpredictable political scenario in Brazil, and declining resources, political influence and representative capacity places these local actors in a highly vulnerable position. Moreover, the volatile political setting may also have an impact on reducing environmental controls in the future.

Despite the recent governance shift swinging the pendulum back to self-governance modes, local agency has been able to reshape and readapt the sector on the ground as the implementation process opened new channels of social interaction, crop production, and market relations. As a result, a transformed regional, social and agrarian landscape emerged, based on residual expansion rates (mostly replacement of old plantations), demographic changes (reduced migrant population), new outgrowers' strategies (reduced support and worse and better off smallholders; and new independent mills), and new partnerships (between new investors and local companies, and between local companies and outgrowers). Under the current setting of disinvestment, absent state and reduced participation, local companies seem to be emerging as the main private players as they are more resilient to change and more able to build up stable partnerships with small and middle scale farmers.

Regardless of participatory narratives, the SPOPP repeats some historical problems. Like some past development interventions, instead of supporting and strengthening local actors, “foreign” or external agents are prioritized as drivers of change. Moreover, the program hasn't been able to adjust to a new socio-political context and keep its instruments fine-tuned to achieve the multiple goals of sustainability, social inclusion and economic development. Yet, despite reduced enthusiasm and new structural challenges, the recent sector reorganization based on local agency and residual expansion rates seems to have minimized many of the socio-environmental risks, at least temporarily. However, if contextual changes trigger a new wave of expansion, and no significant changes are made to SPOPP, there is no guarantee the Brazilian palm oil sector will be able to reorganize again avoiding many of the socio-environmental problems experienced in the past.

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Conflicts of interest

The authors declare no conflicts of interest.

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Appendix A. Supplementary data

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