OIL PALM EXPANSION IN THE BRAZILIAN AMAZON

The challenge of reconciling conservation and development

Frederico Brandão

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OIL PALM EXPANSION IN THE BRAZILIAN AMAZON

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OLIEPALM EXPANSIE IN DE BRAZILIAANSE AMAZONE

De uitdaging om natuurbehoud en ontwikkeling met elkaar te verenigen

(met een samenvatting in het Nederlands)

A EXPANSÃO DA PALMA DE ÓLEO NA AMAZÔNIA BRASILEIRA

O desafio de conciliar conservação e desenvolvimento

(com um sumário executivo em Português)

Promotoren
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for Rui Guilherme…

Tu destino está en los demás
tu futuro es tu propia vida
tu dignidad es la de todos.

Otros esperan que resistas
que les ayude tu alegría
tu canción entre sus canciones.

Entonces siempre acuérdate
de lo que un día yo escribí
pensando en ti
como ahora pienso.

Nunca te entregues ni te apartes
junto al camino, nunca digas
no puedo más y aquí me quedo.

La vida es bella, tú verás
como a pesar de los pesares
tendrás amor, tendrás amigos.

José Agustín Goytisolo

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ACRONYMS AND ABBREVIATIONS

Abrapalma - Brazilian Association of Palm Oil Producers
ADM - Archer Daniel Midlands
ANP - National Agency of Petroleum, Natural Gas and Biofuels
APP - Area of Permanent Preservation
BBB - Belém Bioenergia Brasil
CAMTA - Tomé Açu Agricultural Cooperative
CAR - Rural Environmental Registry
CGCs - Consumer Goods Companies
CIFOR - Center for International Forestry Research
CNS - National Council of Rubber Tappers
CONTAG - National Confederation of Agricultural Workers
COP - Conference of the Parties
CPO - crude palm oil
CPT - Land Pastoral Commission
CSPO - certified sustainable palm oil
CSR – corporate social responsibility
DAP - Declaration of Aptitude to PRONAF
DDT - dichlorodiphenyltrichloroethane
DETER - Real Time System for Detection of Deforestation
EMATER - Rural Extension and Technical Assistance Company
Embrapa - Brazilian Agricultural Research Corporation
ESPO - European Sustainable Palm Oil
ESR - endogenous switching regression
EU-RED - European Union Renewable Energy Directive
EU-RED II - European Union Renewable Energy Directive for 2020-2030
FDI - foreign direct investment
FETAGRI - Pará state Agricultural Workers Federation
FFA - free fatty acid
FFB - fresh fruit bunches
FIML - full information maximum likelihood
GCF - Governors Climate and Forests' Task Force
GDP - gross domestic product
GEE - Google Earth Engine
GHG - greenhouse gas
GIS - geographic information systems
HCS – high carbon stock
HCV - high conservation value
IBGE - Brazilian Statistical Agency

IBM - inclusive business models
ICRAF - World Agroforestry Centre
INCRA - Brazilian Agency for Agrarian Reform
INPE - National Institute for Space Research
IPCC - Intergovernmental Panel on Climate Change
IRHO – French–Brazilian Oil Crop Research Institute
ISPO - Indonesian Sustainable Palm Oil
ISCC - International Sustainability and Carbon Certification
ITERPA - State Land Agency of Pará
JA – jurisdictional approach
LAR - Rural Environmental License
MAPA - Ministry of Agriculture, Livestock and Food Supply
MDA - Ministry of Agrarian Development
MDGs - Millennium Development Goals
MSPO - Malaysian Sustainable Palm Oil
MST - Movement of Rural Landless Workers
MT - metric ton
MZEE-AL - Macro Ecological-Economic Zoning of the Legal Amazon
NGOs - non-governmental organizations
NYDF - New York Declaration on Forests
OVEG - the Pro-Óleo and the Energy from Vegetable Oil
PAA - Program for Food Procurement
PAS - Plan for Sustainable Amazonia
PKO - palm kernel oil
PNAE - National Program of School Nourishment
PNPB - Biodiesel Production and Use Program
POFC - Palm Oil Federal Chamber
POSC - Palm Oil State Chamber
PPCDAM - Plan of Action for the Prevention Control of Deforestation in the Amazon
PRONAF - Program to Support Family Farming
REASA - Reflorestamento Amazônia, SA
REDD - Reducing Emissions from Deforestation and Forest Degradation
RSPO - Roundtable on Sustainable Palm Oil
SAD - Deforestation Alert System
SDGs - Sustainable Development Goals
SFS - Social Fuel Stamp
SNUC - National System for Protected Areas
SPOPP - Sustainable Palm Oil Production Program
STTR - Union of Rural Workers
SUDAM - Superintendence of Development in the Amazon

UN - United Nations
UNFCCC - United Nations Framework Convention on Climate Change
USA - United States of America
ZAE-Palma - Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon
ZD - zero deforestation
ZEE - Ecological–Economic Zoning

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When I started on this journey nearly six years ago, I could not imagine how my life was going to change in so many ways. A popular Amazonian saying is "Whoever goes to Pará and tastes açaí [the real one, not the stuff processed with granola], remains in Pará." I have to say that I'm probably living evidence of its veracity! Not so much because of açaí - of which I am of course a delighted consumer - but mostly because Pará, and the Amazon in general (and not only the Brazilian side of it), is a charming, fascinating, and even thrilling landscape. Although of course Amazon's exuberant forests and turbulent rivers are impressive, in particular for a peri-urbanite like me, it is the hospitality and warmness of its people in addition to its inspiring, but also tragic, socio-political history that captured my heart, and after some time even my full dedication and commitment. In the Colombian Amazon, locals refer to that as the *manigua* - a sort of spirit or wisdom from the forest that capture those who are targeted by it. So, probably yes, I was captured by the Paraense *manigua*.

When I arrived in Brazil in 2013, I had little more than a few stereotypes in my mind about the Amazon. Hummingbirds and images of the confluence of colorful rivers were probably the firmest images I held. Like most Europeans of my generation, I believed the Amazon was the scene of a struggle between good and evil - the evil represented by unscrupulous capitalist forces that see no value in standing forests, the good by traditional populations concerned about protecting the untouched and sacred forests. Obviously, my role, like that of anyone with decent intentions, would be to support the latter. Yet, while this dualism has certainly a *raison d'être*, it represents only a small part of the story. The Amazonian reality is far more complex. The small and traditional is not always beautiful; forests are hardly untouched or inhabited; and companies can sometimes be more progressive than governments and local communities. This, I guess, is the beauty of it, and probably the reason why so many policies and strategies failed in the past. I hope this dissertation, as well as my overall work in the region, can support this understanding. Like a bridge connecting two sides of a river, I hope that this book will help to strengthen links between the Amazonian world - which is often inward-looking and isolated from global processes - and global debates, which frequently lack a deep understanding of local contexts and seek universal top–down solutions.

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A very important acknowledgment goes to those who have been the main body of my research: the Amazonian smallholder farmers. For nearly two years, they offered me and my team the opportunity to delve into their lives and to enter their homes, and they guided us along thousands of kilometers on dirt roads and even cooked for us. Some of them have also become friends with whom I keep in contact and pay sporadic visits to. My singular appreciation goes to Elineuza da Costa, Linelson da Costa, Francisco Sobrinho (Chicão), Everaldo Lima (Rambo), Deusarina Lima, Valmir Reis, Geraldo (Bolinha), Manoel do Carmo, Lucas do Carmo, Marcos do Carmo, Rita Lima, Assis da Silva, Antonina Santana, Cornélio Santos, Alexandre (de Mocajuba), Gleydison Soares, João Lopes Filho e Paula (do Catita), Lula (da Vila Moraes), Napoleão dos Santos, João Sousa e Maria Sousa, Almir Araújo, Benedita do Nascimento, Campião, and António Fala Grossa.

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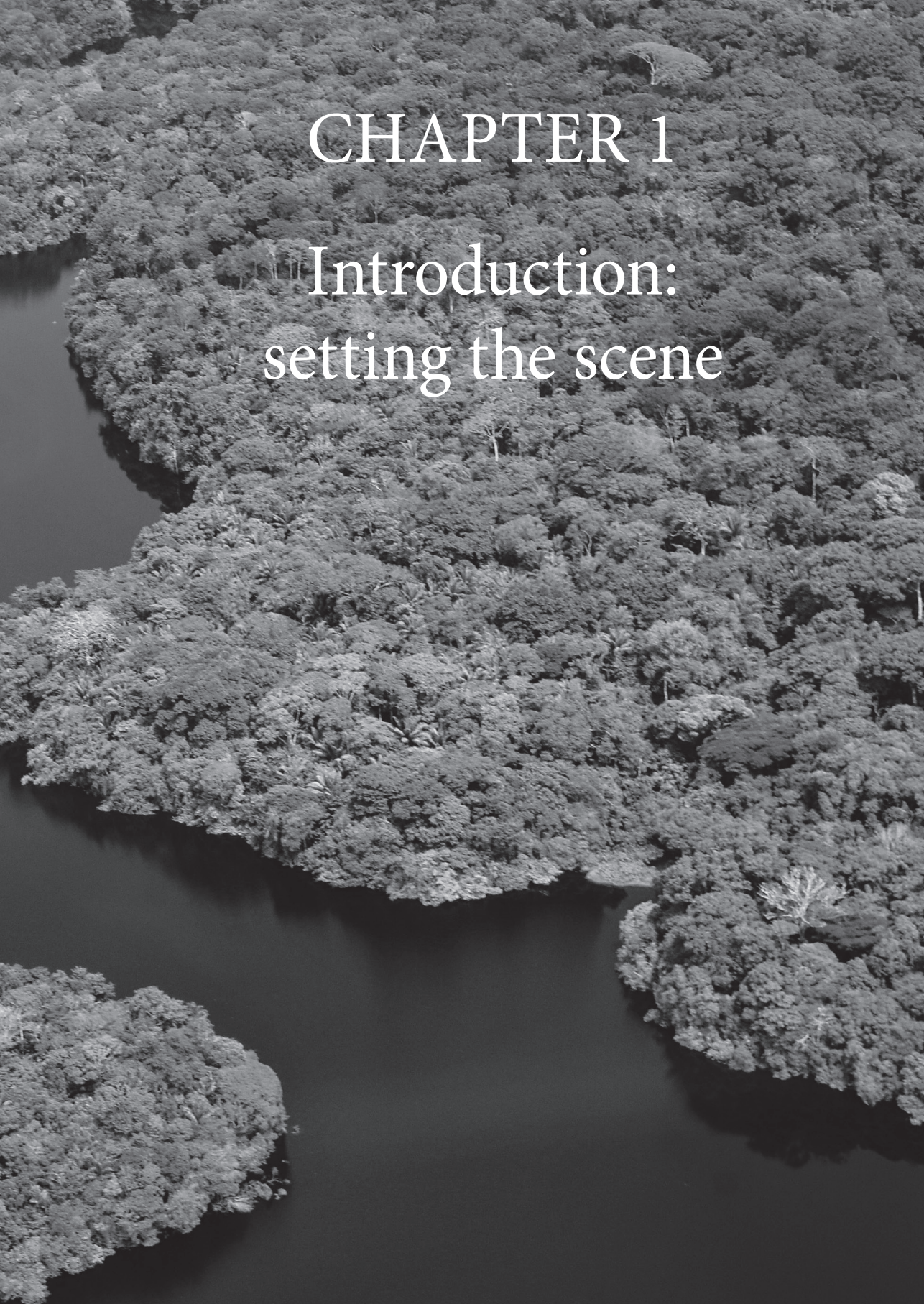


CHAPTER 1

Introduction: setting the scene

1.1. OVERALL AIM

Expanding population and per capita food consumption, changing consumption patterns toward processed foods and meat products, and the introduction of biofuel policies in many countries have stimulated the expansion of agricultural commodity[1] production worldwide (Byerlee and Rueda, 2015; Meijer, 2015). Agricultural investments have been promoted since they contribute to producing countries' macro-economic goals, such as economic growth and increased export revenues, and capacity to promote rural development along with poverty alleviation, for example by building infrastructure, introducing technological innovations, and stimulating employment in remote areas (Pacheco, 2012b; Potter, 2015; German et al., 2013). In some cases, they have also contributed to reducing poverty amongst consumers by supplying cheaper consumption goods.

However, the expansion of commodity crops such as soybean, beef, palm oil, and cocoa in many Latin American, African, and Asian countries has been historically related to a number of harmful impacts. Innumerous reports have highlighted concerns about the environmental and social footprint of these investments in producing regions, mentioning such issues as deforestation or the degradation of highly sensitive biomes, the displacement of traditional populations, land conflicts, or food insecurity (Byerlee and Rueda, 2015; Kessler et al., 2007). These issues impact not only producing regions, but also the whole planet through, for example, climate change (Federici et al., 2015).

At the heart of these problems is the notion of ***governance***. Socio-environmental deterioration linked to agricultural production, in particular deforestation as the most important issue, is to a great extent an outcome of bad or a lack of governance. In many cases, poor domestic policy and legal frameworks, along with weak state monitoring and enforcement capacity, which are typically prevalent in rural areas and forest frontiers in developing countries, are important reasons for the predominance of unsustainable practices in the agricultural sector (Nepstad et al., 2013). Moreover, a lack of private-sector commitment and motivation to change the business-as-usual situation, and inadequate or non-existent market mechanisms to compensate for the cost of often more expensive improved production practices, have also inhibited sustainability enhancements for decades (Mayer and Gereffi, 2010).

Therefore, a number of state and non-state actors have been seeking ways to change this state of affairs and enhance the sustainability of agricultural commodity supply. At a transnational level, global civil society organizations have, for example, been proposing consumer boycotts of certain commodities, and in some cases have been collaborating with firms through multi-stakeholder

1 Commodities are products that are sold across markets without qualitative differentiation. In general terms, there are three types of commodities: agricultural, energy, and metals. Agricultural commodities can be grains (e.g., wheat, corn, rough rice), oil seeds (e.g., palm oil, soybean, canola), meat (e.g., live cattle, pork bellies), dairy (e.g., milk, butter, whey), and others (e.g., cocoa, coffee, rubber).

platforms to encourage companies to improve their practices (Vellema and van Wijk, 2015). The latter often includes commodity moratoria or market-based instruments such as certification schemes. Other types of transnational initiatives and arrangements include codes of conduct, global trade rules, or consuming country regulations (Lambin et al., 2018). In the context of globalization and the intensification of transboundary flows of goods, information, services, persons, and capital, transnational efforts have assumed a leading role in the debate. Nonetheless, initiatives have been also pursued at the national level, such as improved socio-environmental domestic regulations and standards implemented in several producing countries. This is to a great extent related to climate change mitigation efforts, strategies to restore confidence in consuming countries, and pressure from domestic and international civil society groups.

A key discussion on agricultural commodity governance is related to the reconciliation of conservation and development goals - more precisely, the management of trade-offs between agricultural development, forest conservation, and poverty alleviation. In fact, promoting agricultural development while avoiding the conversion of high conservation value ecosystems and improving the livelihoods of vulnerable population groups has become the silver bullet to ensure a sustainable and prosperous future, particularly in rural areas of the developing world. But what kind of governance arrangements should be put in place? Is it possible to harmonize the interests of both producing and consuming countries (including final consumers), and of both corporations and smallholder farmers in the global South? Is the trend toward transnational governance the right path, or does domestic governance still play a role? Is there a universal solution to this problem?

The aim of this dissertation is to contribute to this debate by focusing on the recent wave of oil palm expansion in the Brazilian Amazon as a case study. In this region, oil palm expansion has been driven since 2010 by a domestic program designed according to sustainability principles. Unlike the main palm oil producing countries, whose sustainability concerns have long been externally driven by private standards and consuming country regulations, Brazil seems to have developed its own path toward sustainable supply apparently without much transnational influence. The Brazilian government proactively developed environmental safeguards and mechanisms to promote smallholder integration, and the sector developed with such safeguards already in place. Moreover, despite the centrality of state actors in the Brazilian case, non-state actors such as companies and unions enjoyed a particularly relevant position in the design and implementation of the program. As sector development and governance are not dictated by external interests and include the participation of local actors, this model can theoretically enable the more effective alignment of zero-deforestation concerns with sector expansion dynamics and local development priorities, such as poverty reduction. This is particularly relevant, since most transnational initiatives emerge out of an environmental and climate-related agenda driven by developed countries where issues of inclusivity and the productive integration of smallholders or rural development in producing countries have long been secondary priorities (Astari and Lovett, 2019).

In analyzing the expansion of one of the most controversial crops in one of the most complex socio-ecological systems, this dissertation discusses the potential and effectiveness of domestic initiatives to reconcile conservation and development, in particular to better manage trade-offs between agricultural development, forest conservation, and poverty alleviation. Specifically, this dissertation dissects and evaluates Brazil's recent oil palm expansion wave and its associated social, economic, and environmental outcomes, and their tradeoffs, while assessing the role of governance factors shaping those outcomes. This is particularly challenging in the Brazilian Amazon, a landscape traditionally marked by frontier expansion processes associated with boom-and-bust development patterns (Tritsch and Arvor, 2016). Historically, the main governmental initiatives such as the "March toward the West" in the 1930s, "Operation Amazônia" in the 1960s, and "Polamazônia" in the 1970s, achieved very limited long-term economic results while triggering innumerous problems, such as deforestation, land accumulation, social inequality, and conflicts (Schmink and Wood, 2012; Arvor et al., 2018).

Considering that most efforts at the global level have been dedicated to developing and implementing transnational initiatives and arrangements to enhance the sustainability of agricultural commodity supply, these findings can offer some nuance to and leverage important lessons for global debates on the role of states, domestic initiatives, and bottom-up processes in developing countries, shaping sustainable production, with a particular emphasis on forest conservation and livelihoods.

After this introduction, the following section (1.2) introduces the main theoretical debate. In section 1.3, the dissertation explains why discussing agricultural commodity governance is relevant. Section 1.4 justifies why oil palm was chosen as the research topic, while section 1.5 introduces the case study and section 1.6 the research design. Finally, section 1.7 presents the structure and outline of this book.

1.2. THE GOVERNANCE OF AGRICULTURAL COMMODITIES

Ongoing trends such as globalization, decentralization, privatization, and the emergence of market- and individual- focused instruments have challenged the traditional role of the state and pressed for innovative ways to address common problems, such as climate change, forest management, or agricultural commodity supply (Lemos and Agrawal, 2006; Lagendijk et al., 2009). In this context, governance emerged as a buzzword to conceptualize the new modes of governing that go beyond the traditional role of the state (Arts, 2014). Despite being very popular in academic and policy debates in recent decades, what exactly "governance" means is far from consensual (box 1.1).

The different understandings of governance are often related to three dimensions, namely politics, polity, and policy (Treib et al., 2007). These dimensions also constitute the analytical

lenses through which to analyze which governance modes are more appropriate to steer change. The politics dimension relates to the actors involved and their power relations. In this case, the central aspect is the relation between public and private in policymaking. Hysing, (2009) for example, refers to the intensity of state involvement and places governance modes along a continuum of state intervention and societal autonomy. Other authors, such as Driessen et al. (2012), created five ideal types based on the different combinations of power and responsibilities between the three actors - state, firms, and civil society (box 1.1). The polity dimension refers to the formal and informal rules of the game; in other words, "the institutional architecture in which politics and policy-making take place" (Lange et al., 2013). Different governance modes focusing on this dimension refer to several aspects, such as the continuum between hierarchical and market institutional structures, the opposition between central and dispersed authority, and the dialectic between institutionalized versus non-institutionalized interactions (Treib et al., 2007). Another conceptualization focuses on adaptive governance, which promotes flexible and collaborative decision-making as opposed to top–down, bureaucratic governance (Wyborn, 2015). The policy dimension relates to the mode of political steering; in other words, through which instruments change is promoted. This relates to discussions on different types of policy instruments ranging from more regulatory to incentive or information-based instruments (Howlett, 2011). Other types of conceptualizations mention rights, incentives, and technologies (Agrawal et al., 2014), or incentives, disincentives, and enabling measures (Börner and Vosti, 2013), as typologies of policy instruments.

In addition to these three dimensions, there is also a fourth distinction in terms of scope. In broad terms, governance "relates to any form of creating or maintaining political order and providing common goods for a given political community on whatever level" (Risse, 2014). In this case, the definition includes traditional hierarchical modes of government and all different types of policy instruments. In narrow terms, governance entails only the modes of governing that go beyond the traditional role of the state, and typically include the role of non-state actors and non-hierarchical forms of governing.

For the purpose of this dissertation, governance is defined as an ensemble of *actors* interacting at multiple levels in dynamic contexts, responding to particular *institutional features*, which produces a certain *policy content* (Driessen et al., 2012). Despite implying an obvious move from state-centric toward multi-actor approaches, this definition also includes traditional forms of government. Additionally, the definition also embraces different governance levels from the local to the global (Mwangi and Wardell, 2012). Although implicit in the initial discussions on governance that related to the erosion of the nation-state (Bulkeley et al., 2012), the adjective "transnational" explicitly refers to governance processes that go beyond national boundaries.

Box 1.1: Governance modes: a vibrant and prolific academic field

Many authors have conceptualized the so-called governance modes (Lange et al., 2013). One of the most complete conceptual frameworks to date was introduced by Driessen et al.(2012). Along this framework, there are five archetypical modes of governance designed based on the roles and interactions between actors: (1) Centralized governance and (2) decentralized governance are governance modes where state actors have leading roles; in the former case central governments and in the latter regional or local governments. In these cases, market and civil society forces are mainly recipients. Public–private governance (3) and interactive governance (4) are governance modes where public and private actors share responsibilities and cooperate, in the first case between government and market actors, while in the second case it also includes civil society actors on equal terms. Finally, (5) self-governance modes are characterized by significant market and civil society autonomy vis-à-vis public action. Other frameworks include, for example, that of (Arnouts et al., 2012), who distinguish four types: (1) Hierarchical governance, which refers to the predominance of governments; (2) self-governance, which refers to the prevalence of non-state actors; and (3) closed co-governance and (4) open co-governance, which are both characterized by equivalent roles of state and non-state actors, in the former case being more strict and formal, and in the latter case more flexible and autonomous. All these categorizations are obviously ideal-typical. In reality, governance modes are rarely presented in their purest forms. Other authors have presented different notions, such as global governance architectures (Biermann et al., 2009), polycentric governance (Ostrom, 2010), multi-actor governance (Newell et al., 2012), private governance (Mayer and Gereffi, 2010), partnered governance (Nikoloyuk et al., 2010), hybrid governance (Viana et al., 2016a), or market based governance (von Geibler, 2013).

According to Pattberg and Stripple (2008), transnational governance is characterized by at least four key aspects: the proliferation of governance arrangements from mandatory to voluntary; a mosaic of actors such as governments (from municipal to federal levels), firms, civil society, scientific organizations, and others; divergent principles and idiosyncrasies regarding how to govern common issues; and the multiplication of non-synchronized links, connections, and communication channels. The final layer of connections and interlinkages between different governance arrangements at different levels constitutes a governance system. Governance arrangements can be complementary, substitutive, or antagonistic (Lambin et al., 2014). When there are overlapping and non-hierarchical arrangements governing a particular issue, this is called a governance regime complex (Pacheco et al., 2018; Margulis, 2013). Although some authors use these terms interchangeably, a regime complex constitute a particular type of governance system (Faude and Gehring, 2017).

The debate within the realm of agricultural commodity supply has been particularly active in terms of emphasizing the role of transnational governance. A broad range of new sustainability

governance strategies and approaches have emerged with little to no state engagement (Abbott, 2012; Byerlee and Rueda, 2015). Firms and civil society organizations and partnerships between them have brought to the fore a number of instruments and initiatives, such as codes of conduct, moratoria, certification schemes, and multi-stakeholder platforms (Glasbergen, 2011). The biofuel and food sectors have been specially relevant in this field with many different initiatives taking place, including the roundtables on Sustainable Palm Oil (RSPO), Responsible Soy (RTRS), Sustainable Biofuels (RSB) (Schouten and Glasbergen, 2011; Derkx and Glasbergen, 2014), and the Soy Moratoria in the Amazon (Gibbs et al., 2015). Firms have also played a powerful role in, for example, the debates on corporate social responsibility (CSR), sustainable supply-chain management, and zero-deforestation commitments (Ansari and Kant, 2017; Vermeulen, 2013). These mechanisms were partly a response to societal pressure and the recognition of public governance's inadequacy, and had limited reach to effectively address the socio-environmental "externalities" of commodity production (Newell et al., 2012), the so-called "from government to governance" narrative (Jordan et al., 2005).

Despite the notorious rise of transnational governance, the extent to which states continue to play a major role in governance systems is subject of a major debate. Whereas some claim that the "retreat" or "hollowing out" of the state is a unidirectional trend driven by globalization, privatization, and decentralization processes (Lagendijk et al., 2009), others argue that states are still the most relevant political entity (Capano et al., 2015). Concerns about credibility and legitimacy, equity or effectiveness on the ground, and the difficulty of maintaining sustainability initiatives in the long-run or achieving scale are examples of the limitations of transnational governance mechanisms (Boström et al., 2015; Mayer and Gereffi, 2010; Vermeulen, 2013, Jopke and Schoneveld, 2018). In certain views, transnational initiatives are also perceived as green colonialism, namely environmental narratives that maintain the exploitation of developing countries by inhibiting their economic development and undermining their national sovereignty (Pye, 2018).

Considering the limits of both public and private governance mechanisms, engaging the public and the private has been proposed as key to strengthening the effectiveness of sustainability interventions (Lambin et al., 2018). In recent years, the notion of jurisdictional governance was used in an attempt to respond to that need by linking different stakeholders and different sectors operating in the same landscape through a common approach or partnership (Reed et al., 2016). While the term has been used and defined in different ways, a jurisdictional approach (JA) is defined here as a comprehensive strategy, grounded in a legally defined territory, that harmonizes cross-sectoral policies with both direct and indirect influences on forests and land-use practices. Ideally, a JA should provide a platform for cross-sectoral policy harmonization, ensure vertical coordination across government levels, and connect public and private efforts in a comprehensive framework (Boyd et al., 2018). Although promising, so far JAs have been only vaguely operationalized and few advances have been made on the ground to understand its nature and assess its potential to trigger change.

Given the proliferation of approaches mentioned, through which governance modes and concrete governance arrangements, can the transition to a sustainable agricultural supply be made? How effective are they regarding the management of trade-offs between agricultural development, forest conservation, and poverty alleviation? Is the trend toward transnational governance in the agricultural sector a universal solution? Do states still play a role? Is engaging public and private governance really the most effective way to reconcile conservation and development in the agricultural sector? All these questions are discussed in the following chapters. First, though, it is important to justify why this topic is relevant and why oil palm and the Brazilian Amazon were selected.

1.3. WHY IS THE GOVERNANCE OF AGRICULTURAL VALUE CHAINS IMPORTANT?

Decoupling economic and social development from natural resources depletion is the major challenge the world faces today. To meet the global population's demand for food, clothing, water, shelter, energy, and infrastructure requires the extraction of a huge amount of natural resources - such as timber, fossil fuels, and minerals - and the transformation of more and more ecosystems through, for example, deforestation, urbanization, or infrastructure development. While most countries in the developing world still aspire to enhance the living standards of their growing populations, pressure on finite resources and fragile ecosystems is expected to increase.

Box 1.2: The planetary boundaries

In 2009, a group of scientists led by Johan Rockström identified nine key processes driven by human actions that could threaten the Earth system stability and quantified how much pressure they were still able to absorb before unexpected and dangerous changes occur: Climate change; rate of biodiversity loss (terrestrial and marine); interference with the nitrogen and phosphorus cycles; stratospheric ozone depletion; ocean acidification; global fresh-water use; change in land use; chemical pollution; and atmospheric aerosol loading became known as the planetary boundaries and were soon converted into the guiding framework on global sustainability (Rockström et al., 2009).

One of the most important issues is the increasing global demand for food, fiber, and fuel (the three F's) and its impact on land use. Increasing production to meet the growing demand can be achieved either through improving productivity (the so-called intensification process) or by expanding into new areas. The latter process is called change in land use and can occur in degraded/abandoned areas or in lands with high carbon stocks or conservation value, such as forests, wetlands, and peatlands. The conversion of natural ecosystems into other uses, mostly agriculture, is considered one of the nine planetary boundaries (box 1.2). According to a group of scientists (Rockström et al., 2009), the percentage of global land cover converted to cropland (11.7%) is not yet above the red line (15%), but if nothing is done in the near future then at the

current pace of agricultural expansion that ceiling won't take long to break, with unpredictable consequences for climate, biodiversity, and people.

Of the natural ecosystems that have been converted to agriculture, forests - particularly those in the tropical domain - are of critical importance. Forests are important for hosting more than 75% of the world's terrestrial biodiversity and playing key roles in the water cycle, soil conservation, and habitat protection (FAO, 2016). They also contribute to the livelihoods of many people not only through timber extraction, but also by providing a wide variety of forest foods such as bush meat, nuts, vegetables, and fruits, as well as forest medicines that are used as fungicides and antibiotics (Seymour and Busch, 2016). All these aspects have an important role in poverty reduction (FAO, 2018). For all these reasons, the removal of forests - in other words, deforestation - is a global problem that is also related to other planetary boundaries, such as climate change, as forests are large reservoirs of carbon (box 1.3).

Box 1.3: Why are forests essential for climate change mitigation?

Most debates on climate change have been centered on the impacts of fossil fuels. The burning of fossil fuels and other industrial processes contribute to the largest and fastest growing share of carbon released into the atmosphere, namely from 55% in 1970 to 65% in 2010, while the contribution from the category related to forests (FOLU - forestry and other land uses) decreased from 17% to 11% in the same period (IPCC, 2014). However, these figures undervalue the role of forests in climate change, given that IPCC reports present the share of emissions from forests as a net figure. This means that 11% (or 8% if only tropical forests are considered) by 2010 represents the emissions from deforestation minus the emissions sequestered by forest regrowth. When looking at tropical forests alone, studies estimate that gross emissions from tropical deforestation (also including forest degradation) represent 16–19% of global emissions while removals by tropical regrowth constitute 8–11%. All in all, the mitigation potential of tropical forests (i.e., reducing emissions from deforestation and degradations plus sustaining regrowth) can reach 24–30% (Seymour and Busch, 2016), which is significantly higher than net values and reveals the relevance for climate change of tackling deforestation.

Anthropogenic emissions are responsible for around 1.0° C of global warming above pre-industrial levels, which has already impacted a number of land and ocean ecosystems. If emissions continue to increase at the current pace, global warming is likely to reach 1.5° C in the coming years, which according to the latest Intergovernmental Panel on Climate Change (IPCC) report will result in warming of extreme temperatures, rising sea levels, and increases in the frequency and intensity of heavy precipitation in some regions and droughts in others. This will accentuate the ongoing negative impacts on biodiversity and ecosystems, such as species loss and extinction, and climate-related risks to livelihoods, food security, water supply, and human health (IPCC, 2018). This is even more worrying given that around 800 million

people still suffer from hunger and 1 billion live in extreme poverty (FAO, 2015). As most of these people live in rural areas and rely on agriculture as their main income source, keeping the planetary boundaries safe and ensuring the human dignity of both farmers and global consumers is particularly challenging.

Recognizing these problems, and also their transnational nature, many efforts have been made in the international arena. In 2015, the 2030 Agenda for Sustainable Development was approved at the General United Nations (UN) Assembly as the overall global framework for the coming years (UN DESA, 2018). Seventeen goals - including end poverty in all its forms (goal 1), sustainable consumption and production (goal 12), and climate change action (goal 13) - became known as the Sustainable Development Goals (SDGs), replacing the previous ambitious but far from achieved Millennium Development Goals (MDGs). In the same year, the Paris Agreement signed at the 21st Conference of the Parties (or "COP") to the United Nations Framework Convention on Climate Change (UNFCCC), agreed to limit the rise in global temperatures and strengthen the capacity of countries to deal with climate change impacts. However, at the same time as these extraordinary diplomatic efforts are being made, an anti-environmental populist discourse is emerging at a national level in some places. A number of populist governments have been elected partly as a result of their exploitation of voters' resentment over the socioeconomic costs of increasing environmental regulations. The two most prominent cases are the election of Trump in the USA and Bolsonaro in Brazil, both of whom relied on strong anti-environmental rhetoric and promises to deregulate environmental protection and withdraw from international processes such as the Paris Agreement.

In this challenging context of population growth, increasing (and changing) per capita consumption patterns, the continuous battle to end poverty particularly in rural areas, climate change debates, emerging anti-environmental populism, etc., there is an urgent need to act. Finding alternative development models or new governance strategies to harmonize social, economic, and environmental aims has been seen as key to ensuring the present and future prosperity of the planet. A number of strategies have been proposed to reconcile these aspects, such as climate-smart agriculture, forest and landscape restoration, REDD+ initiatives,[2] standards and certification, and interventions in supply chains (see Chapter 2 for further explanations on policy options), to

2 REDD is the original name and stands for Reducing Emissions from Deforestation and Forest Degradation. The "+" was added at a later stage and means conservation, sustainable management of forests, and enhancement of forest carbon stocks. REDD+ is basically a global framework launched in 2007 as a strategy to reward those delivering results for example in avoiding deforestation. Since its early days, the framework was refined and a number of instruments such as MRVs (monitoring, reporting and verification mechanisms), FPIC (free, prior and informed consent), FREL (forest reference emission levels), SIS (safeguard information system) were created. Over 50 countries have adopted national frameworks and more than 350 initiatives were implemented as REDD+ pilot projects (Duchelle et al., 2018). In recent years, under the influence of the Governors' Climate and Forests (GCF) Task Force, the focus has moved towards the promotion of jurisdictional approaches at sub-national level as intermediary step. Despite ambitious expectations, the large-scale results-based approach funded by developed countries has up to now failed. However, some funding has been made available through result-based multilateral and bilateral donations. Examples in Brazil include the Amazon Fund, considered the most visible and successful pay for performance instrument, and state-level REDD+ programs in Acre and Mato Grosso supported by the REDD+ Early Movers Program of the German government.

mention only the most relevant (Agrawal et al., 2014). It is now clear that environmental protection shouldn't come at the expense of socioeconomic development, or vice versa. Yet, to effectively achieve that requires not only thinking outside the business-as-usual box in terms of how the global economy is structured, but also to promote profound transformations in the way producers, consumers, governments, and other public and private actors operate and cooperate.

1.4. WHY THE FOCUS ON OIL PALM?

Amongst tropical commodities, few have been as controversial in recent years as palm oil. Campaigns such as the Greenpeace demonstration at Unilever's office in Liverpool with activists dressed as orangutans in 2008 (figure 1.1), and protectionist political proposal such as the French "Nutella Tax" in 2012 imposing a surcharge on foods containing this oil, have attracted global attention to the issues of global palm oil supply (Rival and Levang, 2014). At the core of these concerns are the historical and ongoing negative impacts on tropical rainforests in Southeast Asia. Between 1989 and 2013, the expansion of oil palm plantations occurred at the expense of large proportions of primary forests in Indonesia (53.8%) and Malaysia (39.6%), according to Vijay et al. (2016); the two largest producing countries supplying about 85% of the global consumption (Pacheco et al., 2017a). Deforestation also had negative consequences for biodiversity, ecosystem services, and climate change (Savilaakso et al., 2014).[3] Simultaneously, social impacts such as displacement and land conflicts (Abram et al., 2017) and elite capture (Obidzinski et al., 2012) are frequently associated with oil palm in Southeast Asia and elsewhere (Hervas, 2017; Maher, 2015).

Figure 1.1: Greenpeace demonstration at Unilever's office in 2008

Photo credit: Will Rose/Greenpeace (2008)

3 Oil palm expansion into peatlands has also been a major issue in Indonesia given their important role as carbon sinks and suppliers of ecosystem services.

Oil palm is therefore perceived as a high forest-risk commodity, along with soy, beef, cocoa, paper, and coffee (Angelsen et al., 2018). This is one of the reasons why it was selected as case study. Moreover, in recent years oil palm has been particularly targeted by several governance processes and is a prolific field of regulatory innovations. The oil palm value chain has been shaped by an international context marked by increasing consumer pressure and several national and transnational sustainability initiatives. These include the emergence of the Roundtable on Sustainable Palm Oil (RSPO) and its certified sustainable palm oil (CSPO) label, private-sector commitments to zero deforestation, producing country certification mechanisms, and consuming country initiatives such as the European Union Renewable Energy Directive (EU-RED) and green procurement policies. The complexity of sustainability initiatives is such that some authors refer to it as the "palm oil governance complex" (Pacheco et al., 2018).

The RSPO was created in 2004 as a multi-stakeholder platform involving non-state actors from the seven sectors that comprise the palm oil industry: oil palm cultivators, processors and traders, consumer goods manufacturers, retailers, banks/investors, and NGOs. The platform emerged in a context of increasing criticism and global pressure to regulate palm oil production. RSPO created a set of certification rules (Principals and Criteria), including several environmental and social safeguards, which are adapted to each country through national interpretations. There are currently nine countries with national interpretations approved by RSPO (Indonesia, Malaysia, Papua New Guinea, Colombia, Honduras, Guatemala, Ecuador, Nigeria, Gabon, and Ghana), but growers from other countries can be also included. RSPO-certified growers are accorded CSPO producer status and allowed access to premium markets. By 2018, 19% of global palm oil production was RSPO certified (Lyons-White and Knight, 2018).

In addition to the RSPO, in recent years many companies in the palm oil sector, ranging from growers to retailers, have made commitments to zero deforestation. In 2010, the Consumer Goods Forum (CGF) - a platform of some 400 retailers, manufacturers, and service providers, including major palm oil buyers such as Unilever - pledged to achieve zero-net deforestation (see below for different definitions of "deforestation") (Jopke and Schoneveld, 2018). This triggered a number of individual commitments in the following years that culminated in the New York Declaration on Forests (NYDF) being signed by several corporations, including consumer goods companies (CGCs), traders, and retailers. Under the NYDF, they have committed themselves to eliminate deforestation from their supply chains across some commodities, such as palm oil, soy, paper, and beef, by no later than 2020. In some cases, commitments go beyond zero deforestation to include restrictions on expanding plantations into peatlands and on workers' exploitation. According to estimates, 96% of the global palm oil supply is linked to one of these commitments (Pirard et al., 2015).

Still at the transnational level, consuming countries have also implemented demand-side policies to drive sustainable production. The most important is the EU-RED, which requires producers

that want to sell biodiesel derived from palm oil to apply for certification under the International Sustainability and Carbon Certification (ISCC) scheme, which ensures that biofuels entering the European market have contributed to a 35% or 50% reduction in greenhouse gas emissions (Philippidis et al., 2018). Nowadays, within the context of newly approved Renewable Energy Directive for 2020–2030 (EU-RED II), there is an ongoing discussion on environmental criteria with consequences for the phasing out of palm-oil based biodiesels in the near future. To enter the EU market, biofuel feedstocks should comply with regulations on dLUC (direct land use change), in particular not to be grown in areas of high biodiversity value, such as primary forests and peatlands converted since 2008. Moreover, given its indirect impacts on high-carbon stocks, under the recent proposal palm oil is currently the only feedstock considered as high iLUC (indirect land-use change)-risk[4] feedstock and its use will be gradually reduced to zero between 2023 and 2030 (European Commission, 2019). At the time of writing (November 2019), the discussion is continuing, with complains and threats from both Indonesia and Malaysia, the major palm oil producers whose European market represents a large share of exports. Palm oil supply and its sustainability debates have thus geo-political implications. Moreover, seven European countries[5] assumed palm oil commitments and adopted the Amsterdam Palm Oil Declaration[6] to drive the uptake of sustainable palm oil and to achieve "100% sustainable palm oil in Europe by 2020," which basically means at least RSPO certified (or equivalent) (Pacheco et al., 2017a). Several palm oil buyers and sector associations in Europe have established initiatives to support the Amsterdam Palm Oil Declaration, including the European Sustainable Palm Oil (ESPO) initiative and the European Palm Oil Alliance.

In recent years, the debate has moved on to the effectiveness, equity, and outcomes of all these transnational initiatives. RSPO, for example, has been criticized for being dominated by commercial interests (Dauvergne, 2018), for depoliticizing contentious issues, or for focusing exclusively on North–South trade relationships (Higgins and Richards, 2019). A particularly challenging issue has been achieving global scale and avoiding the bifurcation of markets. With less stringent emerging markets such as China, Russia, India, and Pakistan representing a large share of global consumption and RSPO governing less than 20% of global production, companies that are unwilling or unable to meet CSPO criteria can simply target these countries (Jopke and Schoneveld, 2018). Moreover, RSPO has been also accused of non-compliance by members or even of being insufficiently strict regarding, for example, secondary forests. This relates to the discussion of what is considered "deforestation" and the use of the High

4 According to the EU definition, indirect land-use change occurs "when cultivation of crops for biofuels, bioliquids and biomass fuels displaces traditional production of crops for food and feed purposes. This additional demand may increase the pressure on land and can lead to the extension of agricultural land into areas with high carbon stock such as forests, wetlands and peatland causing additional greenhouse gas emissions" (Council Directive, 2018).

5 Denmark, France, Germany, the Netherlands, Norway, and the UK signed in 2015; Italy joined in 2017.

6 The Amsterdam Palm Oil Declaration is now being merged with the Amsterdam Declaration on Deforestation into the Amsterdam Declaration Partnership.

Conservation Value (HCV) approach,[7] which mainly focuses on primary forests (Houten and Koning, 2018). Likewise, the effectiveness of zero-deforestation commitments has also been questioned due to the existence of different definitions of "deforestation" and the lack of clarity about what exactly corporations are referring to. In general, the term can refer to legal deforestation (defined by governmental laws), zero-net deforestation (which includes reforestation and afforestation to compensate for deforestation),[8] or zero-gross deforestation (which only accounts for deforestation *per se*). Moreover, many NGO and media reports have noted the failure to implement those commitments, including problems of leakage and high costs associated with monitoring (Lyons-White and Knight, 2018).

A particularly problematic issue concerns the social cost of transnational sustainability strategies. Understanding which actors win and which lose in this attempt to improve the sustainability standards of palm oil production, is determinant not only in terms of discussing global justice *per se* but also for assessing the long-term effectiveness of these approaches. There are concerns that certification under RSPO tends to exclude smallholders from benefiting from formal certified markets. Over 90% of the certified oil comes from the largest transnational corporations (Pye, 2018). This is particularly problematic since there are nearly 3 million smallholders involved in the sector worldwide (Rival and Levang, 2014), and most of them rely on oil palm as their main income source. Limited knowledge on best agricultural practices is associated with slash-and-burn; difficult access to quality inputs (such as seeds and fertilizers), limited access to credit, and inadequate incentive mechanisms (such as price premiums) are important barriers to smallholders' achieving their productive potential and complying with public and private compliance requirements (Astari and Lovett, 2019). The problem is even more acute among independent smallholders,[9] who represent 12% and 28–30% of the areas under production in Malaysia and Indonesia, respectively. This group is typically associated with very low yields and unregulated expansion into no-go areas such as peatlands (Schoneveld et al., 2019). Therefore, transnational initiatives such as RSPO might entrench sectoral power asymmetries by privileging large players' interests over those of local actors, for example smallholders or indigenous groups (Pichler, 2013; Brandi et al., 2015; Nesadurai, 2018). This is related to the debate on inclusive business models and sustainability (box 1.4).

While transnational governance initiatives such as those mentioned above have many limitations, the discussion has moved back to include the role of states. The two largest producing countries - Indonesia and Malaysia - have been implementing domestic certification schemes. In 2011, Indonesia implemented a mandatory certification system based on domestic

7 An alternative model has been proposed under the High Carbon Stock (HCV) approach, whose main difference lies in the inclusion of some secondary forests based on the carbon value. There are discussions going on about merging these approaches.

8 Both reforestation and afforestation mean the planting of trees. The former takes place in areas previously forested, while the latter does not.

9 These are farmers not linked to any development scheme or corporation.

regulations, namely the Indonesian Sustainable Palm Oil (ISPO) initiative. A few years later, Malaysia implemented the Malaysian Sustainable Palm Oil (MSPO) standard, which will be mandatory by the end of 2019. These initiatives have been perceived as a reaction against transnational processes and as strategies to undermine RSPO (Hospes, 2014). According to the views of producing countries, transnational processes such as the RSPO do not favor domestic goals such as economic growth and rural development. By developing their own certification standards, Indonesia and Malaysia are thus better equipped to align global concerns, such as climate change, with domestic priorities, such as economic development and poverty reduction. The ISPO, for example, explicitly mentions the economic viability of producers as a major goal. In addition to domestic certification standards, producing countries have also been adopting policies to address climate change. In 2011, for example, the Indonesian government adopted a nationwide moratorium on new concessions for oil palm and pulpwood plantations on peatlands and primary forestland. This was further strengthened by a presidential instruction banning the clearance and exploitation of peatlands following the fire and haze crisis of 2015 (Pacheco et al., 2018b).

Despite some enthusiastic narratives, domestic initiatives have been also questioned. The implementation of ISPO, for example, still faces tremendous challenges, including problems related to sanctioning and the enforcement of regulations. There are also many doubts about the credibility of ISPO, which raises the question whether it is merely a greenwashing scheme. Critics have pointed to the lack of adequate regulations on deforestation and to tensions between stricter transnational standards. Specifically, ISPO seems to favor economic development over environmental aspects. Moreover, there is also a lack of clarity regarding the benefits for smallholders and doubts about the government's capacity to implement it (Hidayat et al., 2018).

A recent attempt to introduce more integrated approaches between transnational and domestic governance strategies, tried to reconcile value chain and landscape-based interventions through the notion of jurisdictional approach (Meyer and Miller, 2015). This approach is being tested with mechanisms to align RSPO with domestic standards and include local governments (Pacheco et al., 2018). Sabah state (Malaysia) was the first to pledge its commitment to a jurisdictional approach; it was followed by Central Kalimantan (Indonesia) (Houten and Koning, 2018). Despite their popularity, it is not yet clear how effective and equitable these initiatives are or can be (Noordwijk et al., 2017).

While much of the discussion has focused on Southeast Asia, little attention has been paid to other producing countries. In recent years, oil palm has expanded rapidly in West Africa and Latin America. In the latter, the area devoted to oil palm has more than doubled since 2000 and oil palm is now grown in Colombia, Ecuador, Peru, Guatemala, Honduras, and Brazil (Furumo and Aide, 2017). Some of these countries have learned from previous experiences in Southeast Asia and tried to do things differently, including designing domestic programs

and regulations to avoid deforestation and include smallholders. For example, Brazil tried to link social inclusiveness and environmental sustainability in the sector through the Sustainable Palm Oil Production Program (SPOPP), which was adopted in 2010. To what extent the model proposed by Brazil is more suitable and appropriate to reconcile conservation and development while ensuring sectoral competitiveness, is a major discussion in the following chapters.

Box 1.4: Inclusive business models

Despite the continuing relevance of international aid and philanthropy in addressing poverty alleviation and sustainable development goals in many parts of the world, there is a paradigm shift toward the need for inclusive economic growth. The marginalized and the global poor are no longer seen as passive losers of globalization, but as a stakeholder group with agency that should be integrated into the global processes of value creation, a renewed and recontextualized version of the old "trade not aid" slogan. The new approach has also called the need for new strategies and frameworks for both public and private institutions to interact in order to combine both private sector economic viability and the much needed inclusive development. The notion of inclusive business models (IBM) emerged in this context and can be defined as frameworks that improve the livelihoods of low-income groups by integrating them into value chains as suppliers, employees, distributors, and consumers of goods and services (WBCSD and SNV, 2011). In the agricultural sector, these acknowledgements question the viability of large-scale plantation-oriented models and raise the need to move towards new models. According to Vermeulen and Cotula (2010), there are six types of IBM in the agricultural sector, namely: contract farming; management contracts; tenant farming and sharecropping; joint ventures; farmer-owned business; and upstream/downstream business links. Contract farming assumes a special relevance in this dissertation and is further detailed in Chapters 5 and 6.

Not all debates about the sustainability of oil palm concern Indonesia and Malaysia, and experiences in other countries may also generate important lessons and promote cross-learning. Brazil, for example, has had the most effective results in reducing deforestation than any other country in the world (Seymour and Busch, 2016). This is particularly important to inform ongoing debates within the EU on phasing out palm-oil based biodiesels or the implementation of jurisdictional approaches in some regions. The following section details these and other aspects in relation to the dynamics of oil palm in the Brazilian Amazon. Despite its current limited relevance, Brazil has a vast potential to become one of the largest global players in the sector, considering the 29 million ha of land in the Amazon that are suitable and available for expansion.

1.5. WHY SELECT THE BRAZILIAN AMAZON?

This dissertation focuses on the Brazilian Amazon, in particular the state of Pará, whose roughly 200,000 ha of oil palm account for nearly 88% of Brazil's estimated area under cultivation (Abrapalma, 2017). The reasons for selecting this specific case study are fourfold. First, as mentioned, in recent years Brazil has made impressive progress on environmental governance, which has made the country a laboratory of governance innovations and the world's largest contributor to reducing emissions (Seymour and Busch, 2016). Through a large number of ambitious policies, Brazil has managed to engage governments, the private sector, and civil society organizations in an unprecedented way. Specific policies like the Plan of Action for the Prevention Control of Deforestation in the Amazon (PPCDAM) in 2004, the Plan for Sustainable Amazonia (PAS), and the National Policy on Climate Change in 2009, to mention only a few examples, were major developments, while private-sector arrangements such as the Soy Moratorium in 2006 and the Cattle Agreement in 2009 gave a further impetus to tackle deforestation (Pinho et al., 2014). The success of this strategy has been evident with Brazil being able to reduce deforestation by more than 70% since its peak in 2004 (Nepstad et al., 2014; Souza and Junior, 2015; Godar et al., 2014; Aubertin, 2015). Brazil has also made impressive progress on social governance and poverty reduction. Some examples are poverty alleviation-specific cash-transfer programs like Bolsa Família and Fome Zero in 2005, and improved access to institutional markets and growing concerns on sustainability and food security (van der Ploeg et al., 2012). These were able to lift 26 million people out of poverty, with 36 million others joining the middle class (Burton, 2013). Those policies have also had a positive impact on poverty alleviation in the Amazon region (Sousa et al., 2016; Viana et al., 2016b; Brondízio et al., 2016).

Second, the Brazilian Amazon is part of the world's largest tropical forest biome and is an integrated socio-ecological system providing environmental services of vital relevance for the whole planet. The total amount of carbon stocked in both biomass and soil is equivalent to a decade of global human-induced carbon emissions. In addition, the Amazon not only discharges one fifth of the world's freshwater, but is also considered a gigantic hydrological pump that guarantees irrigation to many regions of the continent (Seymour and Busch, 2016). It also hosts a large proportion of terrestrial and freshwater biodiversity (Fearnside, 2012; Gardner, 2013). In socio-political terms, the Amazon Basin total area encompasses nine countries, is home to approximately 31 million people, and experiences high poverty rates. In the Brazilian part, for example, nearly 17% of the people still live in extreme poverty (FAO, 2016). The Brazilian Amazon is thus a key region to understand the development and governance implications of commodity production, particularly in relation to its environmental and social footprints.

Third, the Brazilian government has launched a specific program to promote palm oil production which is seen as unique in its socio-environmental components (Villela et al., 2014). The Brazilian government faced the challenge of triggering and capturing private-

sector investments in the palm oil sector in order to achieve, for example, domestic targets on biodiesel production and macroeconomic aims without conflicting with the protection of high conservation value ecosystems. Moreover, as the sector in the Amazon has been traditionally dominated by large-scale plantations, another challenge was to build a sufficiently robust governance framework to promote the inclusion of smallholder farmers in the business, thus contributing to a fair and equitable distribution of benefits. As such, the SPOPP was adopted in 2010 to further complement the 2005 Biofuel Law incentivizing oil palm as an alternative feedstock for biodiesel production, at that time also a national priority. The program involved the introduction of fiscal incentives for companies to include smallholders in the value chain, a zoning instrument setting clear guidelines to prevent the deforestation of primary forests, and a package of policies to support smallholder inclusion comprising a credit scheme and specific rules for technical assistance (Brandão and Schoneveld, 2015).

Fourth and finally, despite still being a relatively small global player - particularly when compared to Malaysia and Indonesia, which have 5.6 and 10.4 million ha of oil palm under cultivation, respectively (Pacheco et al., 2018) - Brazil has the potential to be the largest global player. According to the Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon (ZAE-Palma), there are around 29 million ha of land across ten states of the Legal Amazon suitable and available for oil palm expansion without conflicting with primary forests, protected areas, or indigenous territories. In the state of Pará alone, ZAE-Palma identified around 12 million ha (Filho et al., 2010), which, if totally converted to oil palm, would make Brazil the largest producer in the world. Considering this vast potential and the vital value of the Amazon biome, Brazil is not only in a position to offer lessons to global debates on palm oil sustainability, but also a country where oil palm expansion should be constantly monitored. The following section presents how the analysis in this dissertation was operationalized.

1.6. RESEARCH DESIGN

1.6.1. Research questions

As mentioned, the overall main research question is: (1) How can ”sustainable” oil palm expansion reconcile conservation and development in the Amazon?
This question is further subdivided into the following sub-questions:

(1.1) How is the oil palm value chain characterized, what business models are involved, and who are the stakeholders?

(1.2) What are the consequences of oil palm expansion in terms of inclusive and sustainable development?

(1.2.1) Does oil palm contribute to the improvement of local people's livelihoods?
(1.2.2) What are the deforestation impacts of oil palm cultivation?

(1.3) How to steer oil palm value chains in the "right" direction, and what are the core challenges and dilemmas?

1.6.2. Research approach

This thesis is based on real-time research and captures the most recent governance dimensions. It draws on extensive fieldwork activities between 2013 and 2015 as part of the DFID KNOWFOR-funded "Large-scale investments in food, fiber and energy: Sustainable options that work for forests and the poor (LIFFE Options)" project[10] led by CIFOR (Center for International Forestry Research), which focused on the inclusivity dimensions of palm oil production in the Amazon. It also received significant inputs from the initial activities of the USAID-funded project "Oil Palm Diversification: Reconciling Conservation with Livelihoods".[11] The aim of this project is to develop smallholder-inclusive approaches through a paradigmatic shift toward agroforestry-based, diversified production, supported by inclusive business models; it is implementing on-the-ground oil palm agroforestry pilot experiments in the Amazon. For this reason, this work also offers a strong component of policy implications and recommendations to local, national, and global actors in the fields of forestry, agricultural investments, environmental governance, smallholder inclusion in value chains, and rural development.

While the data collection and discussions with colleagues facilitated by these projects assumed great relevance and constitute the backbone of this thesis, the research was further complemented and enriched by dozens of inspiring fieldtrips in the Amazon, not only during the last five years. In many cases, the final versions of the chapters presented in this book have been updated several times with new information and insights obtained during subsequent trips. These include innumerous visits to company facilities, communities, rural villages, agrarian reform settlements, indigenous and *quilombola*[12] communities, and conflict areas. The research has also benefited from experiences during visits to palm plantations and surrounding communities in the state of Bahia (Brazil), in Colombia (Barrancabermeja), and through the experience of eight months in Bogor, Indonesia, which enabled a deeper understanding of the Indonesian example. Finally, the work-related experience in other regions such as Paragominas, Santarém, São Félix do Xingu,

10 Led by CIFOR, a leading research organization on forestry related issues, this project aimed to provide improved knowledge and information on the main global and regional trade and investment processes driving large-scale investments in land acquisition, production, and transformation of food, feed, and fiber in forest-rich producing countries; and to discuss the probable social and environmental impacts of these acquisitions under diverse business models, and their implications for deforestation, forest degradation, and forest recovery. The project also included International Development Studies, Utrecht University, Netherlands; Copernicus Institute, Utrecht University, Netherlands; and Joanneum Research, Austria, Stockholm Environment Institute as partners.

11 Led by the research arm of Brazilian cosmetics manufacturer Natura Brazil, with the participation of CAMTA (Tomé Açu Agricultural Cooperative), Embrapa (the Brazilian Agricultural Research Corporation), and ICRAF (World Agroforestry Centre).

12 Quilombola are descendants of runaway African slaves.

Santana do Araguaia, Serra Pelada, and El Dorado dos Carajás, where soy, ranching, cocoa, and mining are expanding, provided valuable contributions toward understanding the broader context of commodity expansion and sustainability debates in the Brazilian Amazon.

1.6.3. Data collection and analysis

Data collection encompassed multiple research activities: key informant interviews, collection of data from companies, focus groups; geo-referenced household surveys of both smallholders and plantation workers; and collection of secondary data from several sources at state and municipal level. The following details the data collection approach:

Semi-structured interviews were held with 192 key informants on, for example, value chain dynamics and regulatory challenges, and impacts. The informants comprised 37 individual farmers, riverside dwellers, and other individuals, five representatives of banks and other financial institutions, 65 community and civil society representatives, 32 private-sector representatives, eight policymakers at state, federal, and international levels, 33 representatives of municipal institutions, and 12 researchers, professors, and representatives of non-governmental organizations (NGOs).

Both open and structured interviews were held with eight oil palm companies to identify investor characteristics, practices, and strategies. Although the research sought to capture all of the nine major oil palm companies, one was unwilling to participate in the research. The interviews covered investor value chain activities, plantation management practices, employment generation and social and environmental practices.

Household surveys among smallholders. In total, 420 structured questionnaires were completed by 121 pre-SPOPP farmers (farmers who had adopted oil palm before the government program), 149 SPOPP farmers (who had adopted oil palm through the SPOPP scheme), and 150 non-participant farmers. The sample of contracted farmers represents 63% of the total pre-SPOPP and 12% of the total SPOPP universe. The questionnaire was used to collect detailed information on the household socioeconomic characteristics, sources of income, assets, land, crop production, inputs, and perceptions of wellbeing. Specific add-ons were developed for non-contract farmers to capture the reasons not to participate, and for contract farmers to capture the contract characteristics and the agronomic practices. Five research sites were selected based on their high density of contract farmers representing all major companies operating in the sector. Within each of the sites, 30 household surveys were conducted for each stakeholder group, including contract and non-contract farmers and, in some cases, more groups of contract farmers if there was more than one company operating. Farmers were randomly selected from lists of households developed with information provided by companies, community associations, municipal smallholder unions, and/or municipal governments.

Focus group discussions were held in four oil palm cultivating communities, in order to reconstruct oil palm development trajectories and to capture the communities' social, environmental, and

economic conditions. Those focus group discussions were organized in collaboration with local leaders and smallholdersunions. A total of 100 people participated in them.

Household surveys among plantation workers. A total of 60 surveys were conducted, namely 30 each in the villages of Forquilha (Tomé Açu) and Palmares (Tailândia). These villages were selected as they are the main areas where workers are concentrated and the impacts are more visible. Workers were selected opportunistically in the surroundings of their *vilas de quarto* (houses or villages with rooms to rent). This sample represents the workers who come from other municipalities, and not those who live in the surrounding communities.

Collection of other primary data. In addition to the household surveys, which constituted the core of the data collection process, other primary data were gathered by means of: (1) a census of private small businesses and public services conducted in the villages of Forquilha (Tomé Açu) and Palmares (Tailândia); (2) a database on the human and physical capacity of local institutions (Secretary of Agriculture, Secretary of Environment, EMATER (Rural Extension and Technical Assistance Company) and smallholder unions) to fulfil their mandates across 10 municipalities; and (3) community lists across the five research sites with qualitative information on 843 households, including both participants and non-participants.

Geo-referenced data: The GPS locations of farmers, company plantations, and other relevant land uses were collected in order to perform remote sensing analysis using geographic information system (GIS) software to map oil palm distribution.

Secondary data were collected at the municipal and the state level on health, education, security, and tax revenues, combined with data collected online through IBGE (Brazilian Statistical Agency) on a number of different issues and sources including, for example, the Agricultural Census of 2006, Population Census of 2000 and 2010, and the Municipal Production Index.

Participation in workshops and conferences: Several events were attended during this period in both Brazil and other countries. This included presentations at the Federal Oil Palm Chamber (25th ordinary meeting) in 2017, Oil Palm State Chamber (2nd ordinary meeting 2017), Palm Oil Dialogues in 2016, LandAc Conference and Land Governance Summer School at Utrecht University in July 2015, Land Governance Conference at Campinas University in September 2015, and Workshop Palma Sustentável organized by Embrapa and MDA (Ministry of Agrarian Development) in November 2014. Several other project or CIFOR related workshops were attended in Holland, Colombia, and Indonesia.

Throughout the chapters, the thesis uses a different mix of quantitative and qualitative methods, including discourse analysis, observations, econometric techniques, statistical analysis through R and STATA, and remote sensing analysis through ArcGis, QGIS, and Google Earth Engine.

Each of the chapters specifies the methods, the specific data collection activities and when relevant the data repository link or COI.

1.6.4. Epistemology and intellectual foundations

This dissertation follows a post-positivist paradigm. Post-positivism is an emerging epistemology in social sciences that tries to overcome the rigidity and duality of positivism. In contrast to positivism, post-positivism recognizes there are no universal laws or right or wrong scientific methods, and proposes methodological pluralism (Henderson, 2011). Despite various efforts, there is no holistic super-discipline capable of understanding the planet as a whole, that is, as an integrated socio-ecological system (Geels et al., 2016). Therefore, this dissertation uses multiple conceptual and theoretical lenses drawing from various disciplines, methods, and analytical angles. While the overall dissertation is framed under governance debates, each of Chapters 4–7 follows a specific approach, namely political ecology (Chapter 4), econometrics (Chapter 5), land-use science and livelihoods (Chapter 6), and governance studies (Chapter 7). Although adding additional challenges in terms of alignment across chapters, this aspect should be considered an advantage. Rather than remaining in comfortable niches, this dissertation makes an effort to use different methods and combine different analytical lenses. This allows wide-ranging analysis, enriches and stimulates debates with wider audiences, and avoids niche discussions, which are typical in some academic fields.

Following the post-positivist angle, this research rejects the dichotomy of qualitative and quantitative research and adopts the methods that are more suitable to answer specific research questions. That methodological freedom allows, for example the complementary use of both large quantitative datasets and open interviews. As such, in contrast to clear-cut and predetermined interactions, this thesis offers a nuanced analysis of change. Rather than offering universal laws or fully generalizable findings, it offers a sound understanding of a specific context and tries to interpret as closely as possible such a complex reality as forestry, agriculture, and livelihoods in the Brazilian Amazon. Yet, this work is still strongly grounded in empirical analysis and mostly supported by an inductive logic. Additionally, it does not reject the existence of potential biases related to interpretivism and the subjectivity of certain empirical analysis. There is no such thing as universal truth and nobody is completely neutral. For example, the researcher's personal background and experiences, or the urgency to mitigate climate change, may influence certain interpretations. Nonetheless, some efforts were made to minimize these risks, such as promoting transparency, collaborations with other authors, and the validation of results through workshops. Moreover, given the researcher has no history with either the region or the participants, the theme was approached with fresh eyes, which allowed the obviation of many preconceptions.

In terms of intellectual foundations, there are several key cross-cutting components. First, the sustainable livelihoods and the landscape approach are influential notions throughout the thesis. Although in many cases they are not explicitly referred to or cited, they are undoubtedly key

intellectual foundations. The sustainable livelihoods approach goes beyond the conventional definitions of poverty centered on income, toward other indicators such as health, education, and access to social services. This approach realizes that economic growth does not necessarily lead to poverty reduction, which pretty much depends on poor people's capacity to grasp the benefits of economic opportunities. The focus is on poor people and how access to assets (human, social, physical, natural, and financial) are used to face changing contexts to pursue livelihood strategies (Scoones, 1998). The landscape approach has been promoted by, among others, CIFOR as a tool to reconcile agriculture and the conservation of forests and other high conservation value habitats, with other land uses, in response to growing concerns about environment and development trade-offs (Sayer et al., 2013). Within this framework, there is a shift from purely conservationist approaches on the one hand and agricultural intensification on the other, toward more inclusive views where, for example, poverty alleviation goals and respect for cultural diversity are taken into account. Several principles are pillars of the landscape approach, the most relevant being the multiple scale of analysis, the multifunctionality of landscapes, and the existence of multiple stakeholders. Rather than a physical space, landscapes are thus defined as broader concepts encompassing the changing relations between entities interacting according to biophysical and social rules.

Second, this work adopts a green economy or a green growth discourse (Ferguson, 2015). Indeed, moving the economy away from the current social and environmentally unsustainable path is the major proposition analyzed. That does not necessarily mean there are no limits to growth - there are, of course; however, in the current situation limiting economic growth in developing countries where a large share of the population lives below the poverty line is obviously naïve. The same line of reasoning applies to the discussion on expanding commodities in tropical landscapes: Commodity production will not stop in the near future. Many countries rely on revenues from agricultural commodities to balance their fragile economies, while countless people - including the most vulnerable groups, such as many smallholder farmers and traditional populations - depend on this type of production to make their livelihoods viable. This is significantly different from understanding the expansion of commodity production as the most desirable or sustainable model for rural development in tropical countries. Although it is not within the scope of this dissertation, designing alternative development models for tropical landscapes is certainly a priority.

Finally, this work draws on several other theories and intellectual contributions. The main references and sources of inspiration include Amartya Sen's *Development as Freedom* (Sen, 2000); Raworth's doughnut economics (Raworth, 2017); Rockström et al.'s planetary boundaries (2009); Alexander Mather's theory of forest transition (Mather, 1992); Arild Angelsen, Sven Wunder, and William Sunderlin among many other CIFOR scientists and research associates who have built a robust work on forests and livelihoods; and Van der Ploeg's studies on the new peasantries (Ploeg, 2008), struggle for autonomy, and resilience. This work also draws on fundamental contributions from George Schoneveld and his work on inclusive business models, contract farming, and smallholder inclusion in global value chains; and Pablo Pacheco's work on zero deforestation, sustainable supply, and frontier studies. Two major references in the

Amazon are Wood and Schmink's seminal *Contested Frontiers in Amazonia* (Schmink and Wood, 2012) and Lucio Flávio Pinto's hundreds of journalistic articles and books covering nearly half a century of frontier expansion, destruction, and hope in the Brazilian Amazon.

1.7. STRUCTURE AND OUTLINE

This dissertation is organized into eight chapters, four of which are articles submitted to or published in academic journals. Following this introductory chapter, Chapters 2 and 3 address and contextualize the case study. The former provides the historical, political, and economic background to the Brazilian Amazon, and particularly Pará, while the latter characterizes the main governance frameworks shaping the palm oil sector in the region, describes the companies and their strategies, and identifies the business models implemented.

Chapter 2: Looking beyond the Lost Eden: The politics of agricultural investments in the Brazilian Amazon

Chapter 3: The state of oil palm development in the Brazilian Amazon: Trends, value chain dynamics, and business modelsAs these chapters are mostly contextual, they have not been published elsewhere; however they expand and update a previously published work.

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).

Chapter 4 presents an analysis of the landscape transformations in the Brazilian Amazonian region of Tomé-Açu derived from the recent oil palm expansion wave. It highlights the different narratives and discourses around the program and shows how local actors have adapted to a changing context. This chapter was published in the Journal of Rural Studies.

Brandão, F., de Castro, F. & Futemma, C. (2018). Between structural change and local agency in the palm oil sector: Interactions, heterogeneities and landscape transformations in the Brazilian Amazon. *Journal of Rural Studies*, 71, 156-168.

Chapter 4: Between structural change and local agency in the palm oil sector: Interactions, heterogeneities, and landscape transformations in the Brazilian Amazon

Chapter 5 narrows down the analysis by looking at smallholder outgrowing schemes. The chapter discusses the dilemmas of smallholder integration as proposed by the SPOPP, by presenting an econometric model that explains why some farmers decided to participate in the program and plant oil palm and others didn't. It also looks into the labor dynamics and the impacts on livelihoods. The article has been submitted to The Journal of Development Studies.

Brandão, F. & Schoneveld, G. (2018). *Managing disparate objectives in the promotion of oil palm contract farming in Brazil: The challenge of balancing inclusion, food security, and scheme viability.* Manuscript submitted for publication.

Chapter 5: Managing disparate objectives in the promotion of oil palm contract farming in Brazil: The challenge of balancing inclusion, food security, and scheme viability

Chapter 6 further narrows down the analysis by looking at Calmaria II, a rural settlement that has been an active deforestation frontier and where oil palm expanded under contract farming. This chapter bridges smallholder livelihood studies and land-use science and has been submitted to the journal Development and Change:

Brandão, F., Schoneveld, G. & Zoomers, A. (2019). *Socio-environmental impacts of oil palm contract farming in the Brazilian Amazon: Implications for scheme design.* Manuscript submitted for publication.

Chapter 6: Socio-environmental impacts of oil palm contract farming in the Brazilian Amazon: Implications for scheme design.

Chapter 7 identifies in detail the social, environmental, and economic outcomes of the recent expansion wave shaped by the SPOPP and hypothesizes what the main factors shaping those outcomes were. It further discusses the dilemmas related to managing social, environmental, and economic trade-offs. It concludes by examining to what extent domestic governance strategies such as the SPOPP can be an appropriate strategy to promote sustainable supply in a context where transnational governance processes have taken the lead. The article has been submitted to the journal World Development.

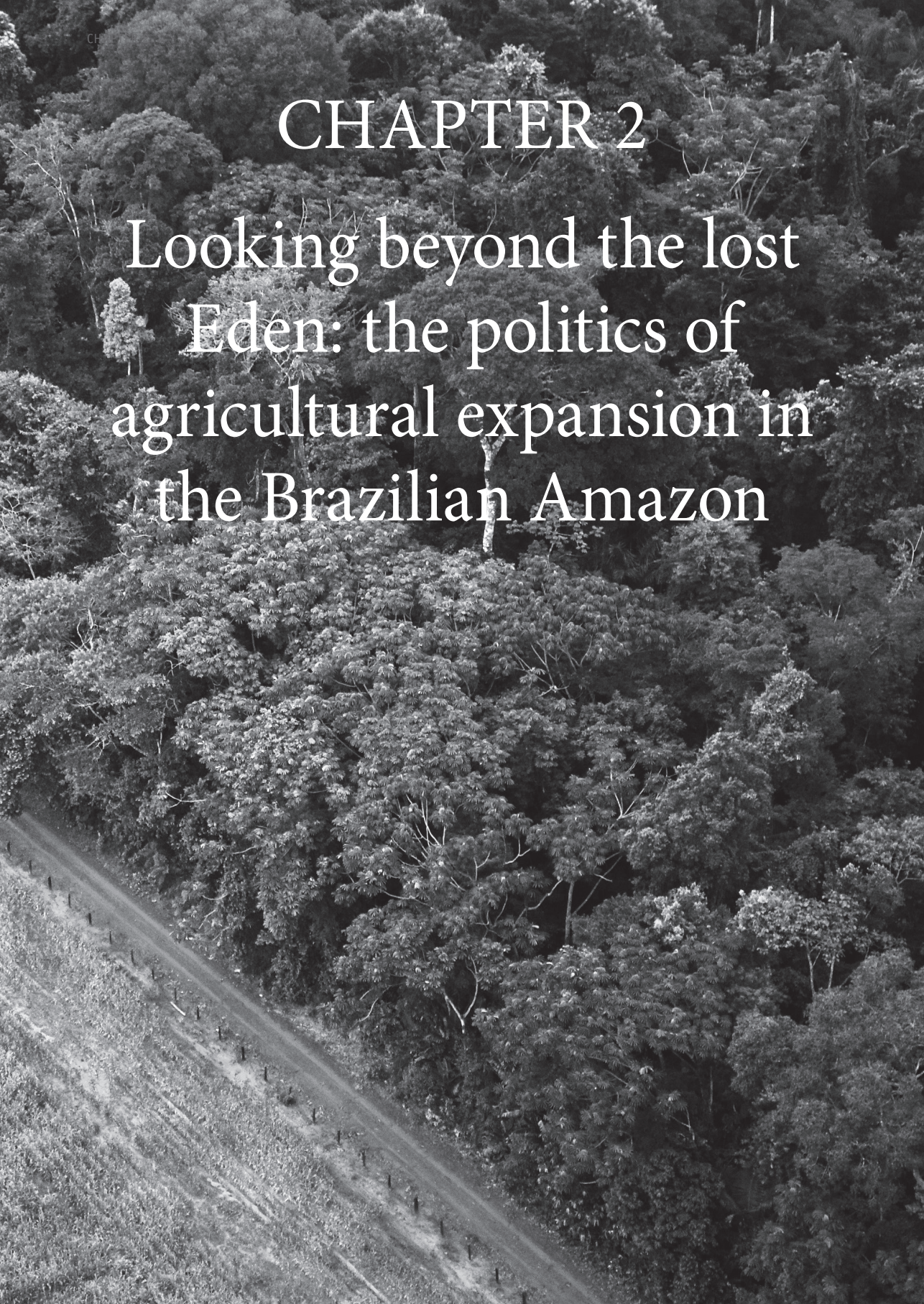
Brandão, F., Pacheco, P., Schoneveld, G., Vieira, I., Piraux, M. & Mota, D. (2019). *The challenge of reconciling conservation and development in the tropics: Lessons from Brazil's oil palm governance model.* Manuscript submitted for publication.

Chapter 7: The challenge of reconciling conservation and development in the tropics: Lessons from Brazil's oil palm governance model.

Finally, this thesis ends with Chapter 8. This is the moment to go back to the major governance debates, step out of the case study, and discuss the academic relevance of the findings.

Chapter 8: Concluding remarks

Enjoy the journey!



CHAPTER 2

Looking beyond the lost Eden: the politics of agricultural expansion in the Brazilian Amazon

2.1. INTRODUCTION

Perhaps no other place on Earth has been as mystified as the Amazon forest. Images of wild animals, turbulent rivers, and exuberant forests have recreated the imaginary of many people, particularly those not familiar with the region. Journalistic expressions like "untouched," "inhabited," or "virgin" have certainly contributed to reinforcing those stereotypes. The reality, however, is far more complex. The Amazon is a huge and very dynamic landscape where multiple dimensions reverberate in space and time. Large cities, slums, agrarian reform settlements, floodplain areas, pasturelands, and minefields are some examples of less well-known Amazonian realities where multiple actors, livelihoods, and ideas coexist, compete, or cooperate. Indigenous groups are only one of the multiple types of actors that populate those territories, which are also home to descendants of runaway slaves, landless migrants, Japanese settlers, cowboys, riverside dwellers, descendants of European and Arabic tradesmen, gold prospectors, national and global corporations, and others. Between the Lost Eden narrative of Euro-Americans (Hecht, 2012) and the El Dorado dream of gold explorers (Ioris, 2015), there is a vast territory of contested spaces and changing landscapes (Vadjunec et al., 2011b).

While each of these territories, actors, and narratives is certainly unique, full of invisibilities, nuances, and subtleties, there are three general dimensions that help to understand Amazon's political economy and social history: the "Ür nature," the "neo-nature," and the "socio-nature" (Hecht, 2012). The Ür nature is the classic notion of wild nature that underpins conservationist approaches. Under this interpretation, the Amazon - as the world's largest tropical forest biome - should be protected against human interference. In some views, this can be attributed to its "sacred" side and unmeasurable value, while in others it can be related to its vital relevance for mankind in terms of environmental services provision (Fearnside, 2012). For example, the total amount of carbon stocked in both biomass and soil is equivalent to a decade of global human-induced carbon emissions. In addition, the Amazon basin not only discharges one fifth of the world's freshwater, but is also responsible for exporting water vapor via "aerial rivers" or "flying rivers" that produce rainfall and irrigate distant regions (Nobre, 2014).

Whereas this "untouched" biophysical component has been an important part of the debate, recent research has identified a long history of human interference, suggesting that vegetation and even soil characteristics were shaped by pre-Columbian societies for a long period of time (Levis et al., 2017). Forests are transformed by people in many ways, but the most common include plant cultivation following slash-and-burn, seed dispersal and propagation, and plant domestication (Levis et al., 2017). These transformations are the basis of both the "neo-nature" and the "socio-nature" dimensions. Although they have existed for a long time, they have been particularly visible in the Brazilian part of the Amazon since the mid-20th century.

The neo-nature refers to the "agro-industrial modernist landscapes" where land is basically

an input for economic activities such as mining and agro-industrial or livestock production (Hecht, 2012). This is the production-based approach that recognizes few benefits of standing forests. They are viewed as an obstacle to economic development. According to neo-nature's advocates, the huge land reserves in the Brazilian Amazon could be used to expand Brazil's mineral[13] or agricultural output. With only 9% of its total area under cultivation (compared to the national average of 19%), the Brazilian Amazon could contribute to strengthening Brazil's position as an agricultural superpower (Mueller and Mueller, 2016; Strassburg et al., 2014).[14]

The neo-nature approach has been very influential since the militaries seized power in 1964 and imposed a developmentalist agenda. Under the slogan "Occupy it to avoid surrendering it," the militaries promoted infrastructure developments, fiscal incentives, and colonization programs in the Amazon. This resulted in a process known as frontier expansion, namely the large-scale conversion of forestland to other land uses, mostly pastureland. In many cases, frontier expansion has been strongly associated with violence and social conflict (Schmink and Wood, 2012). As a result, the region has become a significant hotspot of agricultural expansion. While beef is by far the main and most important commodity, in recent years soybean, palm oil, and cocoa have emerged as important crops.

Finally, and most importantly, the "socio-nature" both contradicts the idea of idle and untouched forests, and recognizes that local populations should be at the center of development strategies. This dimension is the backbone of a new alternative development model known as "socio-environmentalism" (Hecht, 2012). In other words, forests and people cannot be dissociated from each other, as both are part of the same system. A good example is the swidden system - slash-and-burn practices, that is, the cutting of trees and the burning of fields to open up the land and provide fertility to produce staple crops - by which humans maintain and develop agrobiodiversity (Padoch and Pinedo-Vasquez, 2010). In some cases, socio-environmentalism romanticizes the "noble peasant" or "sage indigenous peoples," the tropical version of the "small is beautiful" approach. But in many others, it is a pragmatic approach that has shown positive outcomes (de Toledo et al., 2017).

Socio-environmentalism has assumed great importance since the death of the rubber tappers' leader, Chico Mendes, in December 1988 (Ventura, 2003). Mendes is the most famous Amazonian martyr on a long list that includes an American nun, Dorothy Stang (Le Breton, 2008), the Pará state member of parliament, João Batista (Batista, 2008), and community leader João Canuto (Cartaxo, 1999), to give only a few examples. Socio-environmentalism inspired a number of political changes that altered the governance system and produced impressive results. The

13 The Brazilian Amazon is home to large reserves of iron ore, manganese, copper, gold, bauxite, nickel, and other minerals, some of them the most significant in the world.

14 Brazil is the world's largest producer of a number of products such as beef, sugar, orange juice, pork, coffee, cotton, and soybeans.

most significant was reducing Amazonian deforestation by around 80% from 2004 to 2012 at the same time as agricultural output grew. This made Brazil the world's largest contributor to reducing emissions (Seymour and Busch, 2016). Brazil has also managed to lift many people out of poverty in the Amazon region, partly by improving and strengthening smallholder-oriented policies such as microcredit, technical assistance, access to land through agrarian reform projects, and access to institutional markets (Grisa and Schneider, 2014; Niederle et al., 2014; Schneider, 2016; Hammond, 1999).

By looking at the interface between the Ür nature, the neo-nature, and the socio-nature dimensions, this chapter introduces the current governance system shaping agricultural commodity production in the Brazilian Amazon. As presented in the previous chapter, the notion of governance includes the actors, the institutional features, and the policy content (the politics, polity, and policy dimensions of governance (Driessen et al., 2012)). Given that agriculture in the Brazilian Amazon is strongly linked to a number of different policies and other aspects related to, for example, deforestation, socioeconomic development, tenure, or biofuels, this chapter understands the governance system shaping agricultural commodity supply in broad terms. Therefore, the notion is used interchangeably with terms like "governance of land use" (Wicke et al., 2011) and "governance of agriculture-forest landscapes" (Agrawal et al., 2014).

In order to characterize the governance system, this chapter looks at the Amazon's historical context, geographies, social and cultural diversity, land-use trends, and political economy. By doing so, it explains why Brazil has developed a progressive governance system. This chapter also provides the background to understand why and how oil palm expanded in the region and the antecedents shaping the emergence of the Sustainable Palm Oil Production Program (SPOPP), which is presented and discussed in the next chapter. Based on an extensive literature review, this chapter expands and updates a CIFOR Working Paper published in 2015. After this introduction, section 2.2 presents the theoretical foundations. Section 2.3 introduces the antecedents of frontier expansion in the Amazon, from pre-Columbian societies to the end of the rubber cycle. Section 2.4 discusses in more detail the process of frontier expansion in the mid-20th century and its consequences for deforestation and land use, including the military periods, the rise of socio-environmentalism, and the election of the Workers' Party in 2002. Before the concluding section (2.6), section 2.5 describes the main characteristics of the Brazilian governance system, notably in terms of land tenure, biofuels, family farming, environmental management, and foreign direct investment.

2.2. THEORETICAL FOUNDATIONS

Historically - and simplistically - agriculture expansion has taken place by converting terrestrial natural ecosystems. This is associated with a transition process in human history from hunting

and gathering, to swidden cultivation and sedentary agriculture (Mazoyer et al., 2006). In forest and other woody environments, this transition is typically performed through slash-and-burn practices[15] (Mazoyer et al., 2006) and is associated with increasing market economy integration (Sunderlin et al., 2005). Therefore, it is important to look at the interactions between agricultural development, deforestation, and livelihoods. The following subsections introduce the most important definitions and theories underpinning these interactions, namely (1) land change or land systems science and (2) frontier studies. The section concludes with a review of the main policy options linking agriculture, forests, and livelihoods.

2.2.1. Land change or land systems science

Land change or land systems science is an interdisciplinary field that studies the interaction of the human and biophysical components of local and global land systems (Meyfroidt, 2015). Land systems are a typical example of socio-ecological systems or coupled human–environment systems (Young et al., 2006). This field of study is concerned with understanding the dynamics, drivers, and consequences of both land use and land cover change. Although intrinsically related, land use and land cover mean different things. Land cover refers to the attributes of the land surface and the immediate surface, including biota, soil, topography, water, and human constructions. There are two types of land cover change: conversion or modification. The former is a shift from one type of classification to another, while the latter is a gradual modification without changing the classification. Land cover changes occur mainly, but not only, due to human activity. Examples of land cover are grasslands, mangroves, savannahs, croplands, snow, etc. Land use, on the other hand, is the purpose for which humans exploit land cover and normally requires a detailed on-the-ground analysis. Examples of land use are area under permanent or temporary agriculture, mining, or pastureland (Lambin and Geist, 2006).

Understanding land use and land cover changes in tropical landscapes has been a hot topic, particularly with regards to understanding the determinants of forest conversion. Inspired by von Thünen's theory of rent, classical economic knowledge explains the allocation of land according to financial returns. Changes in land use and land cover over time are explained by variations in the land rent of different uses. Under this assumption, deforestation occurs because it is profitable and it will occur until the profit for conversion is smaller than the one from keeping the forest standing. A central issue in this approach is the determination of land rent, which is shaped by several factors, for example, commodity prices, technological progress, off-farm wages, capital availability, infrastructure development, and the cost of enforcing property rights, to mention only the most relevant ones (Angelsen, 2007).

15 In the last 5000 years, the global forest area has declined the equivalent of 50% of today's figures, while agricultural areas have sharply increased (FAO, 2016).

Box 2.1: The forest transition theory and the environmental Kuznets curve

The forest transition (FT) theory essentially states that forest resources are initially abundant, diminish as development progresses, and then re-emerge later on (Mather and Needle, 1998). This is because economic development generates non-farm jobs, thus pulling people off the land and allowing spontaneous forest regeneration, and because the lack of forest resources in developed regions induces new tree plantations. This transition means little for biodiversity purposes - plantations and secondary forests have considerably lower biodiversity levels than primary forests - but it can be important for carbon sequestration and soil conservation (Rudel et al., 2005). Despite being generally accepted as valid (Angelsen, 2007; Sunderlin et al., 2007), this theory has been criticized for its bias toward the historical processes of industrialized countries in North America and Europe, which are not always applicable for developing countries (Perz and Skole, 2003; Pfaff and Walker, 2010). The environmental Kuznets curve (EKC) adaptation to forestry displays the relation between deforestation and economic development in the form of an inverted-U. According to this view, deforestation is low at the initial stages of development, high at intermediary stages, and low again after a certain threshold is reached (Sunderlin et al., 2005). Even though the EKC seems to be aligned with the FT principles, there are several differences between them. For example, as opposed to the FT theory, the EKC implies accelerated deforestation during the early stages and does not necessarily imply reforestation at a later stage (Angelsen, 2007).

An updated version of this model considers five broad land uses instead of the strict duality of only forest and agricultural lands. These land uses are: intensive agriculture, extensive agriculture, managed forests, open-access forests, and old-growth forests. In this approach, areas closer to the marketplace are more likely to be under intensive agriculture. As distance increases, there is a progressive move toward more extensive agricultural uses and eventually to forest. The area between intensive and extensive agriculture is the ***intensive margin***, while the area between extensive agriculture and forests is the ***extensive margin*** (Angelsen, 2007). The extensive margin is particularly important in the context of deforestation policies; however, there are also important interactions with the intensive margin.

An extension of the von Thünen model differentiates areas of intensive (lowland) and extensive (frontier) agriculture in order to introduce the discussion on agriculture intensification (the "sustainable intensification" debate), one of the policy options to reduce deforestation.[16] It basically predicts that increasing agricultural output per hectare behind the frontier decreases pressure on forests due to productivity gains. Increasing intensification can increase labor demand, pushing wages and pulling people out of extensive agriculture and closer to the forest. Additionally, increased supply exerts downward pressure on prices, reducing the rent of extensive agriculture. This approach has been the rationale behind many policies implemented

16 Based on von Thünen assumptions, there are three types of strategies to reduce deforestation: to reduce agricultural rents, to increase forest rents, or to directly create protected areas.

in the Amazon. However, even if there is logic to it, it also contradicts the general approach of land rents. That is, by improving the profitability per hectare, intensification may cause increased pressure on forests and not the other way round (Ceddia et al., 2013). This became known as the "Jevons paradox" (Ceddia et al., 2013). This is more likely to take place with global commodities whose prices are hardly affected by variations in local supply or with low labor-intensive activities such as ranching or soy (Angelsen, 2010). Empirical analyses of agricultural intensification have given mixed results and the issue remains largely unsolved (Byerlee et al., 2014; Baudron and Giller, 2014; Ceddia et al., 2014; Cohn et al., 2014; Latawiec et al., 2014; Maertens et al., 2006; Phelps et al., 2013; Angelsen and Kaimowitz, 2001).

The von Thünen theory offers a valid understanding of the dynamics and drivers of tropical deforestation. Its principles are generally accepted by most authors in this field and have inspired theories such as the forest transition and the environmental Kuznets curve (box 2.1). Nonetheless, reality is far more complex than classical economic premises explain. Policies and regulatory frameworks, as well as globalization dynamics and social processes at the local level, undoubtedly also have a key role in shaping these processes (Angelsen and Kaimowitz, 1999; Boucher et al., 2011; Geist and Lambin, 2002) and that is where frontier studies step in.

2.2.2. Frontier studies

Forest frontier, agricultural–forest frontier, deforestation frontier, agrarian frontier, pioneer frontier, or simply the frontier are terms currently used by different authors to explain the process of agricultural expansion into forestland (Gould, 2006; Verburg et al., 2014; Soler et al., 2014; Rodrigues et al., 2009; Pacheco, 2012a; Otsuki, 2013; Maertens et al., 2006; Browder et al., 2008; Bryant et al., 1997; Thalês and Poccard-Chapuis, 2014). The original frontier concept was introduced by Fredrick Jackson Turner in 1893, to describe the colonization process of the American West (Browder et al., 2008). Yet, it was not until the 1950s that French scholars used the notion of pioneer frontier to describe the process of coffee and livestock expansion in southern and southeastern Brazil (Thalês and Poccard-Chapuis, 2014). In the subsequent decade, Brazilian authors adjusted the notion to the Amazon region, in particular to describe the recently started colonization process (Cleary, 1993).

In those initial years, the notion of frontier implied a certain ideological ballast, with neoclassical and structuralist perspectives dominating the political economy debate. The former was inspired by neoclassical approaches to equilibrium, and the latter was essentially influenced by the dependency school - which was very prominent in Latin America - and the notions of capitalist penetration and surplus extraction. It is worth mentioning that the structuralist approach perceived expansion as a process of dispossession of land, where a peasant front of *minifundios* (small properties) moves forward while larger landholdings consolidate behind them. This originated the famous notion of "hollow frontier" (Hecht, 2005). A third wave of studies emerged more consistently in the 1990s and challenged the previous deterministic

approaches. The household lifecycle approach centers on demographic factors and household composition. Associated with an empirical literature boom using household surveys and land-cover/ land use change analysis, this approach perceives socio-spatial differentiation as a result of changes in those characteristics, policies, and historical contexts (Browder et al., 2008).

Frontier expansion at a global level has been conceptualized by some authors (DeFries et al., 2004). In the Amazon, Rodrigues et al. (2009), for example, provide a classification of frontiers ranging from inactive to active based on both deforestation activity and extent. It comprises seven classes of frontier types, ranging from pre-frontier with no deforestation and virtually intact forests, to post-frontier with a low percentage of forest cover and almost inactive in terms of deforestation. Similar line of reasoning, although with fewer classes, has been taken by others (Gardner et al., 2014; Poccard-Chapuis, 2004; Thalês and Poccard-Chapuis, 2014; Pacheco, 2012a; Arvor et al., 2013). The differences are largely related to data availability or case study specificities. In any case, irrespective of the number of classes, there is a transition from pre-frontier to post-frontier landscapes. Frontier theories are logically intertwined with the general debates on land change science. However, influenced by Turner's original conception, the notion of frontier underlies a certain socio-political notion of "march of civilization," "institutional innovation," or even the "arrival of modernity into an unexplored wilderness" (Browder et al., 2008).

Despite its general adoption, the notion of frontier has been questioned by some for being fuzzy and biased toward larger and intact forest polygons and primary forests, therefore lacking operational capacity (Innes and Er, 2002; Agrawal et al., 2014). The concept excludes, for example, forest regeneration and reforestation, which are widespread (but invisible) realities across Latin America (Hecht, 2010). Moreover, the idea of frontier connotes a certain black and white image of a line between two worlds, while the reality is often more complex with forest and agricultural lands, with different densities or intensities of use, coexisting in mosaic patterns of various sizes and shapes. To solve this problem, Agrawal et al. (2014) proposed the notion of agricultural–forest landscapes.[17]

2.3. THE ANTECEDENTS OF FRONTIER EXPANSION IN THE AMAZON

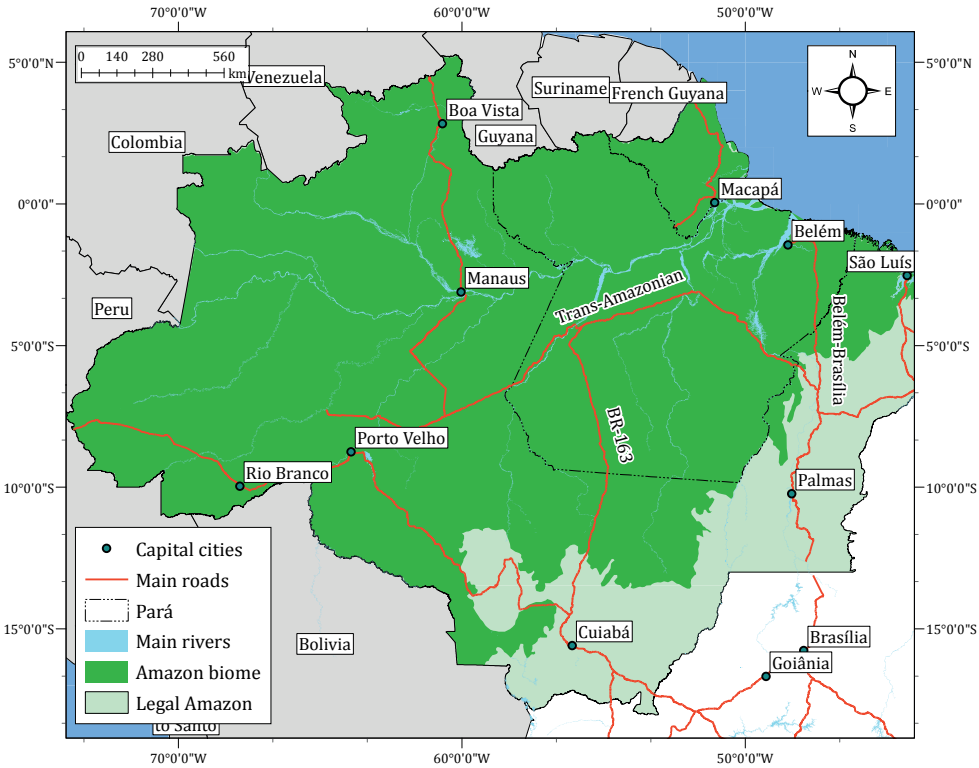
2.3.1. Pre-Columbian societies

The region that is now the Brazilian Amazon (figure 2.1 and box 2.2) has been populated by Amerindian communities for at least 11,000 years (Cleary, 2001). For many years the pristine myth prevailed, that is, the notion of a remote region, sparsely populated by hunter-gatherers

17 Recognizing these limitations, throughout this dissertation both "frontier" and "agricultural–forest landscapes" concepts are used. The former is generally used to represent macro processes of deforestation and expansion of agricultural lands, while the latter is used to portray more complex micro dynamics of specific landscapes.

with limited cultural complexity and agricultural vocation. This myth has raised the belief in the "ecologically noble savage," a conservation-minded population before European contact (Bush et al., 2015).

Figure 2.1: The Legal Amazon



Source: Representation of own data; IBGE cartographic base; Geographic Coordinate System: WGS 1984

However, new archeological evidence suggests that the pre-Columbian period was characterized by high population densities not only along riverbank settings, but also in upland areas (Souza et al., 2018). Researchers have identified a long history of domestication of crops such as rice, maize, and cassava (Levis et al., 2017; Koch et al., 2019) and the use of slash-and-burn agriculture, home-gardens, raised fields, and polyculture agroforestry for some millennia.[18] Important evidence in addition to the presence of earthworks and charcoal has been extrapolated through the analysis of Amazonian *terra preta* (dark earths), which are modified soils enriched due to human activities (Bush et al., 2015). Overall, this evidence has led to estimates of between one and 20 million inhabitants (with recent studies more inclined to figures closer to the higher end)

18 In fact, based on the writings of early European travelers, the floodplain environment had towns, cassava plantations, large-scale farming of turtles, and swarms of canoes (Cleary, 2001).

before the arrival of European colonizers. The regional landscape has also been characterized by large numbers of pre-Columbian settlements and several million hectares of land under intense and extensive cultivation all over the Amazon (Koch et al., 2019).

Box 2.2: What exactly is the Amazon?

The Amazon basin is a geographical area drained by the Amazon River (and its tributaries (including gigantic rivers such as Xingu, Tapajós, Tocantins, Negro, and Orinoco). The Amazon River is also called Solimões above its confluence with the Rio Negro until the Peruvian border, and thereafter Maranõn up to its source in the Peruvian Andes. The Amazon Basin covers an area that includes Brazil, Peru, Colombia, Ecuador, Venezuela, Guyana, Suriname and Bolivia. The Amazon biome corresponds to most of the Amazon basin and is typically covered by dense moist tropical forests. There is a general distinction in the biome between floodplain (várzea) and upland (terra firme) areas. The Brazilian Amazon, referred domestically as the Legal Amazon, is an administrative area that covers the states of Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima, and Tocantins, and part of Maranhão (figure 2.1). The Legal Amazon represents 61% of Brazilian territory and comprises the Brazilian part of the Amazon biome, which covers approximately 82% of the Legal Amazon (Santos et al., 2013). The remaining area is largely comprised of Brazil's tropical savannahs, known as Cerrado, in the states of Mato Grosso, Tocantins, and Maranhão, and heath forests, known as Campinarana, in the states of Amazonas and Roraima. The Amazon basin is home to approximately 31 million people, most of whom (23 million) are in the Brazilian portion.

2.3.2. European colonization and the spices of the forest cycle

In the 16th century, possession of the Amazon region was disputed by European powers. Spain and Portugal had divided the "New World" in 1494 through the Tordesilhas Treaty, and the eastern portion of what is now the Brazilian Amazon fell under Portuguese jurisdiction. The Amazon was not immediately a priority and the Portuguese only started effectively occupying it by the early 17th century (Hecht and Cockburn, 2011).

Military occupation through fortresses in strategic locations, such as Belém and Macapá, and most importantly religious orders' missions were the main vectors of geographical occupation in that period. The Jesuits and other orders began establishing missions along the major rivers and relocated indigenous people into *aldeias* (villages) to be supervised and "Christianized." In addition to Jesuits and militaries, small numbers of European settlers, entrepreneurs, and deportees also arrived to the region (Cleary, 2001).

The search for *drogas do sertão* ("spices of the forest," such as cocoa, clove, aromatic roots, vanilla, guarana, Brazil and cashew nuts, cinnamon, turtle shells, tobacco, cotton, and many other regional products) is considered the first economic cycle in the region, which took place

particularly in areas densely ramified by rivers and tributaries. Nevertheless, minor agricultural production was already taking place, specifically in areas ruled by Jesuits, who introduced some agricultural crops such as sugar cane and coffee, and domesticated animals such as pigs, chickens, and cattle (Schmink and Wood, 2012). In this period, at least tens of thousands of Amerindians died due to innumerous revolts and the spread of diseases brought by Europeans (Schmink and Wood, 2012).[19] Existing estimates refer to a 90% decline in the population of Amerindians after contact with Europeans in the Amazon (Koch et al., 2019). Together with other genocides throughout the continent in the same period, this may have contributed to the Little Ice Age[20] experienced before the Industrial Revolution (Koch et al., 2019).

When in 1750 the Treaty of Madrid replaced the Tordesilhas agreement, most of what is now the Brazilian Amazon was transferred to Portuguese sovereignty under the principle of *uti possedetis* ("whoever has it, holds it"). This was followed by the replacement of the Jesuit by civilian rule in the villages, the end of indigenous slavery, and the beginning of miscegenation (Hecht and Cockburn, 2011). Amerindian populations were thus converted into Brazilian citizens and forced to abandon their native languages and traditions. When the village system was abolished at the end of the century, the detribalized Amerindian populations scattered along the rivers. Making their livelihoods out of subsistence activities and sporadic exchange with small traders, they formed the basis of modern riverside dwellers called *caboclos* (Cleary, 2001).

On the economic side, the basis of modern agriculture in the Amazon was created through concessions, subsidies, guaranteed prices, and even credit for African slaves through the recently created Companhia Grão Pará e Maranhão. These incentives and the labor shortage resulting from the abolition of indigenous slavery propelled the arrival of tens of thousands of African slaves (Hecht and Cockburn, 2011). In some cases, successful fugitive slaves formed *quilombos* (runaway slave communities). There are records of *quilombos* at least since mid-18th century (Marin and Gomes, 2003), including in northeast Pará (Marin, 2010). Together with Amerindians, *caboclos*, and other exploited populations, black populations assumed a leading role a few years after Brazil's independence from Portugal in 1822. Between 1835 and 1840, the *Cabanagem* rebellion took place in Pará. What started as a conflict between elites, soon spread to lower classes and resulted in the death of one quarter of the population. Some of the surviving *cabanos* - as the rebels became known - spread further along the rivers, which contributed to strengthening the process of "caboclization" (Harris, 2009).

19 These include diseases such as smallpox, measles, typhus, influenza, the bubonic plague, malaria, diphtheria, and cholera. Most of them originated from domesticated animals from Europe with which Amerindians had had no previous contact.

20 This is a period between 1577 and 1694 where the planet experienced the only significant global cooling in the last two millennia. On the contrary to what is being discussed now, significant reforestation due to the abandonment of large areas under cultivation may have sequestered a significant amount of CO^2 with significant consequences on global temperatures.

2.3.3. The rubber boom

In the mid-19th century, the Industrial Revolution in Europe prompted a rubber boom in the Amazon. With an abundance of wild rubber in the Amazonian rainforest, the rubber cycle led to the rise of major cities such as Belém and Manaus in strategic locations and enriched the owners of the new rubber companies - the s*eringalistas* or rubber barons - the new elite who appropriated huge areas of forest. This period became known as the *Belle Époque*, as these cities witnessed outstanding architectonic modernization with new theatres, luxurious palaces, markets, and cinemas. However, the Belle Époque was only for the few, since economic prosperity benefited mostly the elites (Hecht and Cockburn, 2011).

At the beginning of the rubber cycle, the dispersed network of *caboclos* working independently along the rivers around Belém extracted the raw material for making rubber - the latex from rubber trees. However, rising global demand since the mid-19th century attracted a complex network of well-capitalized foreign firms, traders, and middleman. The rubber supply chain became so elaborate that could even include six levels from producer to manufacturer (Schmink and Wood, 2012). At the bottom of the system were the *seringueiros* (rubber tappers). In addition to *caboclos*, this group included large numbers of northeastern migrant workers who were attracted to the region by the labor demand. Estimates regarding the rubber boom as a whole indicate that nearly half a million northeastern migrants were attracted to the Amazon (Barbosa, 2000). Together they were part of a semi-slavery system that became known as *aviamento*. Under this system, rubber tappers were obliged to buy food and equipment from the owner of the estate and to sell the latex below market price. As in most cases they were forbidden to produce subsistence crops, income obtained from latex was not enough to cover the food and equipment credit. As a result, rubber tappers became indebted to their patrons, in many cases for life. Rubber tappers would become a key player in the emergence of socio-environmentalism several decades later (Hecht and Cockburn, 2011).

The first rubber boom ended in the 1920s, as the region was failing to compete with the highly productive plantations that were being established by the British and the Dutch in Southeast Asia (Weinstein, 1993). A second, shorter lasting, rubber boom (1942–7) emerged during the Second World War when the US began to source rubber from Brazil because alternative supply lines were shut down during the Japanese occupation of Southeast Asia (Dean, 1989). With the collapse of the rubber economy, many of the tappers remained in the region. Most authors refer to the period between the end of the rubber boom and the beginning of military rule as "largely undisturbed" (Barbosa, 2015). However, there are records that show that *garimpo* (small-scale mining) achieved its boom between 1950 and 1964 (Schmink and Wood, 2012). Moreover, the completion of the Belém–Brasília highway in 1960 was a prelude to what was going to happen in the subsequent decades.

2.4. OPENING UP THE FRONTIER

2.4.1. The military regime

While earlier centuries played an important role in shaping Amazon's political economy and social history, it was only under the military regime (1964–85) that the Amazon underwent a rapid process of frontier expansion and massive land use and land cover change. Vigorous federal policies to occupy the territory under the slogan of bringing the "*landless people*" of the northeast to occupy the "*people-less lands*" of the Amazon (Becker, 2016) attracted new waves of migration to the region. Moreover, infrastructure investments and fiscal incentives also attracted investors and more capitalized farmers from other regions.

Through the Program of National Integration, road corridors such as the Santarém–Cuiabá and the Trans-Amazonian Highway were constructed in the 1970s, and direct colonization programs were initiated alongside the roads to absorb the smallholders displaced by modernization programs in other regions. The federal government also began to offer large federal grants and fiscal incentives to investors through SUDAM (Superintendence of Development in the Amazon). One of the objectives of SUDAM was to integrate, for both economic and national security reasons, the underdeveloped Amazon region into the Brazilian economy. Between 1966 and 1980, SUDAM provided more than US$ 1 billion in finance to investors in the Amazon (Schmink and Wood, 2012). Increased accessibility, in combination with SUDAM incentives, attracted many medium- and large-scale cattle ranchers (Pacheco and Benatti, 2015).

These developments resulted in a new occupation pattern called *Amazônia das estradas* ("Amazon of roads"), as opposed to the previous occupation model of *Amazônia dos rios* ("Amazon of rivers") (Polge et al., 2015). New cities emerged along the main roads such as Paragominas on the Belém–Brasília highway, Tailândia and Xinguara on PA-150, and Medicilândia on the Trans-Amazonian Highway, among many others. The influx of new investors to work mainly with timber and livestock, resulted in innumerous land conflicts between newcomer investors and traditional populations that were living there but had no access to formal land titles and were not recognized by governmental agencies (Schmink and Wood; 2012, Simmons, 2004). Furthermore, the arrival of thousands of migrants, first through official colonization processes and then by spontaneous agrarian reform processes, has in many cases exacerbated the existing tensions and conflicts (Jepson, 2006; Ludewigs et al., 2009; Pacheco, 2009). In many areas, such as in southeast Pará, violence and social conflict have become daily routines, as many SUDAM-supported livestock projects contributed to the eviction of smallholders, and thereby to extensive land concentration in frontier areas (Fearnside, 2001). Mostly through cattle ranching as the dominant - and logical (Hecht, 1993) - economic activity at that time for both small and largescale landholders, considerable areas of the Brazilian Amazon have seen widespread environmental destruction as the frontier moved further (Margulis, 2004).

In Pará more specifically, this process led to an influx of migrants and medium- to large-scale investments from southern Brazil, especially in the livestock and timber sectors. Many of these investments were located along the Belém–Brasilia and Trans-Amazonian highways. SUDAM incentives also led to the establishment of a number of oil palm plantations in northeast Pará. In the 1970s, a large-scale commercial mining sector began to emerge with the development of the Carajás Iron Ore Project (owned by Brazilian mining giant Vale); today it is the largest iron ore mine in the world (Bunker, 2003). In northeast Pará, small-scale farming systems developed during this period, with black pepper, introduced by Japanese settlers, becoming one of the most important cash crops in the area. Although black pepper accounted for approximately 35% of the value of Pará's exports in the early 1970s, a disease began to spread among pepper plants, which in the late 1970s led to the collapse of the sector (Homma, 2009). This prompted the development of more diversified agroforestry systems in the area around cocoa, various types of fruit trees, and perennials such as oil palm. While these cash crops have had major economic relevance, the large majority of the farmers in this region were mostly engaged in subsistence farming, with cassava as the most important crop.

2.4.2. The rise of socio-environmentalism and the election of the Workers' Party

Although there have been social actions for several centuries - including indigenous revolts (Prezia, 2017), the formation of *quilombos* (Marin and Castro, 1999), and the Cabanagem revolt (Harris, 2009) - democratization in the 1980s was instrumental to the emergence of social movements in Brazil and in the Amazon of what became known as socio-environmentalism (Hecht and Cockburn, 2011).

In a context of pervasive inequalities, violence, and the lack of state presence in rural areas, previously formed organizations such as the National Confederation of Agricultural Workers (CONTAG) and the Movement of Rural Landless Workers (MST) became powerful political actors. In the Amazon, groups of rural workers joined forces with local Catholic churches and priests, and started to organize themselves into base ecclesial communities (CEBs in Portuguese) inspired by liberation theology.[21] In many municipalities, these groups managed to win local smallholder union elections, which supported the strengthening of a network of grassroots organizations all over the Amazon.

In the western Amazonian state of Acre, rubber tappers faced with violence from and deadly conflicts with recently arrived ranchers adopted a new strategy: the now famous non-violent stand-offs - *empates*.[22] In 1985, the National Council of Rubber Tappers (CNS) was founded and

21 Liberation theology is a Christian movement that emphasizes concern for poor people. Highly influential in Latin America since the 1950s, the movement supports a social and political oriented mission to support oppressed people. In Brazil, under the leadership of Leonardo Boff, the movement was particularly influential in the 1980s and 1990s.

22 *Empate* is an expression taken from football which basically means "draw." According to Chico Mendes, the expression was selected due to its simplicity to explain a process where neither one side nor the other of the conflict was able to win.

quickly attracted international support from environmental groups. Rubber tappers together with other extractivist groups were seen as forest guardians, basically because their livelihoods depended on standing forests (Vadjunec et al., 2011a). With the death of the rubber tappers' leader, Chico Mendes, in December 1988, the movement achieved global visibility and became one of the strongest pillars of socio-environmentalism. Chico Mendes also inspired the creation of a number of extractive reserves and the later formalization of the Federal Extractive Reserve System (RESEX). Today, there are 67 federal or state extractive reserves spanning around 14 million ha (Vadjunec et al., 2011a)

The 1980s were also critical years for indigenous peoples in the Amazon, in particular since the 1988 Constitution granted exclusive and collective usufruct of indigenous territories (Le Tourneau, 2015). Indigenous groups have been struggling for land demarcation for several decades, but in this period their struggles acquired unprecedented visibility all over the Amazon, in particular since rock star Sting publicly supported the cause of the Kayapó against the construction of hydroelectric dams in 1989. Another famous moment took place during the first meeting of the Indigenous Peoples of the Xingu, held in Altamira, when Tuira Kayapó raised her machete in front of the chief engineer of the state electric holding company (ElectroBras), and then gently tapped his cheeks with the flat of the blade (figure 2.2). Together the rubber tappers and indigenous groups formed a strong alliance which succeeded in protecting large forest reserves through a number of different tenure systems (see section 2.5.1).

A particular important moment in the Amazon took place in 1996 when 19 rural workers were murdered in Pará in a confrontation with the military police (Simmons, 2005). This became known as the El Dorado do Carajas massacre, a decisive event that triggered a number of changes in the following years promoted by the Fernando Henrique Cardoso administration (1995–2002), as described below (see section 2.5.3). In northeast Pará, grassroots movements - in this case inspired by Freire's pedagogy of the oppressed - started to support black populations in this period in their struggle for quilombola recognition. All these events contributed to strengthening both socio-environmentalism and the electoral support base of Lula da Silva's PT which after three failed attempts finally won the presidential election of 2002. The election of Lula da Silva determined the shaping of the current socio-environmental governance system. But before presenting it, it is time to summarize the impacts on deforestation and land use of all these socio-political changes.

Figure 2.2: Tuíra Kayapó

Photo credit: Paulo Jares/Interfoto (1989)

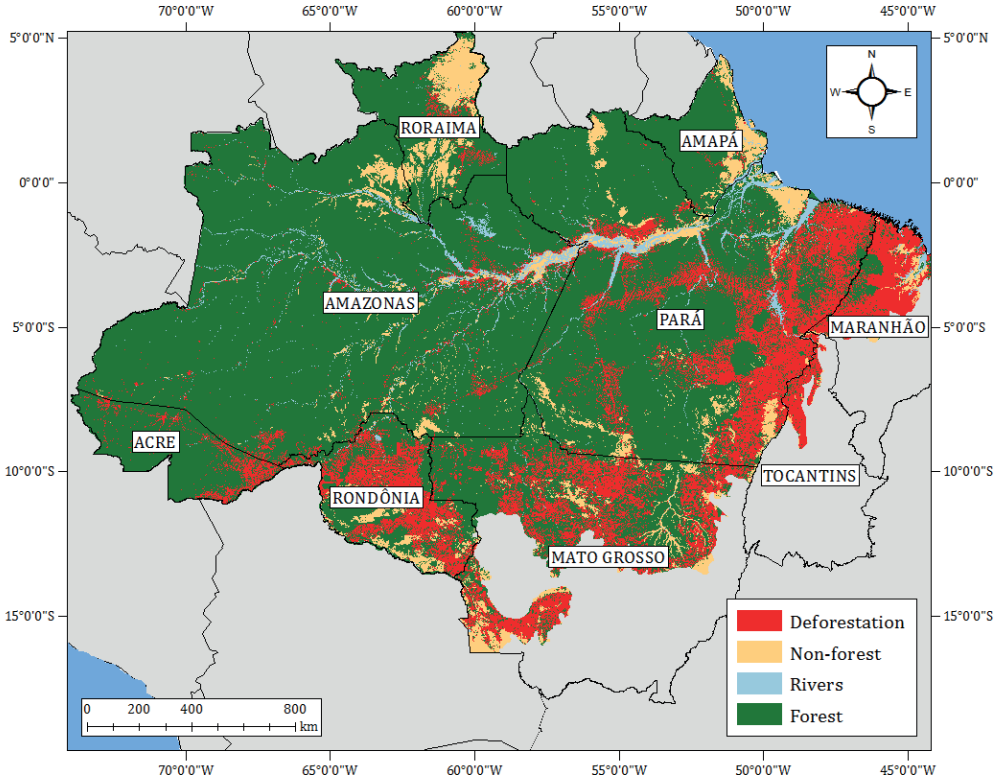
2.4.3 Deforestation and land use

The emergence of predominantly land-extensive and extractive production systems in the Brazilian Amazon since the 1960s has led to the large-scale conversion of forestland. In total, nearly 20% of the Amazon biome has been deforested, though some part of it (around 15%) has regenerated (Nobre et al., 2016) (figure 2.3).

Deforestation is concentrated in what is called the "arc of deforestation" (Pacheco, 2009), a region that includes the eastern part of Pará and the northern part of Mato Grosso. Since 1988, these two states have been responsible for two thirds of the total accumulated deforestation according to figures provided by the National Institute for Space Research (INPE). These figures, however, do not account for forest degradation, a problem that has received considerable less political and academic attention (box 2.3).

There is a huge amount of literature on deforestation and land-use/land-cover change in Brazil. It is generally said that factors such as fiscal incentives, infrastructure development, transportation costs, migration, population growth, household decision making, insecure tenure, and commodity prices are the main drivers of deforestation (Aldrich et al., 2012; Caldas et al., 2007; Margulis, 2004; Godar et al., 2014). Furthermore, the actors have changed considerably over time: In the 1960s to the 1980s, they were small-scale migrants with assistance from the state, whereas since the 1990s, they have been well capitalized farmers, ranchers, and loggers strongly connected to global markets (Rudel et al., 2009).

Figure 2.3: Deforestation in the Legal Amazon



Source: Representation of own data; IBGE cartographic base; PRODES 2018; Geographic Coordinate System: WGS 1984

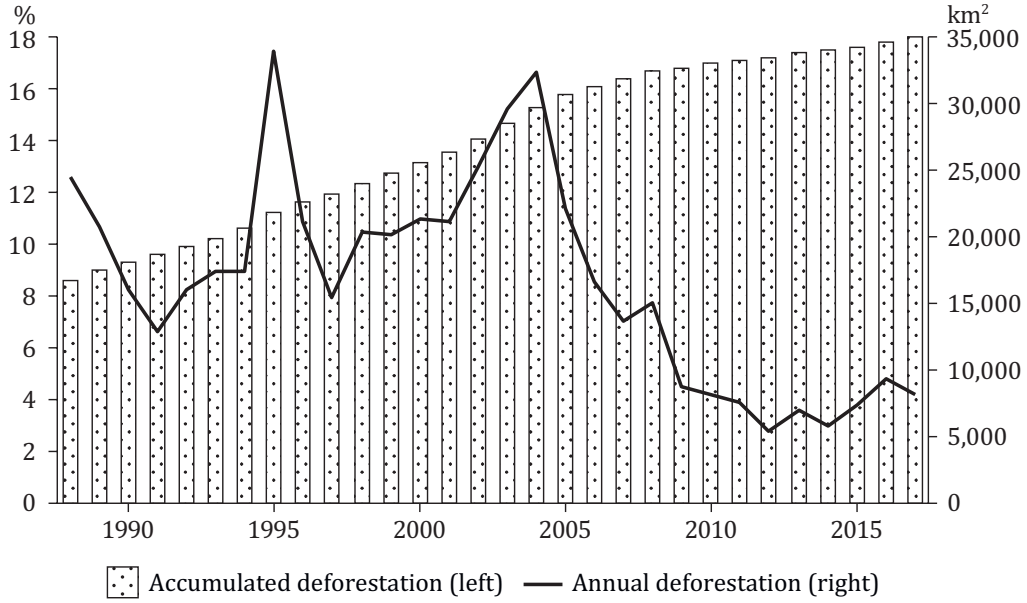
Box 2.3: Deforestation and degradation

An important differentiation should be made between deforestation and forest degradation. While the former means the drastic removal of vegetation, thus being an investment in future alternative land uses where forest is not expected to regrow, the latter refers to other damaging activities, such as logging or charcoal production, often representing a short cashing-in without changing the land use and eventually including forest regeneration (Wunder, 2001). In some cases, these processes are intertwined with forests being degraded during initial stages followed by full conversion to agriculture at a later stage (Hosonuma et al., 2012).

Since the mid-2000s, a number of ambitious policies to tackle deforestation have been implemented (see section 2.5.4). Their success is evident: Brazil has managed to reduce deforestation by more than 70% since its peak in 2004 (Nepstad et al., 2014; Souza and Junior, 2015; Godar et al., 2014; Aubertin, 2015; Hecht, 2012) (figure 2.4). Nevertheless, in recent years there are signs that deforestation is still a problem in Brazil, with rates slowly starting to increase. It is unclear how close we are to the tipping point, when parts of the Amazon might quickly turn

into savannah, but some scientists argue that we are quite close (Lovejoy and Nobre, 2018). In response to improved monitoring and enforcement systems (see section 2.5.4), deforesters have adopted new techniques and deforestation patterns have thus become more complex to detect. Deforestation is now increasingly linked to organized crime, complex legal procedures, and political interest groups.

Figure 2.4: Deforestation trends in the Legal Amazon



Source: PRODES (INPE, 2019)

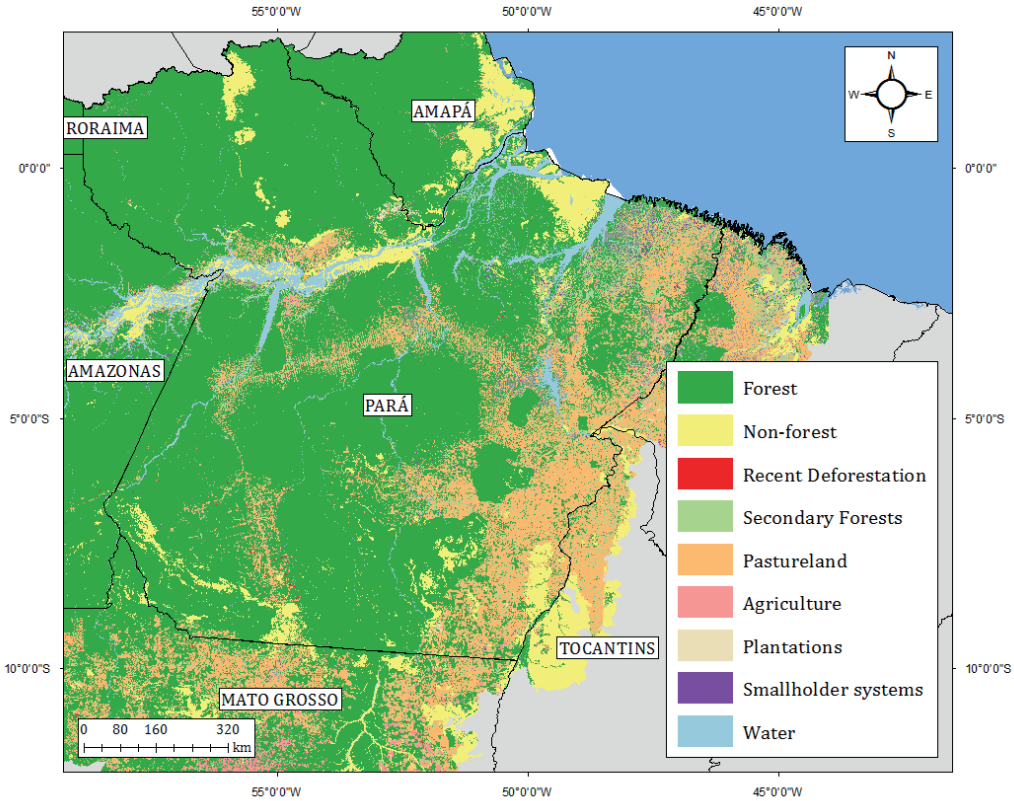
In Pará, the most populous state of the northern region (it has nearly 7.5 million inhabitants), deforestation trends are similar to the regional dynamics. Despite being a deforestation hotspot, Pará still accounts for a significant share of primary forests (69%). According to Brazil's official system (INPE, 2019),[23] the remainder of the state is covered by water (4%), savannah (6%), and deforested areas (21%). According to TerraClass,[24] in 2014 major land uses following deforestation were classified as pastureland (12%) and secondary vegetation (5.3%) (figure 2.5). Annual agriculture, such as soy, corn, and rice, accounted for only 0.3% of the Pará land area; however, there has been an increase in soy production. In the 1990s, large-scale commercial soy production began to expand into the agroecological transition zone between the Cerrado and the Amazon in the eastern municipalities of Santarém and Paragominas. This was driven

23 Developed by the National Institute for Space Research (INPE) in 1988, PRODES identifies clear-cut deforestation polygons every year by processing LANDSAT imagery with 30 m resolution. The system constitutes the reference of Brazil's public policies on deforestation.

24 In terms of land use analysis after deforestation, there are two main sources of data with slight differences due to methodological differences: TerraClass and MapBiomas.

largely by the development of new soy varieties that were better adapted to Amazon's climate, comparatively cheap land prices in the area, and improved transportation and storage facilities (Nepstad et al., 2006).

Figure 2.5: Land use in Pará



Source: Representation of own data; IBGE cartographic base; TerraClass 2014; Geographic Coordinate System: WGS 1984

Detailed information on oil palm is provided in the following chapter (3), but due to classification methodologies oil palm is not disaggregated in TerraClass. The same applies to *açaí* and cocoa. In recent years, these have become important crops in the region, due to increasing global demand. The former is cultivated mostly in floodplain areas inhabited by traditional populations and riverside dwellers (though new actors are increasingly investing in dryland açaí production), and the latter mostly under agro-forestry systems in municipalities such as Medicilândia, São Félix do Xingu, and Tomé Açu.

2.5. THE GOVERNANCE OF LAND USE IN THE BRAZILIAN AMAZON

The previous sections introduced the unique historical, economic, geographic, and socio-political context of the Brazilian Amazon, which helps to understand why Brazil has developed a progressive land use governance system. The following subsections present the most important aspects in relation to agricultural commodity governance.

2.5.1. Land tenure

Land tenure in Brazil, and the Brazilian Amazon in particular, is considered an important barrier to the implementation of public policies. This has largely arisen from a long history of uncontrolled land occupation in the Amazon's frontier areas. Although such occupations date back to the colonial era, they have taken on unprecedented proportions since the 1960s. As explained above, this is largely attributable to the rapid expansion of the economic frontier, driven partly by the federal grants and fiscal incentives offered to investors by the military regime through SUDAM. With the return of democratic rule in the 1980s, internal pressure to address societal inequalities prompted the government to undertake agrarian reform, which involved land tenure regularization and the redistribution of private lands. These reforms initially focused on transferring the administration of lands not registered as federal lands back to state administration and demarcating indigenous and quilombola lands (Pacheco and Benatti, 2015).[25] Redistribution took place largely through the expropriation of private lands that failed to fulfill social and economic functions, for example, from SUDAM-supported cattle ranchers that failed to use their land productively. Despite ambitious proposals, it was not until the Fernando Henrique Cardoso administration that the government began to make real advances in resettling landless and land poor peasants and titling their landholdings (Pacheco, 2009); on federal lands this was realized through the Brazilian Agency for Agrarian Reform (INCRA) and on state lands through the State Land Agency of Pará (ITERPA). During this period, 319,514 families were resettled in the Legal Amazon, including 89,032 in Pará. These efforts were sustained under Lula da Silva's administration (2003–11), and another 265,164 families were resettled in the Legal Amazon during 2003–6, including 125,891 in Pará (Pacheco, 2009).

Part of the strategy to contain social tensions and avoid deforestation has been the creation of special tenure systems. Today, 44.1% of the Amazon is formally recognized as protected. This includes conservation units - protected areas created by the National System for Protected Areas

25 The territorial rights of indigenous and quilombola communities are offered special legal protection under Brazilian federal law, since the 1988 Brazilian Constitution formally recognizes their collective land rights. In an effort to protect these minorities from marginalization and commercial exploitation, these collectively managed lands are to be utilized in a "traditional" manner and are indivisible. Although the majority of indigenous territories have now been demarcated, the government has made slow progress in extending titles to quilombola communities. By 2012, only 192 out of 3,542 registered quilombola communities had received collective title deeds (Backhouse, 2013).

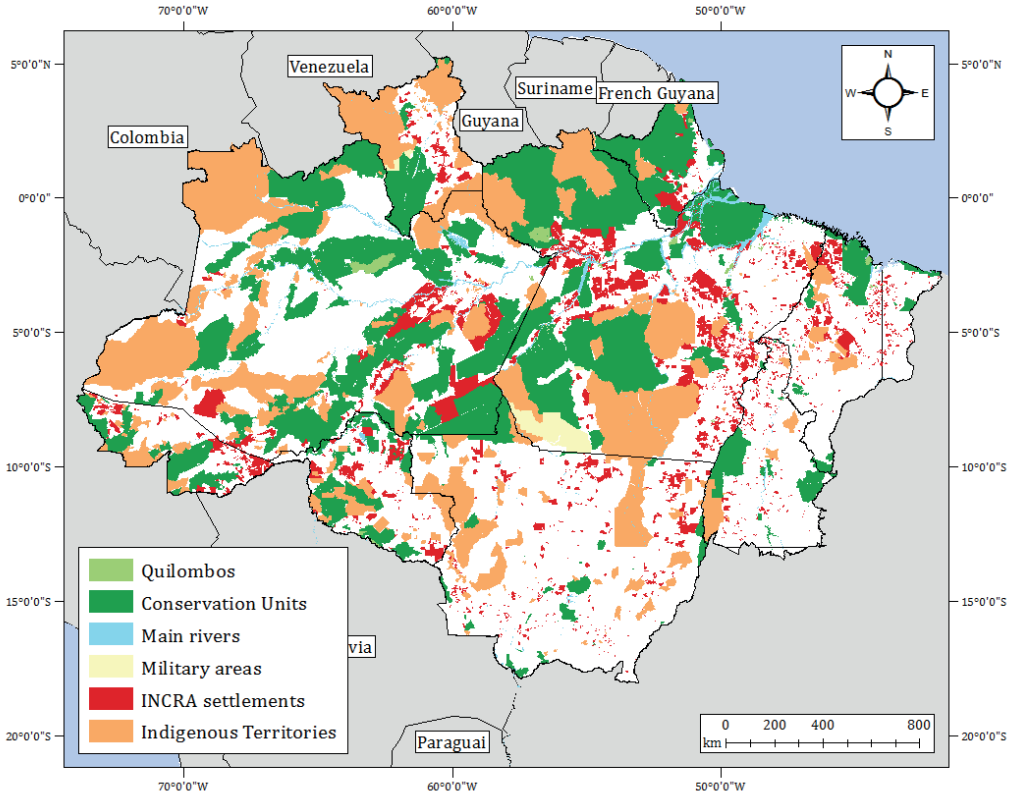
(SNUC) in 2000. The SNUC encompasses several categories of conservation units, including strictly protected areas whose primary function is to preserve biodiversity (the Ür nature) and sustainable use areas, which are inhabited by traditional populations and allow some level of resource use, such as the Chico Mendes-inspired RESEX (Castro, 2014). In critical regions, some of these protected areas have been strategically assigned to buffer frontier expansion. Indigenous territories make up the other half of the area that is formally recognized as protected.

Another 6.2% of the Amazon is under other special tenure regimes which includes INCRA settlements, which are areas designated for agrarian reform purposes; quilombola territories, which are collective titles given to communities with proven African ancestry; and military areas. The remaining territory is privately held (22.7%) or unclaimed or with unclear status (27%) (Santos et al., 2013) (figure 2.6). Pará has a similar tenure composition, with 55% of conservation units and indigenous lands, 7.9% of special areas (INCRA, quilombola and military), and 18% and 19.1% of private and unclaimed land, respectively (Santos et al., 2013). Unclaimed areas are particularly critical since they are often a target of uncontrolled and speculative behaviors around land appropriation (Pfaff et al., 2007).

The regularization of individual land rights outside indigenous territories and conservation units remains a difficult issue to resolve in the Amazon. Considering the prevalence of fraud, illegal land occupation, and conflicting claims, establishing the legitimate ownership of land continues to frustrate land titling (Brito and Junior, 2015). These challenges also restrict the government's ability to ascribe responsibilities in the context of its anti-deforestation programs and provide targeted public services.

In order to address these issues, the Ministry of Agrarian Development (MDA) launched the Legal Land Program in 2009 to expedite the regularization process, especially for small and medium-sized landholdings. The state government established similar programs in 2009 for state land, modeled after the federal Legal Land Program, which in the case of Pará is led by ITERPA. Under these programs, properties to be regularized must have been occupied since at least 1 December 2004 and be less than 1,500 ha in size. With regularization involving a lengthy process of registration, geo-referencing, site inspection, and, ultimately, titling, the progress of both the federal program and state programs has been hampered by human and financial resource constraints (Brito and Junior, 2015). Protracted disputes over the constitutionality of some of the regulations have also posed additional implementation challenges. According to Brito and Junior (2015), in Pará, ITERPA has only been able to issue an average of 454 titles per year. Nevertheless, with land titling in Pará increasingly building on environmental enforcement programs, especially the Rural Environmental Registry (CAR) system (see section 2.5.4), operational and bureaucratic synergies are emerging. In recent years there have been some attempts to use extraordinary regularization plans as an incentive instrument to compensate municipalities that succeed in reducing deforestation.

Figure 2.6: Land tenure in the Legal Amazon



Source: Representation of own data; IBGE cartographic base; Geographic Coordinate System: WGS 1984

Although foreign individuals and corporations have long been permitted to own land in Brazil, due to concerns over expatriate land concentration, and food security in particular, following the food price crisis of 2008-09, laws were reinterpreted in 2010 to prohibit foreigners from owning more than 5000 ha of land. This has led foreign agribusinesses to engage in partnership arrangements with local farmers in order to access land. However, with the sugarcane sector in particular experiencing a loss of private sector investment, and other sectors like the oil palm sector facing difficulties attracting foreign investment, pressures are mounting to reverse the bill.

2.5.2. Biofuels

Brazil has a long tradition of governance intervention to promote alternative energy systems as a means of reducing dependency on imported fossil fuels. This has long focused on the sugarcane-derived ethanol industry that since 1900 has been the primary focus of agro-industrial policies. The blending of ethanol with gasoline became mandatory in 1941 (Andrade and Miccolis, 2011). In response to the oil crisis of the 1970s, the government sought to increase ethanol production

by establishing the Pro-Alcohol program. Under this program, the federal government increased the blending mandate to 20–25%, and introduced new incentives to ethanol-based industries and the manufacturers of ethanol-fueled vehicles. In the 1980s and 1990s, however, instability in the world sugar market, the stabilization of oil prices, and deregulation reforms reduced state intervention in the sector, in turn adversely affecting ethanol output. This changed in 2000, however, when the government established the National Agency of Petroleum, Natural Gas and Biofuels (ANP). The principal objective of ANP was to introduce new pricing mechanisms to protect the ethanol sector from low international energy prices. To prevent output expansion from further exacerbating deforestation, the federal government developed agro-ecological zones for sugarcane, which banned the establishment of sugarcane plantations in the Amazon biome.

Seeking to replicate the success of the Pro-Alcohol initiative, the federal government established the Pro-Óleo and the Energy from Vegetable Oil (OVEG) programs in the early 1980s to stimulate the use of raw vegetable oils for biodiesel production. Under these programs, dozens of plant species were tested and new production technologies and engines were developed. However, as a result of comparatively high production costs, these programs did not receive the same level of government commitment as Pro-Alcohol, which led to their abandonment in the mid-1980s (Rico and Sauer, 2015). Following the election of Lula da Silva, the government renewed their interest in reducing Brazil's dependency on imported diesel. This led to, for example, the establishment of the national Biodiesel Production and Use Program (PNPB) in 2004, which sought to improve the organization of the biodiesel value chain, introduce new funding mechanisms, support R&D, and establish regulatory provisions for blending (Andrade and Miccolis, 2010).

In 2005, this resulted in the ratification of the Biodiesel Law, which specified national blending mandates for biodiesel (2% by 2008, 5% by 2013, and 7% in 2014), provided for fiscal incentives to producers, and initiated the social certification scheme known as the Social Fuel Stamp (SFS) (see section 2.5.3). In order to encourage the diversification of biodiesel feedstock and to include the more economically marginalized north in the renewable energy supply chain, in 2010 the government launched the already mentioned SPOPP. Despite efforts to promote palm oil production for use as biodiesel, the sector continues to rely on soybean oil and tallow, which accounted for 77.6% and 18.0%, respectively, of total biodiesel output in April 2015 (ANP, 2015). Palm oil accounted for only 0.1% of biodiesel production in that month (ANP, 2015).

Despite the existing policies and incentives, in recent years it has been recognized by several observers that biodiesel has lost political momentum. That is partly a result of governmental changes (through the election of Dilma Rousseff as president in 2010, replacing Lula da Silva) and the discovery of large oil and natural gas reserves in the pre-salt layer along the Brazilian coast (Magalhães and Domingues, 2014).

2.5.3. Family farming and smallholder integration

The emergence of socio-environmentalism in Brazil and its mobilizing power increased the pressure on the federal government to pursue more inclusive policies in order to guarantee the electoral support of rural trade union members. This culminated in 2006 in the passing of the Family Farming Law, which served to institutionalize policies targeting family farmers[26]. It also created a clear working definition of what constitutes a family farmer, which is now used as the eligibility criterion for most Brazilian smallholder support programs. Through this law, a family farmer is defined as a person who engages in rural activities, such as ranching and agriculture, possesses no more than four "fiscal modes",[27] utilizes predominantly family labor, and makes a living out of their own production. According to the 2006 National Census, family farming accounts for 84.4% of all rural properties.

Even before the passing of the Family Farming Law, the Brazilian government had established a number of specific programs to support family farming. One of the most important programs that served to entrench the family farming discourse is the Program to Support Family Farming (PRONAF), which was established in 1995 to improve farmers' access to technical assistance and concessionary loans. Under the Lula da Silva administration, the program was expanded in an attempt to address some of the unresolved market access issues faced by smallholders. For example, 2003 saw the establishment of the Program for Food Procurement (PAA), which sought to improve smallholder market access by purchasing products directly from family farmers and distributing the products to food-insecure households. In a similar vein, the National Program of School Nourishment (PNAE), which was established in 2009, requires all school canteens to source at least 30% of their produce from family farmers. Both the PAA and the PNAE continue to be important mechanisms to absorb smallholder output.

A number of specific measures to enhance smallholder integration are also being undertaken at a more sectoral level. For example, the SFS established under the 2005 Biodiesel Law offers incentives to biodiesel producers when a minimum percentage of processed feedstock is sourced through smallholders. The minimum percentage depends on the region, and since November 2014 it has varied from 40% in the south and 30% in the southeast, northeast, and semi-arid regions, to 15% in the north and west-central regions (Brandão and Schoneveld, 2015). Producers are also required to contract family farmers through farmers' associations or cooperatives and provide these farmers with technical assistance and training. Biodiesel producers meeting these requirements are allocated the SFS, which enables them to gain preferential access to the ANP biodiesel auction, which sets aside 80% of auction lots exclusively for producers with a stamp. Distributors and refiners can only buy from stamp holders in these lots. Producers also benefit

26 In this dissertation smallholders and family farmers are considered synonyms.

27 A fiscal mode represents a unit of economically viable farmland. This depends on the municipality in question, ranging in Pará from 5 ha in Belém to 80 ha in Parágominas; meaning that a family farmer can hold a maximum total land area of 320 ha in some municipalities. Not all smallholders have four fiscal modes, for instance in São Domingos do Capim the fiscal mode is 40 ha, while most smallholders have 25–35 ha.

from lower income tax rates and more favorable financing conditions at the Brazilian National Development Bank (BNDES).

Despite these advances, Brazilian agricultural policy continues to demonstrate contradictions between the demands of agribusiness and those of smallholder social movements. This is illustrated by the existence of two agricultural ministries in the PT governments (2002–16), namely the MAPA and the MDA, which had conflicting policy directions: MAPA was oriented toward agribusiness and large landholders and the MDA toward family farming, agrarian reform, and land tenure issues. Under the Lula da Silva administration, the MDA assumed greater political relevance since it represented the interests of the electoral support base of Lula's Workers' Party. However, many policies including the 2012 revision of the Forest Code, which softens the rules for agricultural investments and offers amnesty for environmental crimes committed before 2008, illustrate that the agribusiness lobby continued to be highly influential in that period. This agribusiness lobby is organized through the *bancada ruralista*, a powerful congressional bloc representing the interests of large landowners, which in the present term includes more than half of all members of Congress. The recent political changes in Brazil, including the impeachment of the former elected president Dilma Roussef in 2016 and the election of Jair Bolsonaro in 2018, have strengthened the political influence of agri-business vis-à-vis family farming.

2.5.4. Environmental management

The environmental legal framework in Brazil is considered to be one of the most progressive in the developing world. Environmental licensing requirements for polluting or environmentally damaging economic activities were created in 1981 through the National Environmental Policy, with environmental impact assessments becoming mandatory for many activities in 1986. Most forestry-related issues are governed through the Brazilian Forest Code, which was first enacted in 1934 by the president, Getúlio Vargas. During the military regime in 1965, Brazil first amended the Forest Code and created two important long-lasting concepts, namely the Area of Permanent Preservation (APP) and legal reserves. A legal reserve is a proportion of a rural property that should remain forested, while an APP is a sensitive area such as a riverside, hilltop, or steep slope that should be protected from conversion. The Forest Code initially required that 50% of a rural property should be maintained as a legal reserve in the Legal Amazon, and 20% in the other regions. In 1996, when deforestation rates were peaking, the Cardoso administration increased the size of the legal reserve for the Legal Amazon to 80% and decreased it from 50% to 35% in the Cerrado. State governments may, however, reduce the size of a legal reserve from 80% to 50% by designating certain areas as agricultural production zones through Ecological–Economic Zoning (ZEE) plans. This is the case in northeast Pará, for example, where oil palm plantations have expanded.

Box 2.4: The Cattle Agreement

The Cattle Agreement is a framework that has been instrumental in reducing deforestation and promoting land tenure regularization. Spurred by charges and fines against their landholdings for deforestation, many of the country's main meatpackers and exporter companies began negotiating with the Federal Public Prosecutor's Office and the government of Pará, and together signed the agreement in July 2009. Within this framework, the private sector agreed to eliminate deforestation, register supplier properties under the national Rural Environmental Registry (CAR), and stop supplying cattle from areas embargoed by the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), the State Secretariat for the Environment and Sustainability (SEMAS), and the Slavery Blacklist. The agreement also included strengthened protections for conservation units and indigenous territories. The agreement was later extended to other Amazonian states and to date meatpackers representing 70% of the slaughter capacity have signed on. Major challenges include monitoring indirect suppliers and increasing the number of signatory slaughterhouses.

Despite the introduction of stringent new environmental regulations, law enforcement in the Amazon has traditionally been weak. Its large territory devoid of a state presence has long undermined compliance. It was only under the Lula da Silva administration, with former rubber tapper leader Marina Silva as Minister of the Environment, that the federal government began to invest heavily in strengthening its law enforcement capacity and in improving coordination between the complex and fragmented network of ministries and agencies from the federal to the municipal level. This led to the establishment of the Action Plan for Prevention and Control of the Legal Amazon Deforestation (PPCDAM) in 2004.[28] The PPCDAM in turn led to the creation of a satellite-based monitoring system, the Real Time System for Detection of Deforestation (DETER), which has significantly increased the government's capacity to quickly respond to deforestation events.[29] In order to motivate individual municipalities to enforce environmental regulations, in 2008 the federal government began to place administrative restrictions on municipalities facing high deforestation rates and to make rural credit access conditional on compliance with environmental and land laws. The reduction of annual deforestation rates from 27,772 km^2 in 2004 to 4,848 km2 in 2014 is largely attributable to these efforts. Private-sector commitments to remove deforestation from their supply chains, such as the 2006 Soy Moratorium and the 2009 Cattle Agreement (box 2.4), further contributed to the reduction (Nepstad et al., 2014).

28 In its first stage (2004–08) it was responsible for, among others, the creation of 25 million ha of conservation units on federal land, plus another 25 million on state land. Ten million ha of indigenous reserves were also created at that time. Many of these areas were created in active agricultural frontiers.

29 Developed by INPE, DETER captures and processes images on forest cover every 15 days and has the capacity to identify deforestation and forest degradation for areas exceeding 6.25 ha. In parallel to this, the nongovernmental organization IMAZON launched its own Deforestation Alert System (SAD), which releases information monthly and provides deforestation alerts to local environmental agencies.

However, under the Dilma Roussef administration (2011–16) some changes were introduced to the Forest Code - changes that many critics claim to be a reflection of the increasing political influence of agribusiness. One of the most controversial changes is the amnesty granted to perpetrators of environmental crimes committed before 2008 in order to incentivize offending landowners to regularize their activities. Other changes include the introduction of Environmental Reserve Quotas, which allow landowners with "environmental debts" (e.g., legal reserve areas deforested illegally) to buy forest titles elsewhere in the same biome to avoid the costs of reforestation. The new Forest Code also instituted the CAR system, which has been in force in Mato Grosso and Pará since 2009 and mandates the registration of all rural properties in order to facilitate social and economic planning and the monitoring of deforestation. Once registered under CAR, landowners involved in, for example, ranching, agriculture, and forestry activities should obtain a Rural Environmental License (LAR), which regulates activities on the property and details requirements for complying with the Forest Code. With an LAR, a property owner is permitted to legally deforest within the legal reserve boundaries set by the Forest Code. Smallholders are excluded from having to restore egal reserves deforested before 2008 and are exempted from obtaining an LAR, a clear example of the socio-nature dimension of some policies. For owners who have environmental debts, the Forest Code has also tasked state governments to create a Program of Environmental Regularization (PRA) to set rules for restoration. Although softened in comparison to the previous version, the new Forest Code is perceived by some as a positive revision since it is more incentive-oriented and creates viable pathways to enable full legal compliance (Nepstad et al. 2014).

Finally, a number of specific zoning instruments are relevant to regulate land use. The Macro Ecological–Economic Zoning of the Legal Amazon (MZEE-AL) was approved in 2010 as an overarching strategy for the sustainable use of land. It also aims to contribute to the formulation of federal and state development policies. The Ecological–Economic Zoning of Eastern Pará was approved in 2010 as a state-level instrument building on MZEE-AL to establish the rules and guidelines for the use of land in Pará, specifically.

2.5.5. Foreign direct investment

The political sentiment toward foreign direct investment (FDI) in Brazil has become considerably more favorable since the return of democratic rule in the 1980s. Since the early 1950s, various Brazilian governments have adopted import substitution industrialization policies in order to reduce dependency on external markets and develop domestic industrial capacity. This involved, for example, foreign exchange restrictions, a range of fiscal incentives for import substituting industries, and direct state intervention through state-owned enterprises (Amal, 2016). Although this provided impetus for the Brazilian economy, with many large state-led projects funded through external credit lines, in the early 1980s large public deficits led to economic stagnation, currency devaluation, and unsustainable inflation. With the return of democratic rule, numerous structural reforms were introduced, which eventually led to the privatization

of many state-owned enterprises and the introduction of extensive trade liberalization and fiscal and monetary reforms (Amal, 2016). Additionally, the reforms abolished mechanisms discriminating against foreign capital, allowing foreign companies to enjoy the same legal status as domestic companies. This implies that wholly foreign-owned enterprises are free to operate in most sectors. Foreign investments are, however, not permitted in some strategic sectors, such as nuclear energy, postal services, and healthcare. Some restrictions also apply to foreign enterprises operating in the financial services, aviation, shipping, communications, and mining.

Although the left-wing rhetoric of the PT generated fears among foreign investors that the government would introduce new restrictions, the party continued to embrace the so-called tripod of economic stability, namely a floating foreign exchange regime, fiscal surplus and a system of inflation targets, and refraining from introducing new FDI restrictions (Amal, 2016).

With these reforms, FDI begun to play an increasingly important role in Brazil's economic development from the 1980s, with the value of net inflows increasing from less than 0.5% of gross domestic product in the 1980s to 3.6% in 2013 (World Bank, 2015). Brazil is now the largest regional recipient of FDI, accounting for 45% of total FDI stock in Latin America (FAO, 2013). Much of this FDI is concentrated in the industrial and services sectors, with the primary sectors (agriculture, livestock, and minerals) typically accounting for less than 10% of total FDI flows. Within the primary sector, more than 95% of FDI flows target either the mining or the oil & gas subsector (Brasil, 2015). Despite the interest in attracting foreign investments into oil palm, the sector remains largely controlled by domestic investors. These and other specific aspects of oil palm development in Pará are discussed in the following chapter.

2.6. CONCLUSIONS

This chapter portrayed the Brazilian Amazon's domestic governance context, specifically in relation to Pará - the state that concentrates most of Brazil's land under oil palm. While the mental landscape of many observers is still dominated by images of naked indigenous populations along with wild dangerous species, in reality the Amazon is a very dynamic region and a territory that is central to the global economy, and where agricultural production plays an important role. The Brazilian Amazon is characterized not only by managed forests, open access, or old-growth forests, but also by areas of intensive agriculture and extensive agriculture inhabited by a multitude of actors such as ranchers, traditional populations, and migrant colonists. The interaction between these diverse actors competing and/or cooperating in different landscapes is framed under three different, often contradictory, dimensions: the Ür nature, the neo-nature, and the socio-nature (Hecht, 2012).

In recent decades, the region has undergone major governance shifts mostly related to governmental changes, climate change debates, and the emergence of social movements. These factors have given social (socio-nature) and environmental (Ür nature) aspects a central role in Amazonian politics. Yet, economic development (neo-nature), particularly in relation to agricultural and mining investments, has remained high on the agenda. This context is also key to understanding why, how, and when oil palm has been expanding and the implications it has for sustainable development. Depending on the specific historical, political, or geographic setting, this complex regulatory and policy context has contributed to diverse outcomes on the ground. Although in the Brazilian Amazon deforestation has been reduced by 80% and millions have been taken out of poverty, it remains the region with the highest rate of environment-related assassinations in the world. As Susanna Hecht put it, these contradictions, accomplishments, and failures make the Amazon a place certainly "not for beginners" (Hecht, 2015). In 2016, the impeachment of the elected president, Dilma Roussef, and the rise to power of the former vice-president, Michel Temer, backed by a conservative coalition has put a break on the socio-environmental agenda at the national level, at least temporarily. Moreover, the recent election of Jair Bolsonaro supported by a strong anti-environmental discourse has put the planet on hold. Because all these changes are very recent, they are not reflected in most of this dissertation. However, it is likely that they will have different impacts and implications for land-use and land-cover change, livelihoods, and economic development in the coming years.

CHAPTER 3

The state of oil palm development in the Brazilian Amazon: trends, value chain dynamics and business models

3.1. INTRODUCTION

Palm oil has been used in Brazil for centuries in the Bahian tradition, notably in *acarajé* and *vatapá* dishes. Nevertheless, although it was brought to Brazil from Africa by slaves in the 16th century, it only reached the Amazon for commercial purposes in 1974. For decades, the sector was almost irrelevant in terms of size and political and economic significance. By the end of the 20th century, there was just over 50,000 ha of planted area in the Brazilian Amazon (Venturieri, 2011). In the mid-2000s, however, palm oil began to attract the interest of large national and international investors. The trigger was the sanctioning of the Biofuel Law in 2005, which was further complemented by the launching of the Sustainable Palm Oil Production Program (SPOPP) in 2010. The Brazilian federal government wanted to expand palm oil production in the Amazon in order to diversify Brazil's biodiesel sources, which were (and still are) very dependent on soybean oil.

Upscaling palm oil production in Brazil could, besides enhancing national energy security, also generate a number of important co-benefits, which also underlie the government's commitment to the sector. Specifically, oil palm has unique agronomic advantages over other oilseeds. For example, it yields on average 4 metric tons (MT) of CPO per ha cultivated in Brazil; considerably more than soy, Brazil's most important oilseed crop by area planted, which on average yields 0.5 MT of oil per ha (Pina, 2010). Because of oil palm's high productivity, it places considerably less demand on land than soy does. This could contribute to more intensive land use in the Amazon and thereby reduce pressure on its rainforests, as explained in the previous chapter. Moreover, since there is comparatively little mechanization potential in oil palm cultivation, it is considerably more labor intensive than other major land uses in the Amazon, such as cattle ranching and soy cultivation. Therefore, oil palm also has the potential to generate significantly more employment, thus reducing incentives for rural–urban migration.

Box 3.1: A polarized debate in Brazil

Despite efforts by the SPOPP to reduce socio-environmental risks, critical reports have been published that highlight negative impacts in Brazil. These relate to water and soil contamination, land concentration, dispossession of quilombola communities, rising food insecurity, and substandard labor conditions (Butler and Laurance, 2009; Glass, 2013; Backhouse, 2013). On the other hand, other studies have suggested positive impacts related to smallholder inclusion, employment generation, import substitution, and carbon sequestration - especially when compared to many other cash crops suitable for cultivation in the Amazon biome (Becker, 2010; Langevin, 2011; Homma et al., 2014). The discussion is, however, highly normative, polarized, and insufficiently evidence-based, reflecting the conflicting interests and ideological perspectives of the agribusiness lobby and the agro-ecology school. The latter in Brazil is heavily focused on the need to preserve traditional production systems, reduce dependence on external inputs, and conserve natural resources.

Despite the prospective benefits there are also potentially adverse social and environmental effects. This can be ascribed to the social and environmental sensitivity of the Amazon biome. As described in the previous chapter, the Amazon is a region where commodity expansion has been strongly linked to deforestation and social conflict. Moreover, negative experiences with oil palm elsewhere, in particular in Indonesia and Malaysia, have also been strongly associated with a number of problems, such as deforestation, land concentration, dispossession of marginalized communities, rising food insecurity, and exploitative labor conditions, which is why the federal government produced specific guidelines for sector expansion through the SPOPP. The program restricts oil palm cultivation to previously deforested areas and introduces credit incentives to promote the adoption of business models that are more inclusive of the rural poor and that generate a greater shared value. The specific instruments introduced by the program build and complement the existing robust socio-environmental regulatory context (presented in Chapter 2). The SPOPP was grounded in existing political commitments by the Brazilian government to reduce deforestation and support family farming. The latter includes modernizing smallholder production systems and addressing rural market failures. Finally, the program also aimed to promote socioeconomic development in the northern region, in particular among its poor and marginalized smallholders.

Attracted by the government support, three major players entered the scene with ambitious investment plans: the Brazilian mining giant Vale (Biopalma), the US-based grain company ADM, and a joint venture between Brazilian petroleum company Petrobras and Portuguese petroleum company Galp (Project Belém Bioenergia Brasil, BBB). Investments by these three corporations boosted a sector that until then had comprised only a few small-scale family-based companies and one major player. In just few years, the sector more than doubled in terms of planted area and attracted significant attention from environmentalists, civil society, and research institutions (box 3.1). To what extent the Brazilian governance framework was effectively able to avoid the problems associated with oil palm expansion elsewhere is analyzed in detail in the following chapters. For now, it is important to provide an overview of the palm oil sector in the Brazilian Amazon, specifically in the Amazonian state of Pará, where most oil palm investments are concentrated.

This chapter expands and updates a CIFOR Working Paper published in 2015. Research activities were undertaken between December 2013 and March 2015 under the framework of the CIFOR-led LIFFE Options project. Both quantitative and qualitative data were obtained for this analysis through a range of methods, namely collection of secondary data from relevant government bodies and industry associations on investment trends and dynamics; remote sensing analysis using geographic information system (GIS) software to map oil palm distribution and areas; both open and structured interviews with eight[30] oil palm companies to

30 Although the research sought to capture all nine major oil palm companies, at that time one was unwilling to participate in the research

identify investor characteristics, practices, and strategies; and semi-structured interviews with 147 key informants from academia, civil society organizations, various state and municipal regulatory bodies, and labor and smallholder unions on, for example, value chain dynamics and regulatory challenges.[31] Further updated data were included in 2018. Following this introduction, section 3.2 presents palm oil global trends and debates. Section 3.3 contextualizes the process of oil palm expansion in the Brazilian Amazon, in particular the emergence and content of the SPOPP. Section 3.4 presents the results of the value chain analysis, namely the geographies of oil palm investments, investor backgrounds, the existing business models, the model of smallholder inclusion, and processing and marketing trends. Section 3.5 concludes the chapter.

3.2. GLOBAL PALM OIL TRENDS

3.2.1. A natural oil machine with a bad reputation

In recent years, few crops have been as criticized as oil palm. Its negative environmental and social impacts, particularly in Southeast Asia, have been extensively documented both by NGO campaigns and academic reports (Rival and Levang, 2014). Issues such as deforestation, forest degradation, land conflicts, and biodiversity loss are among the major criticisms of oil palm expansion (Colchester, 2011; Brad et al., 2015; Carlson et al., 2013). In Indonesia, for example, there are reports of 187 oil palm related conflicts (Abram et al., 2017), while between 1990 and 2010, 60% of new plantations were developed within biodiversity and carbon-rich tropical landscapes, including forests and peatlands (Gunarso et al., 2013).

The major problem is that the area suitable for oil palm plantations coincides with forest and biodiversity-rich biomes, and that partly explains oil palm's bad reputation. Oil palm grows best in tropical lowlands that have an average precipitation of 1780–2280 mm and temperatures of 24–30° C. Water deficits and cold temperatures are thus natural biophysical barriers to growing oil palm away from the humid tropics (Barcelos et al., 2015). Moreover, given that many of these territories are occupied by traditional and other forest-dependent groups, struggles and negotiations over access to land, in particular related to business-as-usual large-scale plantation models, often lead to increasing social tensions and conflict (Abram et al., 2017). But if oil palm has such a bad reputation, why does palm oil continue to be the most globally traded oil seed in the world, and why do many countries such as Brazil continue to stimulate its production?

The answer is simple: Oil palm has driven economic growth and contributed to poverty alleviation in several tropical countries (Sayer et al., 2012). As a "natural oil machine," oil palm has the

31 Interviewees included 22 individual farmers, riverside dwellers, and other individuals, four representatives of banks and other financial institutions, 32 community leaders, five representatives of state government, one representative of the federal government, 36 representatives of municipal institutions, 18 researchers, professors, and representatives of NGOs, and 29 workers and farmers unions.

highest productivity (global average of 3.8 t/ha/year, while all the alternatives are well below 1 t/ha/year) and the lowest production cost (e.g., 20% lower than soybean) of all oleaginous crops (Rival and Levang, 2014). Palm oil is also a highly ***fungible*** product that is used to produce biodiesel, food products, industrial chemicals, cosmetics, and pharmaceuticals.[32] Since 2006, these unique features, together with the explosion in global demand for fats, have made palm oil the most globally traded vegetable oil (Sheil et al., 2009; Potter, 2015).

Moreover, the production of oil palm FFBs (fresh fruit bunches) is still hard to mechanize and therefore requires a significant input of labor, on average one worker per 10 ha (Rival and Levang, 2014). Because of this, and also given its relatively basic knowledge and cultural traits requirements, oil palm is perceived to be a smallholder-friendly crop. Prominent examples of smallholder schemes include the Nucleus Estates and Smallholders (NES) schemes (Perkebunan Inti Rakyat; PIR), which were established in the 1980s in Indonesia (Jelsma and Schoneveld, 2016), and FELDA (Federal Land Development Authority) Settlement Schemes in Malaysia since the 1950s (Mamat et al., 2016). In both cases, oil palm was a priority crop to develop rural areas, achieving encouraging effects in terms of socioeconomic development, most notably on income generation (Awang Ali et al., 2011) but also on welfare and nutrition (Euler et al., 2017). Nowadays, in Indonesia for example, around 42% of the total area under oil palm is cultivated by smallholders (Pacheco et al., 2018) and it is estimated that 3 million smallholders are involved in the sector worldwide (Rival and Levang, 2014).

3.2.2. Agronomic characteristics

Oil palm trees produce FFBs, which are harvested and quickly converted into two main commodities by industrial mills: crude palm oil (CPO) and palm kernel oil (PKO). While the former is extracted from the mesocarp (the fleshy part of the fruit), the latter is extracted from the seed. These two products have very different destinations and markets: CPO is used mainly for food and biofuels, while PKO is mainly used for making soaps, detergents, and toiletry products (Basiron, 2007). Since PKO output is around 10% of the total CPO quantity produced, the latter is the main oil palm output. While most of the milling process is industrial, there are places such as Cameroon where artisanal milling, using either semi-automated or manual presses, is a common practice (Nkongho et al., 2014). Besides being commercialized as a commodity, CPO is also further processed into refined products that normally have increased value in global markets.

Because of its comparatively higher bunch to oil ratio, the African oil palm (*Elaeis guineensis*) is the predominant species. The optimal density is 130–150 trees per hectare, with average yields of 3.8 tons of oil per hectare, based on extraction rates of 20–25%. In Brazil, most investors adopt a density of 143 trees per hectare (9 x 9 tree spacing). The most productive varieties can

32 Oil palm also became an alternative to hydrogenated vegetable oils in many industries as a source of trans-fat free, a requirement driven by new food labelling regulations.

produce up to 9–12 tons per hectare, but only under very specific conditions (Barcelos et al., 2015). The second most common species is the American oil palm (*Elaeis oleifera*), which is native to humid territories in Central and South America; however, its oil to bunch ratio is considerably lower than that of the African palm. Its major advantage, however, is its resistance to bud rot (*Amarelecimento fatal*), an alarming disease that has devastated entire plantations in Central and South America. That is why public and private research centers in countries such as Costa Rica, Brazil, and Colombia have been investing in interspecific hybrids of *Elaeis guineensis* and *Elaeis oleifera*. So far, however, hybrid varieties have lower productivity and create an additional cost by requiring manual pollination (Barcelos et al., 2015).

3.2.3. Major producers and governance trends

Two countries - Indonesia and Malaysia - account for nearly 85% of global CPO production (Pacheco et al., 2017a). According to Index Mundi (2018), in terms of area harvested, Indonesia is by far the largest producing country with 11.3 million ha (56%) and Malaysia the second with 5.3 million ha (29%). Indonesia and Malaysia are also the major export countries, together representing 91% of the global output exported. India (24%), the EU (14%), and China (11%) are the main importers palm oil. Colombia is the largest Latin American producer but has only 450,000 ha, nearly 2% in global terms, while Brazil ranks 11th (table 3.1).

Table 3.1: Oil palm area harvested by country, 2018

N	Country	Area (x 1000 ha)	%
1	Indonesia	11,300	56
2	Malaysia	5,300	29
3	Nigeria	2,500	11
4	Thailand	780	3
5	Colombia	450	2
(…)	(…)		
11	Brazil	175	1

Source: Index Mundi (2018a)

Given the controversies associated with oil palm at a global level, a number of governance arrangements have emerged since the early 2000s in an attempt to improve the sustainability of palm oil supply (see section 1.4). In short, initiatives include the Roundtable on Sustainable Palm Oil (RSPO) and its certified sustainable palm oil (CSPO) label, private-sector commitments to zero deforestation from major corporations, producing country certification mechanisms (e.g., in Indonesia and Malaysia), and consuming country initiatives such as the European Union Renewable Energy Directive (EU–RED) and green procurement policies. All these sustainability initiatives interacting at different levels are known as the palm oil governance complex (Pacheco et al., 2018a).

Finally, a relatively new topic on the agenda is the promotion of oil palm under agro-forestry systems. Here, Brazil is the pioneer. Diversified systems can circumvent many of the negative impacts, for example, in terms of carbon sequestration, biodiversity, and food security. However, it is not yet clear if they are feasible and economically viable, in particular for smallholders. In the following sections, these and other aspects related to the dynamics of oil palm in the Brazilian Amazon are detailed. Despite its current production levels, Brazil has tremendous potential for becoming one of the largest global players.

3.3. OIL PALM EXPANSION IN THE BRAZILIAN AMAZON

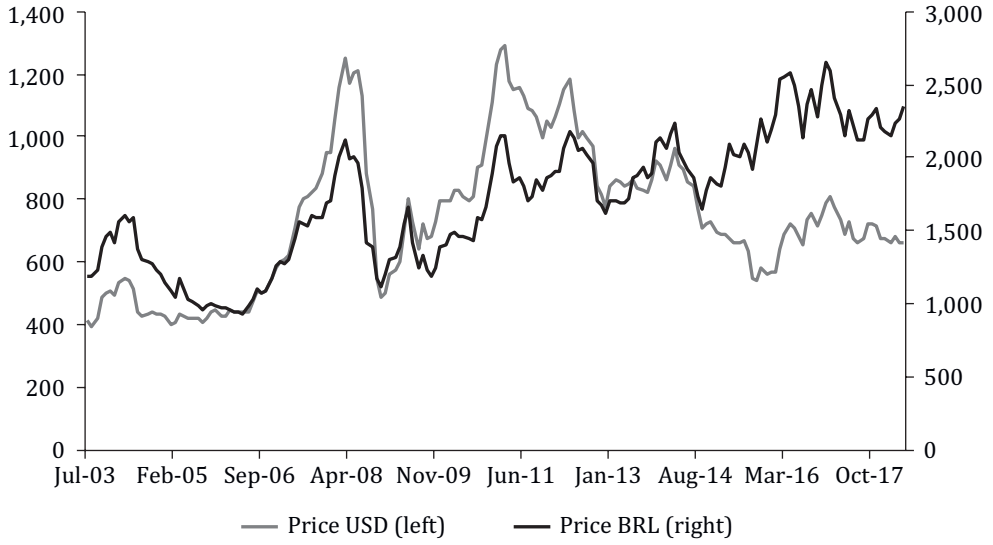
3.3.1. The emergence of oil palm as a promising cash crop

In 1974, a company called Dendê do Pará (Denpasa) began to produce the country's first commercial-scale oil palm on its estate close to Pará's capital city, Belém. This was followed by a number of domestic investments in the 1980s and 1990s, primarily through fiscal incentives offered by the Superintendence of Development in the Amazon (SUDAM) to promote commercial investment in frontier areas. Nonetheless, until the mid-2000s the palm oil sector was relatively insipient in Pará. For example, in 1999 only 63,000 ha had been planted with oil palm by a handful of domestic investors operating through plantation monoculture systems (Venturieri, 2011). This period is considered the first oil palm wave (see more about this in the following chapter).

It was not until the second half of the 2000s, however, that the sector began to draw the interest of large national and international investors such as Archer Daniel Midlands (ADM), Petrobras, and Vale (considered the start of the second oil palm wave described in the next chapter). This was driven largely by economic prospects within the national and international biodiesel market as a result of high international petroleum prices and increased government commitment to incorporating biodiesel into the Brazilian energy mix following the enactment of the 2005 Biodiesel Law. More generally, long-term prospects for the crop also started improving, with CPO prices increasing from around US$ 400 per MT in the early 2000s, to between US$ 800 and US$ 1200 per MT in the late 2000s (figure 3.1 comparing prices in US$ and in BRL (Brazilian real)). While new opportunities within energy markets partly contributed to this increase in global prices, increasing demand for vegetable oil from the emerging Chinese and Indian markets also played an important role during this time.

In 2010, the sector received another boost with the establishment of the SPOPP, inaugurated by former president Lula da Silva in the Pará municipality of Tomé Açu. The program was designed to further complement the 2005 Biofuel Law incentivizing palm oil as an alternative feedstock for biodiesel production, without conflicting with the protection of primary forests while promoting the inclusion of smallholder farmers.

Figure 3.1: Palm oil prices per metric ton between 2003 and 2018



Source: Index Mundi (2018b): Palm oil (Malaysia), c.i.f. N. W. Europe

By forbidding expansion into forestlands and channeling investments to degraded areas, oil palm development was meant to be a strategy to consolidate the intensive margin and reduce deforestation pressure in frontier areas. In other words, by replacing activities such as extensive cattle ranching by more intensive production systems such as oil palm, land rents would increase, which would reduce deforestation pressure from both small and large actors (assuming the Jevons paradox wouldn't occur). Moreover, the restoration of degraded pastures by oil palm systems could improve the provision of environmental services such as carbon sequestration and biodiversity conservation (of course, in comparison to degraded pastures and not primary forests).

3.3.2. SPOPP-specific instruments and roles

In order to attain these objectives, the program introduced six specific instruments (table 3.2), with two deserving special attention. The first is the Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon (ZAE-Palma), a key document identifying available areas deforested before 2008 without conflicting with primary forests, conservations units, and indigenous territories. The second is PRONAF Eco (see below for an explanation on PRONAF) a credit line specifically for smallholder farmers, which together with other regulations and incentives for companies, such as the Social Fuel Stamp (SFS), promotes the inclusion, through contract farming, of smallholder farmers in the sector (Brandão and Schoneveld, 2015).

Table 3.2: SPOPP-specific instruments

Name	Description
Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon (ZAE-Palma)	Developed by Embrapa (the Brazilian Agricultural Research Corporation), it considers agro-ecological suitability and accounts for restricted areas (e.g., primary forests, areas deforested since 2008, indigenous territories, and conservation units). More than 29 million ha in the Amazon were identified as suitable for development; 12 million of these hectares are in Pará. It was approved as Presidential Decree 7172 in 2010.
Draft bill	Draft bill (119) prepared by the federal government and submitted to Congress in 2013. It establishes the SPOPP by, for example, complementing Presidential Decree 7172 forbidding the suppression of primary forests in order to plant oil palm, plantations outside the limits established by ZAE-Palma, among several others. The most controversial issue relates to the possibility to restore legal reserves with oil palm. Since 2015, the bill has been awaiting rapporteur designation at a Senate commission; in 2018, there had been no further developments.
Palm Oil Federal Chamber (POFC)	Created in 2010, the POFC is a consultative body to promote dialogue between government, private sector, and civil society. It includes representatives of federal bodies (ministries of Agriculture, Livestock and Supply (MAPA), Agrarian Development (MDA), Mining and Energy (MME), Environment (MMA), Development, Industry and International Trade (MDIC), Embrapa and Civil House) and representatives of producers, consumers, and workers. By 2017, it had held 25 meetings.
Research & development	US$ 18.75 million[33] over 10–12 years to be allocated to research & development. Priority areas include genetic improvement (in particular related to bud rot),[34] increased seedling production and strengthening of international partnerships, and development of technical assistance capabilities of technical service providers.
PRONAF Eco	Established in 2007, PRONAF Eco is a credit line available for smallholders. Major requirements include a maximum of 10 ha of palm oil, a signed contract endorsed by the smallholder representative organization (FETAGRI, the Pará state Agricultural Workers Federation), a minimum purchasing price, and the obligation for the contracting company to provide inputs at market price and free technical assistance on a monthly basis.
PROPFLORA and PRODUSA	Other credit lines for medium/large holders were revised to include oil palm.

The program also prepared a draft bill establishing the overall regulatory framework of the SPOPP, created a Palm Oil Federal Chamber (POFC), allocated a budget for R&D, and revised credit lines for medium- and large-scale farmers.

33 Amounts have been converted from Brazilian real (BRL) at an exchange rate of BRL 3.2 per US dollar (1 June 2015).

34 See more details on bud rot, also called in Brazil *amarelecimento fatal,* in sections 3.2 and 3.4.1.

In addition to specific instruments, the program builds on, and producers have to comply with, existing social, environmental, and economic regulatory frameworks in Brazil as extensively described in the previous chapter. That includes on the environmental side the Forest Code, Ecological–Economic Zoning (ZEE) plans, the Environmental Crime Law, a georeferenced cadaster system (CAR), commodity agreements,[35] improved coordination of on-the-ground operations and satellite-based monitoring systems, among others. On the social side, the cornerstone of the SPOPP is PRONAF, the National Programme for the Strengthening of Family Farming created in 1996 to provide subsidized credit, insurance, and technical assistance to smallholders. The program was complemented by the SFS, which offers fiscal and market access incentives to biodiesel producers when a minimum percentage of processed feedstock is sourced through smallholders. Finally, on the economic side, investors have for a long time benefited from lower tax rates and more favorable financing conditions through complex legal and financial systems. This includes finance through FNO (North Constitutional Fund) or FDA (Amazon Development Fund) for agricultural or industrial operations; or SUDAM fiscal incentives for implementing industrial operations in the Amazon. At state level, the government of Pará has also created programs to promote economic development, such as Pará Rural and Pará 2030.

The program relies on a number of actors to perform different tasks. In the design stage of the SPOPP, it relied predominantly on state actors, including federal ministries such as the Ministry of Agrarian Development (MDA)[36] and the Ministry of Environment (MMA) to define and align social and environment policies, and Embrapa - the publicly funded agricultural research corporation - to offer technical competences such as the ZAE-Palma design and the PRONAF Eco technical guidelines. However, in the following stages several other actors assumed relevance: companies and smallholder unions, mostly in the implementation phase, and NGOs and public prosecutor's offices (Agrarian and Labor) together with federal and state governments in the monitoring and enforcement stage. The following table (3.3) summarizes the roles and responsibilities of different actors with respect to the SPOPP implementation, as formally envisioned.

The effectiveness of the program in achieving its goals and its interactions with external factors such as the overall governance system is the main discussion in Chapter 7. For now, the remaining sections in this chapter introduce the specific dynamics of the value chain in the Brazilian Amazon.

35 Including the Soy Moratoria (2006) and the Cattle Agreement (2009). There were also attempts to establish an oil palm agreement in 2014, but negotiations between the Agrarian Public Prosecutor's Office and private sector representatives stalled. In response, the private sector signed a socio-environmental protocol gathering state bodies such as SAGRI, PMV, and EMATER, but without a major involvement of civil society organizations.

36 Under the Lula da Silva administration, the MDA assumed greater political relevance since it represents the interests of the electoral support base of Lula's Workers' Party. Smallholder unions organized under the National Confederation of Agricultural Workers (CONTAG) had strong links with MDA and were able to shape the conditions and rules under which smallholder would participate in the program. MDA has also benefited from Agropalma's learning curve with smallholder inclusion to incorporate it into the federal program.

Table 3.3: Actors and their respective roles and responsibilities

Actors	Environmental	Social	Economic
Federal government	Stipulates the overarching regulatory framework. Monitors and enforces environmental compliance	Subsidizes credit; stipulates PRONAF Eco and SFS specific requirements; monitors compliance through MDA	Subsidizes companies through the SFS, SUDAM and BNDES (Brazilian National Development Bank). Adopts import tariffs. Invests in R&D.
State government	Developed specific rules for the Rural Environmental License (LAR). Monitors and enforces environmental compliance through state systems.	Public extension companies may issue DAPs (Declaration of Aptitude to PRONAF) through Rural Extension and Technical Assistance Company (EMATER)	Invests in infrastructure such as state roads, ports, and bridges, and forms of other support through Pará Rural and Pará 2030
Municipal governments	Municipal governments with recognized capacity (exception) address LAR in properties up to 2000 ha	Invest in social infrastructure such as health centers and schools	Invest in municipal infrastructure such as roads and bridges
Oil palm companies	None	Buying guarantee at minimum price for 25 years; offer free technical assistance and inputs at market price	Implement smallholder schemes, own plantations, and build mills
Smallholder unions	None	Negotiate and sign contracts with firms; some organizations issue DAPs (municipal unions).	None
NGOs	Monitor environmental compliance	Monitor contract compliance and other smallholder-related issues such as tenure conflicts	None
Public prosecutor's office	Monitor and enforce environmental compliance	Monitor tenure conflicts and labor rights and enforce.	None

3.4. OIL PALM VALUE CHAIN TRENDS

3.4.1 The geographies of oil palm investments

Pará has become the largest palm oil producing state in Brazil. Our estimates, which are based on data collected from the Brazilian Association of Palm Oil Producers (Abrapalma) and directly from the major oil palm companies, suggest that at least 207,252 ha of oil palm was under cultivation in 2016 (table 3.4). Remote sensing analysis conducted by (Benami et al., 2018) indicates a figure of at least 218,917 ha, not including smallholders. These figures are significantly higher than official statistics, in particular those of the IBGE (Brazilian Statistical Agency), which indicated a figure of 99,402 ha for 2016. This highlights the limited accuracy of official data sources. The difference between remote sensing data and data obtained through the

Abrapalma and the oil palm companies could be explained by the existence of producers that operate independently and are not formally tied into company supply chains, and also by the inclusion in remote sensing data of abandoned and old plantations with no commercial value because they have been affected by bud rot.

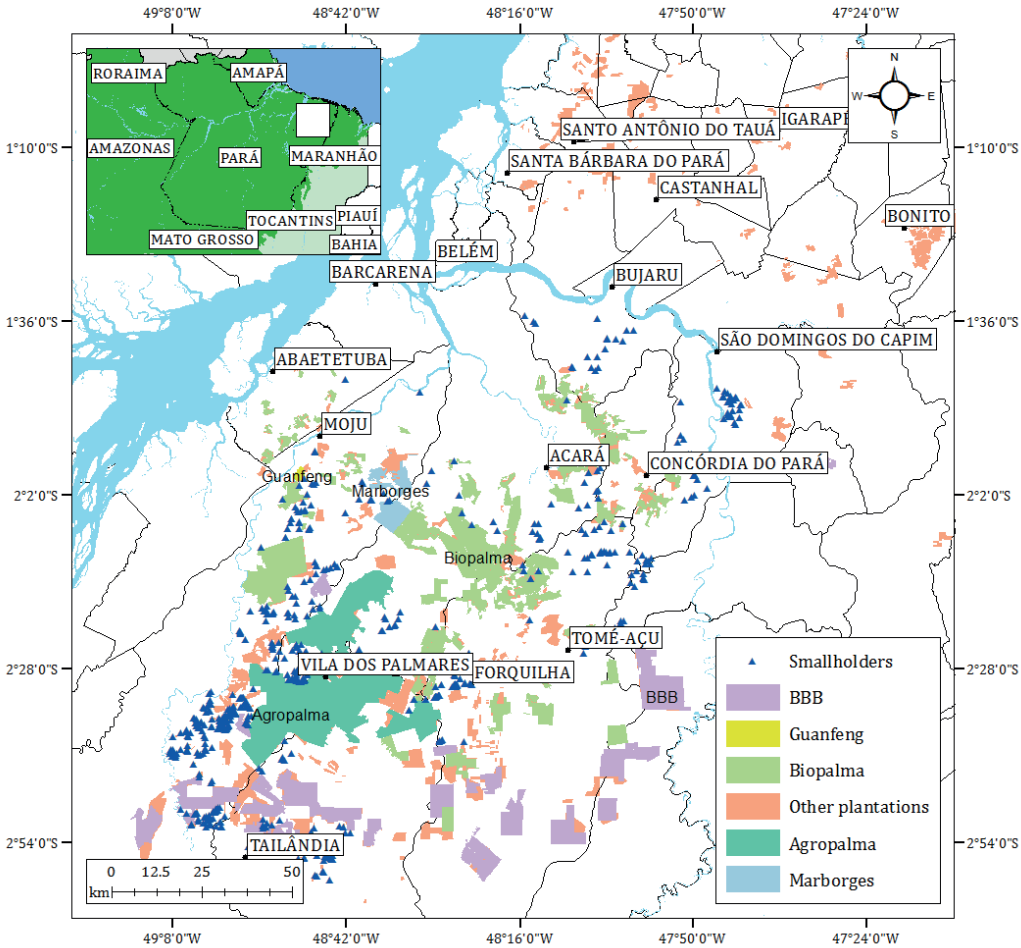
Table 3.4: Total area of oil palm planted per year

Year	Area (in ha)
1985	28,160
1989	43,997
1995	52,058
1999	63,174
2004	80,430
2008	95,293
2011	117,689
2016*	207,252–218,917*

Source: Venturieri (2011) and * Benami et al., (2018), Abrapalma (2017)

Expansion in Pará has taken place predominantly in northeastern Pará and the Metropolitan Region of Belém across 36 municipalities (figure 3.2 and table 3.5 for geographic distribution). Expansions in the 1970s primarily took place in the municipality of Santa Bárbara, near Pará's capital Belém, through a 5000 ha plantation by Denpasa. Expansions in the 1980s and 1990s were close to the Denpasa plantations and in municipalities south of Belém, such as Mojú, Tailândia, Acará, and Tomé-Açu because of SUDAM fiscal incentives. The new incentives offered under the new biodiesel law in 2005 - in particular those through the SFS - initiated a third wave of oil palm investments in Pará, focused largely on the municipalities south of Belém like Tailândia, Mojú, Tomé Açu, Acará, Concórdia do Pará, São Domingos do Capim, and Mãe do Rio. In contrast to earlier investments, this wave was led by large national and international corporations, such as Brazilian mining giant Vale (Biopalma), US-based grain company Archer Daniel Midlands (ADM), and a joint venture between Brazilian petroleum company Petrobras and Portuguese petroleum company Galp (Project Belém Bioenergia Brasil, BBB).

Figure 3.2: Distribution of oil palm plantations in Pará



Source: Representation of own data, IBGE cartographic base, SIMLAM (2016); Geographic Coordinate System: WGS 1984

Historical expansion patterns reveal a high concentration of oil palm expansion around Pará's largest urban center, Belém, and major coastal ports. Moreover, since oil palm estates require a comparatively large labor force, especially in comparison to soy and ranching, proximity to large urban areas is critical. Additionally, the road system is more developed in the area, which improves the accessibility of the large labor force to company plantations and ensures the timely delivery of FFB to processing facilities. Most investors require delivery of fresh fruit bunches FFB within 24 hours of harvesting to prevent FFB bruising, which increases free fatty acid (FFA) content; high FFA content lowers the quality of the extracted CPO. As a result, most investors concentrate their cultivation activities within 50 km of their mills.

Table 3.5: Estimated area (in ha) planted with oil palm in major producing municipalities in 2016[37]

Municipality	Plantations	Smallholders	Company
Abaetetuba	2,640	10	Biopalma
Acará	34,461	725	Agropalma, Biopalma, Marborges
Aurora do Pará	1,308	60	Biopalma
Baião	0	40	BBB
Benevides	80	0	Outgrowers
Bonito	13,018	0	Mejer-Yossan
Bujaru	1,640	110	Biopalma
Capanema	1,149	0	Mejer-Yossan
Capitão Poço	2,829	36	ADM
Castanhal	2,989	0	Dentauá
Concórdia do Pará	6,419	2,070	Biopalma, Dentauá
Garrafão do Norte	1,135	710	Marborges
Igarapé-Açu	5,269	30	Palmasa
Inhangapi	172	0	Unclear
Ipixuna do Pará	6,256	0	Unclear
Irituia	845	591	ADM
Mãe do Rio	0	25	ADM
Marapanim	5	0	Unclear
Mocajuba	0	80	BBB
Moju	38,693	5,206	Agropalma, BBB, Biopalma, Guanfeng, Marborges
Nova Timboteua	346	0	Unclear
Ourém	157	0	Unclear
Peixe-Boi	379	0	Mejer-Yossan
Santa Bárbara do Pará	751	0	Denpasa
Santa Isabel do Pará	924	0	Denpasa, Dentauá
Santa Luzia do Pará	1,202	0	Mejer-Yossan
Santa Maria do Pará	426	0	Unclear
Santo Antônio do Tauá	4,736	0	Dentaua
São Caetano de Odivelas	99	0	Dentauá
São Domingos do Capim	3,833	0	ADM
São Francisco do Pará	977	1,389	Outgrowers
São Miguel do Guamá	469	0	Unclear
Tailândia	45,143	250	Agropalma, BBB
Tomé-Açu	40,093	1,450	BBB, Biopalma
Tracuateua	34	0	Dentauá
Vigia	440	0	Dentauá
Total	**218,917**	**12,782**	

Source: Data on smallholder areas by municipality were obtained from Banco da Amazonia (2015) and updated with data from Benami et al., (2018)

37 Smallholder areas planted with oil palm could not be mapped using remote sensing analysis since plots smaller than 10 ha do not exhibit the same spectral signatures as larger plantations.

3.4.2. Investors' background

Three-quarters of the area under oil palm in Pará can be attributed to Agropalma, Biopalma, and BBB (table 3.6). Agropalma is a wholly owned subsidiary of the Alfa Group, a conglomerate owned by Brazilian billionaire Aloysio de Andrade Faria with business interests also in the banking, construction, communications, and hospitality sectors. Agropalma began its operations when it acquired oil palm company Companhia Real Agroindustrial in 1989 and now consists of 12 oil palm plantations and a separate refining division under the name Companhia Refinadora da Amazônia, which also includes a margarine and fats factory (figure 3.3 for an investment timeline).

Table 3.6: Oil palm total planted area per company in 2016 (including associated outgrowers)

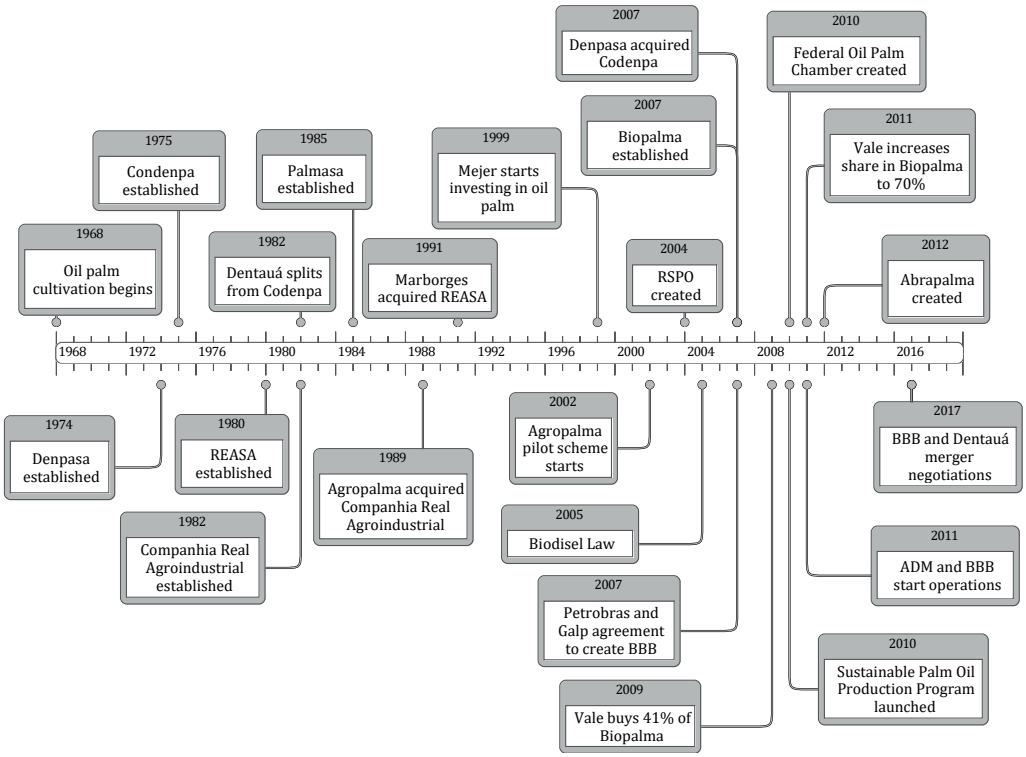
Company	Total area of influence (in ha)	%	Year of first planting
ADM	7550	4%	2012
Agropalma	50,111	24%	1982
BBB	41,422	20%	2010
Biopalma	63,315	31%	2007
Denpasa	4667	2%	1974
Dentauá	7944	4%	1980
Marborges	8935	4%	1981
Mejer	15,595	8%	1994
Palmasa	6480	3%	1985
Others	1234	1%	
Total	207,252		

Source: Abrapalma (2017)

In anticipation of a biodiesel boom, Biopalma was established in 2007 by three former Agropalma employees through the newly formed MSP Group led by Paulo Brito with ambitious plans to develop the infrastructure for a large oil palm operation that it could then sell on. It managed to sell a 41% stake to Vale in 2009, which increased its stake to 70% in 2011 and few years later to 98%. Vale largely intended to use the company as a supplier of biodiesel for the transportation operations of its mining companies. However, when petroleum prices plummeted in 2014 and Vale began experiencing a loss in profits as a result of low ore prices, it began to explore opportunities to divest from Biopalma.

Project BBB arose from bilateral negotiations between Brazil and Portugal in 2007 to secure biodiesel feedstocks for the Portuguese market within the context of a well-established partnership framework between Portugal's largest oil company, Galp, and Brazilian state-owned Petrobras.

Figure 3.3: Oil palm investment timeline



Source: Representation of own data

Although the project also aggressively established a large oil palm operation, like Biopalma, the future of BBB appears insecure, with Petrobras currently embroiled in a high-profile corruption scandal and experiencing heavy losses. Petrobras initially launched two projects: Project Pará - to produce biodiesel for the northern Brazilian market - and BBB, in collaboration with Galp, to export palm oil to Portugal. The planned total investment for both projects was US$ 276 million, which would involve 2,250 smallholders, plant 74,000 ha, and generate 7000 direct jobs. Due to implementation difficulties and changes in the leadership of the company, in June 2011 Petrobras abandoned Project Pará and significantly changed its approach to BBB, frustrating local stakeholders, investors, and farmers who had been planning investments based on the expectations created by the project's arrival. Twenty-three farmers that had already planted for Project Pará in the municipalities of Cametá, Baião, and Mocajuba were transferred to BBB. In 2014, the BBB project received a US$ 180 million loan from SUDAM.

The most recent entrant, ADM, which also had ambitious expansion plans, has taken a more cautious approach. Although ADM has long been actively involved throughout the Brazilian soy value chain and operates a number of oil palm refineries in Europe, this is the company's first

foray as a majority stakeholder into direct oil palm cultivation. Having commenced soy-based biodiesel production in Brazil in 2007, its initial reason to expand into oil palm cultivation was to diversify and to secure the SFS. However, operational and logistical difficulties associated with the construction of its mill in combination with Brazilian economic slowdown led ADM to cease expansion activities in late 2013.

The other five oil palm companies are smaller, typically private-owned, enterprises engaged in palm oil production since the 1980s and 1990s. Palmasa and Dentauá, although established as corporate entities, have strong cooperative characteristics. They were initially established by groups of former Japanese pepper farmers that transitioned out of pepper as a result of crop disease in the 1970s. Denpasa, the first oil palm company in Pará, arose out of a partnership between SUDAM and the French–Brazilian Oil Crop Research Institute (IRHO) to explore the commercial potential of oil palm in the Amazon. In 1974, Denpasa was formally established when the ownership was transferred to a consortium of private investors. Although Denpasa is now controlled by family-owned OMB Group, previous partners included Dutch plantation company HVA International, the Dutch Development Bank (FMO), and the International Financial Corporation (IFC). In 2007, Denpasa merged with another Japanese cooperative, Codenpa. Mejer-Yossan is part of the Kabacznik Group owned by two Polish rabbis who migrated to Brazil in the 1970s. Starting out as a soap-making operation, the diversification into palm oil production was largely to secure a sufficient supply of oils for their soap factory. Privately owned Marborges was established in 1991 through the acquisition of the bankrupt Reflorestamento Amazônia (REASA Group), which had been planting oil palm since the early 1980s, also benefiting from SUDAM fiscal incentives.

A number of private individuals also operate on a more industrial scale, though most are technically considered to be outgrowers, typically of Agropalma. One exception is the Guanfeng Group, a China-based seed development company, which independently cultivates 906 ha of oil palm. Another Asian company, Malaysian government-owned FELDA Global Ventures Holding - the world's third largest oil palm company by planted hectarage–explored options to invest in the Amazon, but the investment was officially cancelled in 2010. Although a tripartite cooperation agreement was signed between FELDA, the Malaysian government, and the state government of Pará in March 2014, Pará authorities were reluctant to divulge information about the content of the agreement and FELDA plans. The agreement relates to the release of hybrid oil palm seeds developed in Pará by Embrapa. Producers have, however, called on the state government to rescind any agreement involving seed transfer.

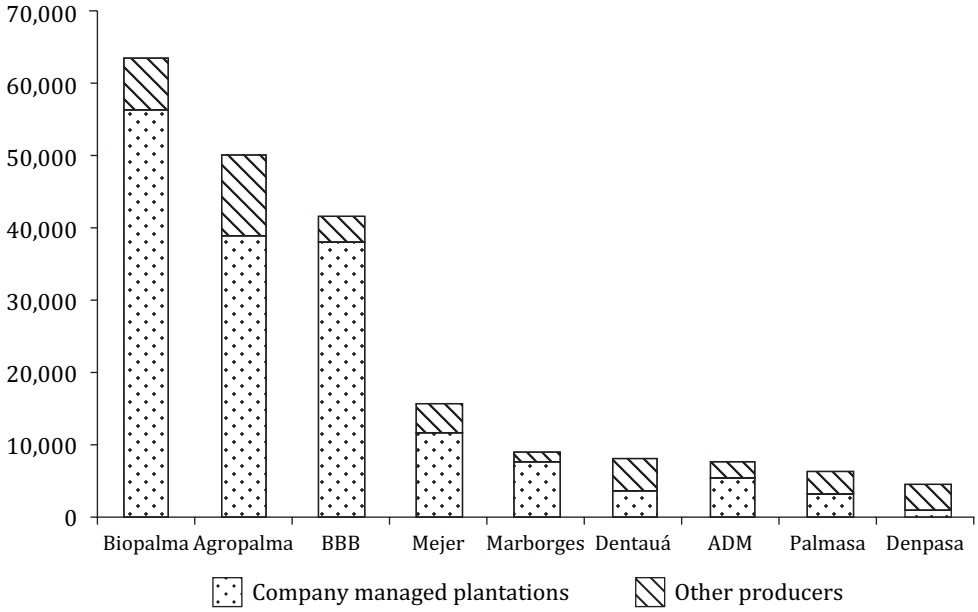
3.4.3. Business models and cultivation

In the three decades between the start of the expansion in the 1970s and the beginning of the 2000s, the sector adopted two major business models: A more cooperative-oriented model that developed into companies with small areas of own production and considerable

numbers of small- and medium-scale outgrowers, most of them Japanese, that expanded in the already populated north bank of the Guamá river; and a second group of companies operating exclusively through large-scale plantations that benefited from fiscal incentives to invest in the Amazon and acquired land in the frontier regions on the south bank of the Guamá, such as Mojú and Tailândia (Brandão and Schoneveld, 2015). A significant portion of this expansion was into forestland, reflecting the irrelevance of environmental standards in the past.

However, in 2010 various incentives prompted new entrants and some of the older companies to include smallholders in their operations through contract farming. This followed the famous Agropalma's smallholder pilot project in 2002, which was replicated in 2004, 2005, and 2006, that engaged 192 farmers (César and Batalha, 2013). Nowadays, most companies operate through nucleus–outgrower arrangements (figure 3.4). This involves a combination of plantations that are company managed and owned, and third-party sourcing through exclusive off-take contracts. In total, third parties account for 40,093 ha (19.3%) of the area controlled by the nine major companies. In the case of the three companies that operate through Japanese cooperatives (Denpasa, Dentauá, and Palmasa), third parties account for the majority or a large proportion of total controlled hectarage, while in the case of the four larger conglomerates this ranges from 8.9% in the case of BBB to 37.3% in the case of ADM.

Figure 3.4: Area under production, by type of production arrangement



Source: Abrapalma (2017)

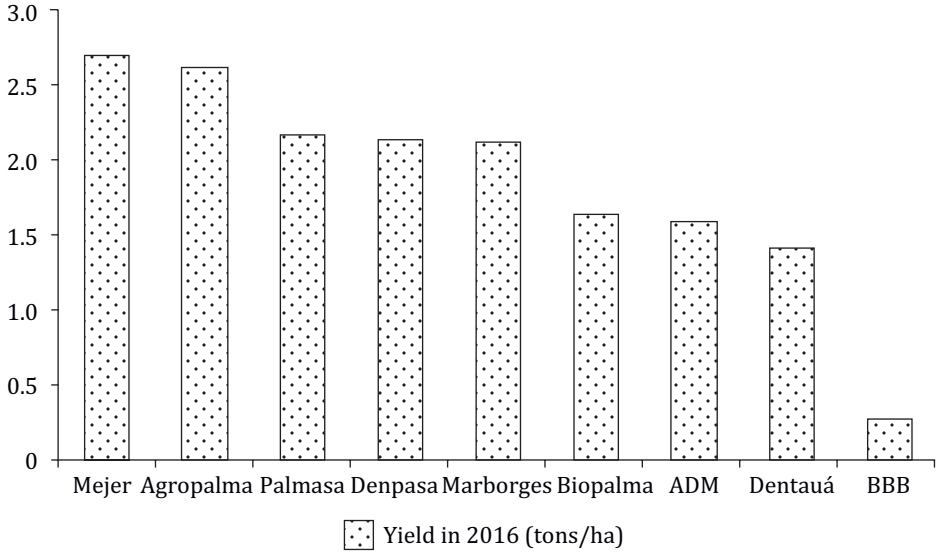
The nine oil palm companies and their outgrowers all cultivate African oil palm (*Elaeis guineensis*) due to the comparatively low productivity of the indigenous Caiaué (*Elaeis oleifera*)

variety. African oil palm can potentially reach yields of up to 9-12 MT of crude palm oil per cultivated hectare, while Caiaué on average yields 2 MT per ha, both under monocrop systems with a standard density of 143 oil palms per hectare. However, the African oil palm is more susceptible to bud rot, a disease that is characterized by leaf yellowing and in Brazil is a major agronomic challenge (Boari, 2010). Bud rot was first detected in 1974 on the Denpasa plantations. Although the impact was then limited, the number of affected palm trees grew from 465 in 1984 to 32,673 in 1987. This wiped out most of Denpasa's plantations and also a nearby cooperative, Codenpa. It was not until 2010 that Embrapa formally launched an interspecific hybrid cultivar of African oil palm and Caiaué, BRS Manicoré, which demonstrate higher resistance to bud rot. It had been testing the hybrid since 1991 on Denpasa plantations and since 2001 on Codenpa plantations. Yields, however, failed to meet expectations until 2007, when Denpasa began trialing assisted pollination experiments on Codenpa plantations. While successfully improving yields, on average assisted pollination increases total production costs by approximately 15% compared to unimproved varieties, negatively affecting adoption rates. Biopalma has the largest area under cultivation with interspecific hybrids, having planted 15,972 ha with BRS Manicoré. Another interspecific hybrid cultivar was developed by Marborges, registered in 2014 as Marborges Inducoari. Marborges has currently planted approximately 770 ha with interspecific hybrids.

With many of the northern plantations affected by bud rot, few companies have been obtaining profitable yields. Agropalma, which is located in an area where bud rot is less prevalent, used to be the most productive investor, obtaining yields of 4.39 MT of CPO and PKO per ha in 2014 (Brandão and Schoneveld, 2015). Yet, in 2015 and 2016 water shortfalls were particularly serious in some regions, resulting in overall low yields (figure 3.5). Moreover, since most companies in the sector have planted large areas over the last five years, low yields by large investors such as ADM, BBB, and Biopalma are largely attributable to immature plantations. Typically, oil palms only start producing harvestable FFB after three years, with maximum yields in Pará not expected until the trees are between seven and ten years of age. Therefore, recent market entrants are yet to realize maximum obtainable yields and harvesting only commenced on some of their plantations in early 2015.

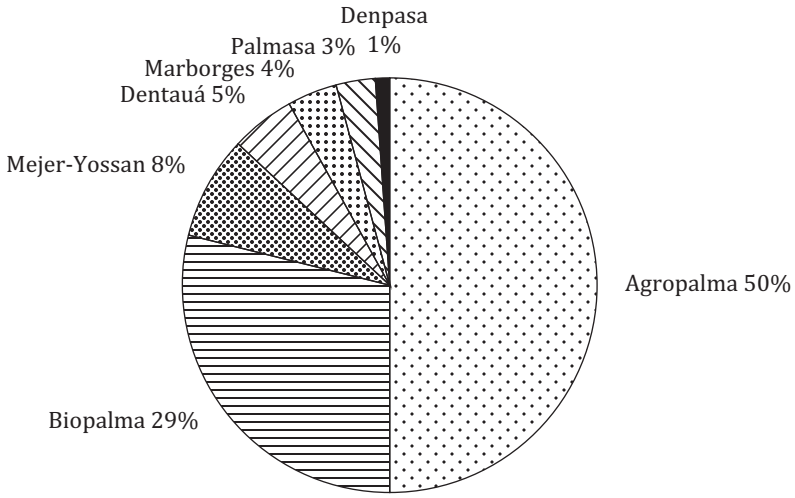
In 2014, Agropalma was responsible for 49.6% of total CPO and PKO produced in Pará (figure 3.6). In total, an estimated 445,950.7 MT of CPO and PKO were produced in Pará in 2014. This is equivalent to 95.4% of official reported Brazilian national CPO and PKO production (FAO, 2014). Once the immature plantations of particularly Biopalma, BBB, and ADM start becoming productive, and if they succeed in obtaining yields in line with those of Agropalma, based on current areas planted, it is estimated that by 2020, the state of Pará could produce almost 800,000 MT of CPO and PKO per year.

Figure 3.5: Average yield in 2016



Source: Abrapalma (2017)

Figure 3.6: Output by company in 2014, as a proportion of total[38]



Source: Abrapalma (2017)

38 Agropalma data are based on production between July 2013 and June 2014.

In Pará, both companies and smallholders use monocrop systems to grow oil palms. According to company managers, this model is the most productive as it facilitates mechanization, enables the adoption of optimum tree density, eases disease monitoring, and prevents the spread of disease. This reduces per hectare production costs. However, the monocrop model has been criticized for its environmental impact, particularly regarding biodiversity and the heavy use of synthetic fertilizers and pesticides, such as Roundup. Moreover, monocrop models have also been criticized for their impacts on smallholder livelihoods, particularly in terms of reducing agricultural diversity and food security. In 2007, Natura[39] - in partnership with Tomé Açu Agricultural Cooperative (CAMTA) - implemented a pioneering project in Tomé Açu, namely an oil palm diversified farming system. The aim was to test the economic and agronomic viability, and to assess some environmental indicators, such as carbon sequestration, on three plots of medium-scale farmers (Andrade and Miccolis, 2010). A few years later, the project was extended to test the incorporation of smallholder farmers with 15 new plots designed according to and implemented under participatory principles.[40] Despite initial doubts, companies have started looking into diversification as a possible alternative and new field experiments at firm level have been carried out, according to some company managers.

3.4.4. Outgrowers and model for smallholder inclusion

While outgrower schemes are typically perceived to be smallholder-oriented, in the Pará oil palm sector, not all outgrower arrangements exclusively involve smallholders or "family farmers" (figure 3.7), such as in the case of Agropalma, Denpasa, Dentauá, Mejer, and Palmasa.[41] For example, data obtained from the companies show that outgrowers that can be formally classified as family farmers account for only 6.85% of the total area and 35.2% of the area cultivated by outgrowers. This ranges from as low as 0.5% in the case of Palmasa to as high as 95.0% in the case of Biopalma and 100% in the case of ADM. By the end of 2016, the sector engaged 1,508 family farmers, on average cultivating 9.4 ha per farmer, and 181 non-family farmers, cultivating an average of 140.1 ha per farmer. The largest outgrowers are integrated into the Agropalma supply chain (49), with six outgrowers cultivating in excess of 500 ha, including one landowner with 2039 ha. Some of these larger outgrowers are Japanese and have more entrepreneurial and commercial characteristics, and some even negotiate collective labor agreements with local worker unions. In the case of Palmasa, Dentauá, and Denpasa, its outgrowers are primarily former members of Japanese cooperatives, which have historically had a more commercial orientation. Although these three companies consider their external suppliers to be outgrowers, in practice few of their outgrowers work through off-take contracts, relying instead on the social capital arising from a shared cultural heritage.

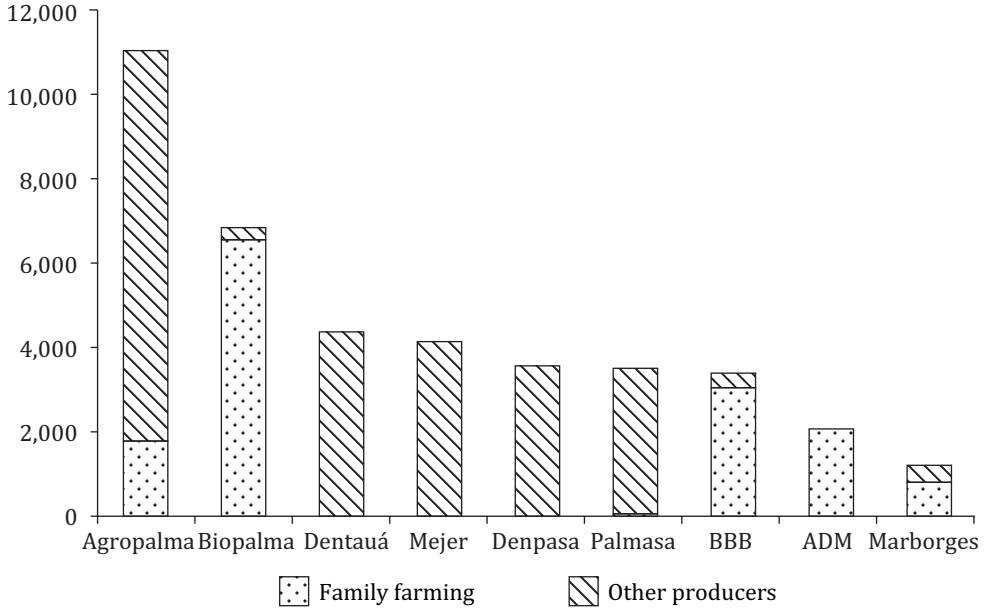
39 Natura is a major Brazilian cosmetics company and a leading player in terms of the sustainability of supply.

40 The new phase was led by ICRAF.

41 Although in the case of Denpasa, Dentauá, and Palmasa other outgrowers can be technically considered smallholders since many fulfill the criteria set out by the Family Farming Law of owning less than four fiscal modes, using predominantly family labor, and having most income generated through agricultural activities. However, since they did not benefit from smallholder credit schemes, we consider them to be other producers for this purpose.

ADM, BBB, and Biopalma made large new investments with the intention of integrating smallholders into their production process. By the end of 2016, they had collectively contracted 1235 smallholders, equivalent to 81.9% of all oil palm smallholders in Pará. Although all three companies expressed the desire to further increase the number of smallholders, the pace of integration has been slower than planned. Biopalma had the most ambitious plans, with plans to engage more than 2000 smallholders. By late 2016, it had contracted 657 families. While ADM's and BBB's initial plan was to contract 600 and 1000 smallholders, respectively, by the end of 2015, BBB had only contracted 310 and ADM only 267 smallholders.[42]

Figure 3.7: Type of outgrowers, by total area



Source: Abrapalma (2017)

In light of ADM's, BBB's, and Biopalma's internal problems and/or operational difficulties, in the short term no further expansion is anticipated from them. The three companies struggled to find sufficient numbers of suitable smallholders interested in and/or capable of planting oil palm. This can be attributed to inherent smallholder distrust of private enterprise and the high perceived risk of indebtedness and devoting a large proportion of their farmland to a perennial crop with which they have no agronomic experience. Foremost, as was also the case in Agropalma's first projects, many farmers fear that companies will use the long-term supply agreements to seize smallholders' farmland. In the case of BBB and Biopalma, some of their contracted smallholders are located close to Agropalma's plantations and smallholders, and the

42 In the case of ADM, after a socioeconomic assessment, it was understood that there are not enough suitable smallholders within a determined radius to have an economically viable operation.

long presence of oil palm and mostly high regard for Agropalma as a company has served to alleviate these concerns. With more modest and pragmatic expansion plans, Marborges engaged 78 smallholders. Of these smallholders, 72 are located in Garrafão do Norte, a municipality where Marborges has its own plantations and plans to commission a new mill. The company selected this area due to the low prevalence of bud rot.

Formal attempts to include smallholders in the palm oil sector date back to 2000, when oil palm investors signed a "compromise agreement" with local smallholder unions. In 2002, the state government, the Municipality of Moju, Agropalma, the State Land Agency of Pará (ITERPA), and Banco da Amazônia signed a technical cooperation agreement to pilot a smallholder program in Moju municipality. In this pilot program, the following agreement was made: (1) Agropalma would make a non-refundable contribution of 40% to smallholder land preparation, conduct topographical surveys, ensure property delimitation, provide seedlings and fertilizers, and purchase all FFB at a guaranteed minimum price; (2) the state government would provide technical support and oversee smallholder environmental management; (3) Banco da Amazônia would provide loans for other startup costs and make a payment of one month's minimum wage every 2 months for the first 3 years; and (4) ITERPA would donate land to the smallholders and regularize it in projects I–III.

In 2002, 50 families around the community of Arauaí were included; they were followed in 2004 by 50 families in Soledade, in 2005 by 50 families in Arauaí, and in 2006 by 35 families in Calmaria II, an INCRA settlement. Another 13 families joined the scheme in 2012. In total, 192 families with 1746 ha were involved in the pilot project. Projects I–III involved the establishment of contiguous plantations with families residing in other areas, while in project IV each producer was responsible for cultivating oil palm on their individual plots of land. Agropalma claims that productivity is higher in areas where families live nearby, as is the case in project IV.

As part of the technical cooperation agreement, ITERPA donated three farm blocks of approximately 500 ha to each of the first three projects. In some cases, farmers who had been living there for some time but did not have a title (*posseiros*), were resettled on nearby plots in exchange for permanent titles and participation in the project. Since projects I–III were established before 2008 - in a period when environmental legislation was less strictly observed - the farm blocks allocated by ITERPA comprised some amount of forestland.

The success of this pilot project caught the attention of the federal government and, following a visit by former president Lula da Silva in 2005, led to the creation in 2010 of the SPOPP. This program is embedded within PRONAF and is intended to deepen and strengthen the Biodiesel Production and Use Program (PNPB), notably the SFS. The SPOPP model does though differ from the 2002 technical cooperation agreement in a number of critical ways. For example, while the early Agropalma pilot scheme involved a large grant component from Agropalma, the newer schemes operate on a full cost recovery basis. This implies that all costs related to land

preparation and inputs are borne by the smallholder. In the case of new schemes, smallholders receive a standard loan of US$ 25,600 for a 10-ha plot, while Agropalma smallholders were only required to take out loans of between US$ 4800 and US$ 7040 for a similarly sized plot. These loans are paid out in yearly tranches after a six-year grace period.

Additionally, the initial Agropalma scheme was developed under the assumption that the state government, through EMATER (Rural Extension and Technical Assistance Company), would contribute technical support. However, with the government failing to deliver in this respect, Agropalma took over all technical responsibilities at its own expense. Therefore, within the SPOPP, the government no longer plays any explicit role beyond its traditional mandates, with technical support now undertaken directly by the companies.

The Agropalma scheme also experienced some early challenges with the loan repayment structure. When the scheme was first conceived, smallholders were required to repay the bank directly, which, like many other PRONAF schemes, led to high default rates. Thus, the bank created a mechanism through which 25% of FFB payments would be transferred by Agropalma directly to the outgrower's own savings account, from which the bank would be repaid at the end of each year. Another 25% is deducted for the costs of inputs and transportation, with any difference between deducted and actual costs settled annually. Payment of loan tranches also became conditional on the adoption of good management practices, with the technical supervisor assigned to the outgrowers required to sign a loan payment release form stating that the outgrower has satisfactorily managed his/her plantation. These practices have now been incorporated into the design of the SPOPP.

In order to streamline communications between the company and its outgrowers, following the Agropalma business model, outgrowers are encouraged to form community-level growers associations and elect a representative to act as a liaison. Depending on the scope of the issue, conflicts and concerns are typically addressed at one of, or across, the three levels. Under Agropalma project I, II, and III, the land titles for the farm blocks allocated by ITERPA are in the name of the association. Although individual outgrowers are responsible for the management of their own plots, under this configuration they are technically not allowed to sell their plots. In the case of plantation mismanagement, Agropalma has the right, as a last resort, to terminate individual contracts and reallocate land through the associations to new outgrowers. It does not have this leverage over the smallholders of Project IV, where individuals own planted lands.

This consolidation of smallholder plots has generated economies of scale for both Agropalma and its outgrowers by reducing transportation and transaction costs and enabling more efficient delivery of technical support. It has also facilitated the certification of smallholder production under the RSPO by increasing the viability of initiatives to support smallholders in conforming to national laws and RSPO principles and criteria. This includes, for example, initiatives

related to integrated pest management, worker health and safety (e.g., by constructing on-farm emergency showers and washing facilities), and formalization of employment. The last-mentioned has been a longstanding issue with smallholders, who are accustomed to hiring informally as a result of stringent Brazilian labor laws. In 2014, Agropalma sought to overcome these challenges by supporting the formation of a smallholder consortium specifically tasked with formally hiring plantation workers for smallholder plots. This is a corporate entity managed by elected representatives of Project I, II, and III. Through the consortium, individual outgrowers are able to hire workers contracted to the consortium for specific tasks. Since this arrangement requires close coordination and is only feasible within concentrated areas of oil palm, such initiatives were not introduced in Project IV (e.g., due to the comparatively large distances between smallholder farms). Although the smallholder consortium plays a positive role in formalizing labor relations and responds to RSPO requirements, it may generate perverse incentives by further facilitating absenteeism and, thus, rural outmigration (that also existed before the establishment of the consortium), as has already been the case amongst some Agropalma smallholders. On the other hand, the need to create corporate smallholder entities with managerial capacity to adequately oversee smallholder operational issues, could provide the basis for upscaling rural entrepreneurialism and enable greater smallholder autonomy.

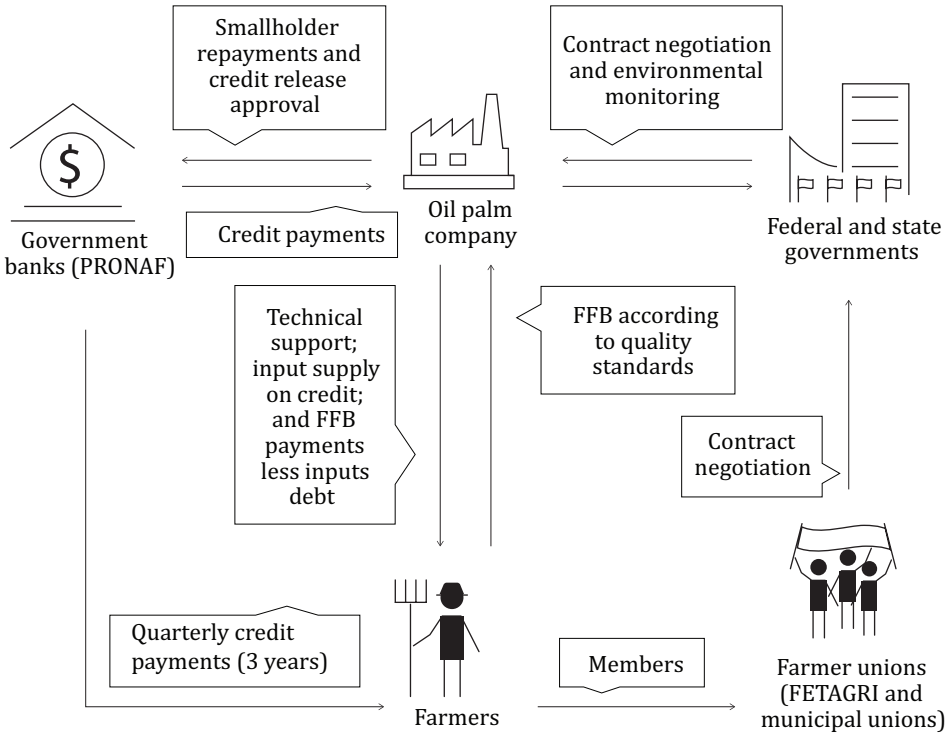
The recent schemes follow the structures of Project IV, where oil palm is integrated within outgrowers' own properties. Although block farms reduce transaction costs and enable economies of scale, this model was not adopted by the SPOPP. Within the context of current environmental legislation and with most degraded lands being privately owned, insufficient large contiguous areas of land are currently available to accommodate investors' smallholder expansion plans. Moreover, based on the Agropalma experience, farmers tend to adopt better agronomic practices and achieve higher yields when they live close to their plots.

Following the contracts used by Agropalma, outgrowers are currently contracted to a company for a period of 25 years - the productive age of oil palm - and are paid a minimum of 10% of the Rotterdam price of CPO for their FFBs. Outgrowers in some cases are eligible for bonuses of up to 8%, determined on the basis of FFB quality and outgrower adherence to the agronomic practice guidelines and management schedules provided by the company. In practice, payments typically range from 10% to 16% of the Rotterdam CPO price. ADM pays its smallholders 10% of the Rotterdam CPO price for collected FFBs, BBB 10%, Biopalma 14.25%, and Palmasa 15%. Over the course of 2014, Agropalma paid their smallholders between 12.3% and 15.34% plus 10% of the RSPO premium received by Agropalma over its CPO.

Companies provide the outgrowers with a harvesting schedule and strategically place containers to enable the efficient collection of FFB; in the case of Agropalma, collections take place every fortnight, with payments for the FFBs collected made every month. Figure 3.8 depicts the SPOPP smallholder outgrower scheme in Pará. There are some variations between

companies; for example, only Agropalma has established an association consortium, while ADM, Biopalma, and BBB are still at an early stage of establishing associations of smallholders. The transportation and weighing systems also differ between companies, with ADM assuming the transportation costs throughout the 25-year contract period, while most other companies assuming them only during the first few years. Moreover, Biopalma has put in place a system of individual weighing, which provides the real weight at the time of collection, while other companies operate a system of counting the number of FFBs and calculating total weight using an average value per bunch. This sometimes creates tensions amongst smallholders when the real weight is significantly different than their own estimates.

Figure 3.8: Oil palm outgrower schemes in Brazil



3.4.5. Processing

All companies except ADM and BBB have their own palm oil extraction facilities. By late 2016, the seven companies with operational extraction facilities had a processing capacity ranging from 30 MT of FFBs per hour for Denpasa to 270 MT per hour for Biopalma (table 3.7). Biopalma was working to expand its processing capacity to 560 MT per hour; however, by 2017 this investment had been stopped. BBB planned to construct three mills, which by 2025 were expected to have a total installed capacity of 405 MT per hour; however, due to its operational

problems and the abandonment of Project Pará, its processing strategy changed and there is only record of one extraction facility planned for Tailândia.

Although ADM planned to have the construction of its own extraction facility completed by 2016, the company faced difficulties in the municipality of São Domingos do Capim and decided to relocate its offices and extraction facilities to the neighboring municipality of Mãe do Rio. ADM continues to plan for the construction of a 40 MT per hour mill; however, under the current crisis the investment is frozen. There are no plans for a biodiesel plant, but the economic returns of a refinery are being studied. Without their own processing facilities, ADM and BBB are selling their harvests to other companies. Consequently, due to high transportation costs and comparatively low margins on the sale of FFBs, neither company is currently making a profit. By 2015, Pará's total FFB processing capacity was 731 MT per hour, which is expected to increase should all facilities planned for construction in fact become operational.

Table 3.7: Processing capacity by company

Company	Number of extraction plants (2016)	Extraction capacity (in MT of FFBs per hour) (2016)	Number of refineries	Refining capacity (ton/day)
ADM	0	0	0	0
Agropalma	6	260	2	770
BBB	0	0	0	0
Biopalma	2	270	0	0
Denpasa	1	30	0	0
Dentauá	2	36	1	100
Marborges	1	40	1	150
Mejer	1	60	2	300
Palmasa	1	35	0	0
Total	**14**	**731**	**6**	**1320**

Source: Abrapalma (2017) and own data

Four companies - Agropalma, Dentauá, Marborges, and Mejer-Yossan - currently further process their crude palm oil into refined products, with Agropalma having a refining capacity of 770 MT of CPO per day. The refining process involves fractionation, degumming, bleaching, and deodorizing in order to separate liquid and solid fractions and remove impurities. The liquid fractions (palm olein) are typically used as cooking oils and the solid fraction (palm stearin) for the production of candles, soaps, and margarine. From its refining activities, Agropalma produces a range of specialty fats, including its own home cooking brand, Dentauá cooking oils, and Mejer-Yossan soaps. Agropalma also produces a range of certified organic palm oil products, which originate from a dedicated 4100-ha plantation and are processed exclusively by one of its six extraction facilities.

Only Agropalma has the capacity to esterify (a chemical process to produce biodiesel), which between 2005 and 2010 produced biodiesel from *ácidos graxos* (fatty acids), a by-product of the refining process. As a result of unfavorable market conditions within the biodiesel sector, since 2010 Agropalma has only been producing methyl esters for the chemical industry. In 2014, BBB and Biopalma pursued a collaboration agreement to develop a biodiesel refinery in the state, but both of their parent companies started reexamining their corporate direction due to internal difficulties and negotiations stalled. Although incentives offered to the biodiesel sector and favorable market prospects in the late 2000s largely motivated the establishment of these new projects, with low international and national petro-diesel prices, in recent years the energy sector has become an insufficiently attractive end-market for oil palm. At present, oil palm cannot compete with soy due to the latter's comparatively low cost of production and well-developed market and logistics networks (Padula et al., 2012).

Despite this, should the BBB production activities reach maturity, BBB still plans to export the vast majority of its output to Portugal for further processing into biodiesel at the facilities of its partner, Galp. Since the BBB project principally serves to address Portuguese energy security and is a product of bilateral agreements, it does not operate under the same market principles as most of the other companies. This also applies to Vale, which intended to use palm oil for its mining operations. Nevertheless, with both Petrobras and Vale looking to divest their investments, the situation is likely to change.

3.4.6. Marketing and certification

In 2014, Agropalma was the only company to serve the export market. According to the company (Agropalma, 2015), approximately 50% of total output is typically exported - 90% of which to the European Union, where, due to its certification under the RSPO scheme, it is typically able to obtain a premium of approximately 30 US$ per MT, though this may vary according to the product and the market. Internationally, Agropalma's largest customers are consumer goods manufacturers and refiners, such as Wilmar and Ferrero, and, domestically, cosmetics company Natura and consumer goods manufacturers Unilever and Yoki (owned by General Mills).

Companies such as Denpasa, Palmasa, and Dentauá used to exclusively sell to the Brazilian vegetable oil company Triângulo Alimentos in São Paulo. However, with Triângulo Alimentos in 2013 beginning to face financial difficulties and failing to fulfill payment obligations, companies had to start looking for new costumers. According to the affected companies, this has had significant implications for the profitability of their operations. Dentauá, for example, now sells its vegetable oil to more than 400 customers, significantly increasing transaction costs. With Dentauá and Palmasa claiming that local prices for CPO are insufficiently profitable, they are currently seeking to capture premiums through refining. Palmasa is now also in the process of constructing a new refining facility and Denpasa is exploring options for the same. These companies exclusively target the domestic market, since they are unable to compete with

Southeast Asia-based competitors due to comparatively high production and transportation costs. Many companies ascribe the comparatively high transportation costs to the lack of return loads on freight exchanges between Europe and the Pará ports. Only Agropalma, by virtue of its RSPO certification and high-quality palm oil, is currently able to target overseas markets. Recognizing this, many oil palm companies have begun to examine their options for RSPO certification. With CPO prices in recent years exceeding the prices set through government-regulated biodiesel auctions, none of the producers in Pará are servicing the energy end-market anymore.

3.5. CONCLUSION

The analysis presented in this chapter introduced the SPOPP and the value chain dynamics of the palm oil sector in Pará. In sum, a total of nine companies operate in the state, most of them through nucleus–outgrower arrangements, which involve a combination of plantations that are company managed and owned, and third-party sourcing through contracts with smallholders and/or medium- to large-scale farmers. Companies have different structures, sizes, and strategies. Some, such as Denpasa, have been operating since the 1970s and developed from a cooperative of Japanese farmers, while BBB and Biopalma, for instance, started operations in 2007 and 2011, respectively, and have developed large-scale plantations either on recently acquired land or via leasing agreements with local landowners.

The sector now includes 1508 family farmers and 181 non-family farmers. The model for smallholder inclusion is based on Agropalma's pilot experience and learning curve, and was defined through the SPOPP with clear rules. In terms of processing and marketing, the sector is still at an early stage of development. Due to high production costs, most companies operate in the domestic market; only one is able to compete in the high standard global market. For that reason, the role of transnational initiatives such as RSPO and corporate zero deforestation commitments has been very limited in Brazil. Moreover, besides the official discourse and public policies to incentivize and diversify biodiesel sources, this market is not attractive to for oil palm companies.

Despite the initial optimism, the ambitious plans of its major players, and over-optimistic expansion projections, the sector has stagnated since 2014/15. High production costs, implementation difficulties, reduced political commitment, and general macro-economic slowdown have led major companies to scale back or divest themselves of their operations. Since this period, only residual expansion has taken place. The future of the sector will depend on the ability to overcome those difficulties. The following chapter explains how these difficulties were experienced in the region of Tomé Açu, and how local actors have managed to adjust to the challenging context.

CHAPTER 4

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

4.1. 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-centered 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 socio-environmental impacts and landscape transformations emerging from these processes. These include deforestation (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 the 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 the 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 were consolidated, such as the granting of 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, 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 socio-environmental impacts (Silva et al., 2008). It was in this context that the Sustainable Palm Oil Production Program (SPOPP) was designed.

In this paper, we analyze 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[43] change. The dichotomy between agribusiness and family farming conceals 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,

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

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 the one hand, and win–win arrangements (Nepstad et al., 2014) on the other, overlook their interplay and the 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 the design and the 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 multipurpose program to address rural development, sustainability, and social inclusion in the Brazilian Amazon region. Under the influence of the commodity boom, a vibrant economy, and a strong political discourse of social inclusion and green energy (César et al., 2013), the program was built on three pillars, namely economic, social, and environmental pillars, such as avoiding deforestation, restoring degraded lands, and promoting the inclusion of smallholders.[44] The oil palm program relied on a combination of general conservation, and 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 previous regional development programs, which 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 is unique in targeting all dimensions simultaneously. In addition, the program differs from other market-based green initiatives as production and commercialization are subsidized and mediated by the national government.

Despite the green and social narrative of rural development and sustainability, policy innovations such as the SPOPP, which rely on synergisms across different programs, are often

44 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.

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 creates 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 changes in narratives, perceptions, interactions, and institutional configuration, and respective responses from key actors in two periods (2008–14 and 2015–17), 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. This is followed by a discussion on the socio-environmental implications of the oil palm expansion program, as well as its challenges and opportunities in fulfilling its various goals.

4.2. 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 dataset 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[45] where migrant workers are highly concentrated. Ninety contract farmers were selected in three communities,[46] according to information provided by companies, community associations, and municipal smallholder unions.

45 Forquilha (Tomé-Açu) and Palmares (Tailândia).

46 Thirty farmers per community—Calmaria II and Arauaí on the border between Moju and Tailândia, and Forquilha in Tomé-Açu.

Quantitative data were complemented by open interviews with key informants at different points in time between 2011 and 2017. The informants were 29 individual farmers, 27 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, seven policymakers and five representatives of banks. Additionally four 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.[47]

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 perceptions provided by relevant stakeholders between 2011 and 2017.

4.3. STUDY AREA

Palm oil production in Brazil is dominated by the state of Pará, which has nearly 88% of the 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 the late 1960s and the mid-1980s, and more recently triggered by the SPOPP. This program addressed two major issues that had emerged in previous development projects in the Brazilian Amazon: The need to reconcile 1) economic, social, and environmental goals, and 2) global, national, and local agendas.

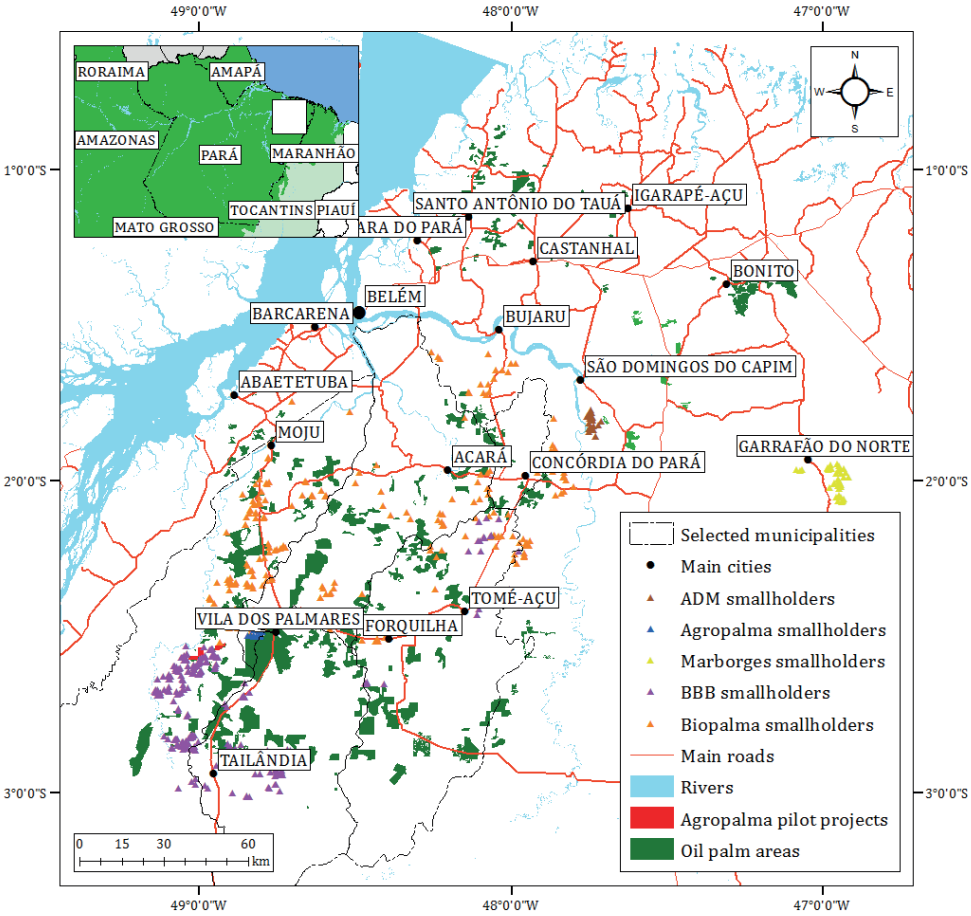
This paper focuses on the Tomé-Açu microregion of the state of Pará, which comprises five municipalities: Tomé-Açu, Moju, Tailândia, Acará and Concórdia do Pará (figure 4.1). The region is where most oil palm expansion has taken place, encompassing 75% of the state's planted area (207,000 ha) (Abrapalma, 2017). A few companies operate there 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

47 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.

heterogeneous demographic groups, including 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,[48] and middle-scale farmers descendant of Japanese migrants. The last-mentioned group arrived in the region in the early 20th 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.[49] This prompted the development of agroforestry systems in the area (see (Yamada and Gholz, 2002) for details of this production system).

Figure 4.1: Map of oil palm expansion in Pará (2017)



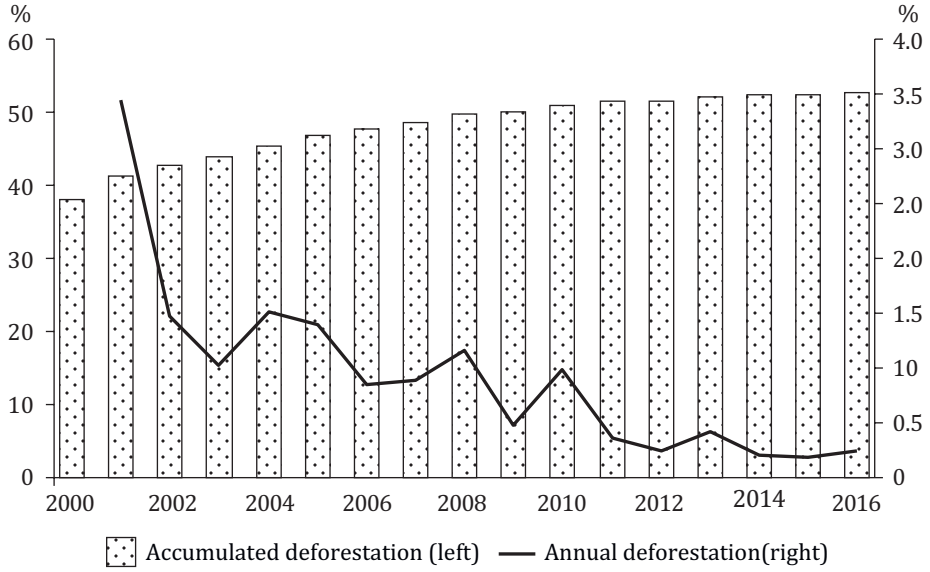
Source: Representation of own data, IBGE cartographic base, SIMLAM (2016); Geographic Coordinate System: WGS 1984

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

49 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).

The region has undergone major deforestation and forest degradation primarily associated with the expansion of cattle ranchers and logging, and to a lesser extent with smallholders (Batistella et al., 2013). In 1977, the construction of the PA150 road across 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, the deforestation rate has dropped significantly since 2004, and especially since 2010 as shown in figure 4.2.[50]

Figure 4.2: Deforestation trends in Tomé-Açu microregion



Source: PRODES (INPE, 2019)

The timber sector has also undergone a boom and bust cycle. In 2008, Tailândia was targeted by a crack-down surveillance operation,[51] which led to the shutting down of illegal charcoal and timber industries. The impact on the local economy led to major social unrest and high unemployment rates.

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

51 The "Arc of Fire" was an unprecedented major federal operation launched in 2008 to combat illegal logging in critical municipalities identified from satellite images. Tailândia was the first municipality to be targeted by the operation in early February 2008. The operation lasted 40 days and involved more than 1000 military, civil, and federal police agents, and resulted in more than US$ 7m in fines, the confiscation of illegal logs, and the dismantling of 14 sawmills, 25 charcoal companies, and 1175 charcoal ovens, which resulted in the unemployment of between 11,000 and 12,000 people.

Enhanced environmental monitoring in the region increased the demand for alternative activities to fill this economic gap. In this context, the expansion of oil palm has become a promising alternative 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 the historical background to the new wave of expansion.

4.4. FIRST OIL PALM WAVE (1960S–EARLY 2000S)

Oil palm plantations in the Amazon were first established near 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 the Tomé-Açu microregion (Homma, 2016). Plantations close to Belém were initially established by groups of Japanese migrant farmers, organized in cooperatives that transitioned out of black pepper monocrops after losing their crops to a pest outbreak in the 1970s, and 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 by private companies with support from state-centered governance grounded on fiscal incentives offered by SUDAM. As in 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)[52] 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 on 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 the plantations of Denpasa and the nearby cooperative, Codenpa.[53]

52 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 the death of several farmers and a city counselor. The situation calmed down in 1990, after a newly created oil palm company, Marborges, acquired the bankrupt 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.

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

Table 4.1: Total area of oil palm planted in Pará per year

Year	Area (in ha)
1985	28,160
1989	43,997
1995	52,058
1999	63,174
2004	80,430
2008	95,293
2011	117,689
2016*	207,252*

Source: Venturieri (2011) and *Abrapalma (2017)

Local factors such as bud rot, territorial conflicts, and the dominance of other economic activities kept the pace of oil palm expansion in the region slow between 1980s and 1990s (table 4.1). 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 in that period (Pacheco, 2012; Rodrigues et al., 2009). National development policies combined with global market demand supported the 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 descendant middle-scale farmers who were mostly engaged in the agroforestry business (Piekielek, 2010). As a result, oil palm remained an incipient sector characterized by small to medium-sized domestic companies operating 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, driven by regulations concerning the use of trans fats in foodstuffs (Downs et al., 2013). Combined with its efficient per-hectare yields, this 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 to 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's rule, a new participatory governance mode emerged, in which policies promoting access to new markets (e.g., governmental procurement programs such as

PAA and PNAE)[54] and sustainable land-use activities (e.g., delinking credit from deforestation, and supporting agroforestry and agro-ecology) were combined with ambitious programs for commodity expansion.

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

4.5. SECOND OIL PALM WAVE (SINCE THE MID-2000S)

The second wave of oil palm cultivation was grounded in the 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, R&D, and regulatory provisions for blending (Andrade and Miccolis, 2010). The Biodiesel Law, ratified in 2005, specified national blending mandates for biodiesel[55] and established a social certification scheme (Social Fuel Stamp - SFS),[56] 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 the 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 the 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). Socio-environmental goals were particularly relevant due to the history of negative impacts of oil palm expansion elsewhere, such as land

54 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.

55 Blending percentage has increased over time, from 2% by 2008, to 5% by 2013, and 7% in 2014

56 Since 2014, the minimum percentage of oil seed production by smallholders has been set at 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 have more favorable financing conditions at the Brazilian National Development Bank (BNDES).

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 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[57] Eco—which, together with tax exemptions and more favorable conditions in biodiesel auctions offered by the SFS, established the framework to incentivize the integration of smallholder farmers (Andrade and Miccolis, 2011). Participation in the 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 a similar project in Malaysia, 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), which is in charge of family farming policies and assumed greater political relevance in the design phase of the program.

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

The new wave of expansion took place largely in the Tomé-Açu microregion and surrounding areas (figure 4.1). By 2016, the sector had engaged nine major companies, 1508 smallholder families and 181 middle-scale producers (table 4.2). Despite efforts to include smallholders, the sector remains essentially dominated by company-managed plantations (80%); smallholders account for less than 7% of the cultivated area. This process was marked by two distinct moments: Euphoria and criticism in the initial stage, followed by disenchantment and adjustment at a later stage.

57 PRONAF is the National Program for the Strengthening of Family Farming—a low interest credit program that became one of the cornerstones of family farming policies in Brazil.

Table 4.2: Total area of oil palm per company and business model in 2016

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	63,315	56,487	Purchase	2007	6543	657	285	2
Agropalma	50,111	39,042	Purchase	1982	1746	192	9323	49
BBB	41,422	38,021	Leasing	2010	3055	310	346	1
Mejer	15,595	11,450	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**

Source: Abrapalma (2017) and own data

4.5.1. 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[58] and direct purchase (table 4.2). 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, the sale price was fixed at around US$ 60[59] 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 and 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 purchased landholdings not only from

58 Partnerships based on profit sharing schemes took place only outside the research area (São Domingos do Capim) between ADM and medium to large holders. This arrangement was used by foreign companies, which were could not purchase or lease land in Brazil due to legal restrictions.

59 Converted from Brazilian real (BRL) at an exchange rate of BRL 3.2 per US$ 1 (1 June 2015).

medium and large owners, but also from smallholders 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 a report (Macedo and Sousa, 2015) estimates that 37% of the company's area in Concórdia do Pará was formerly owned by smallholders. Although land concentration through the acquisition of small plots is not new in the region, the pace and extent to which it took place during this new wave increased land prices, triggered agrarian reconfiguration, changed demographic patterns, and caused uncertainty among local communities, particularly untitled communities.

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 African descendant rural populations, which grants permanent collective use concession. For example, a few communities located between Concórdia and Bujaru (figure 4.3) requested their *quilombola* territorial rights with the help 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.

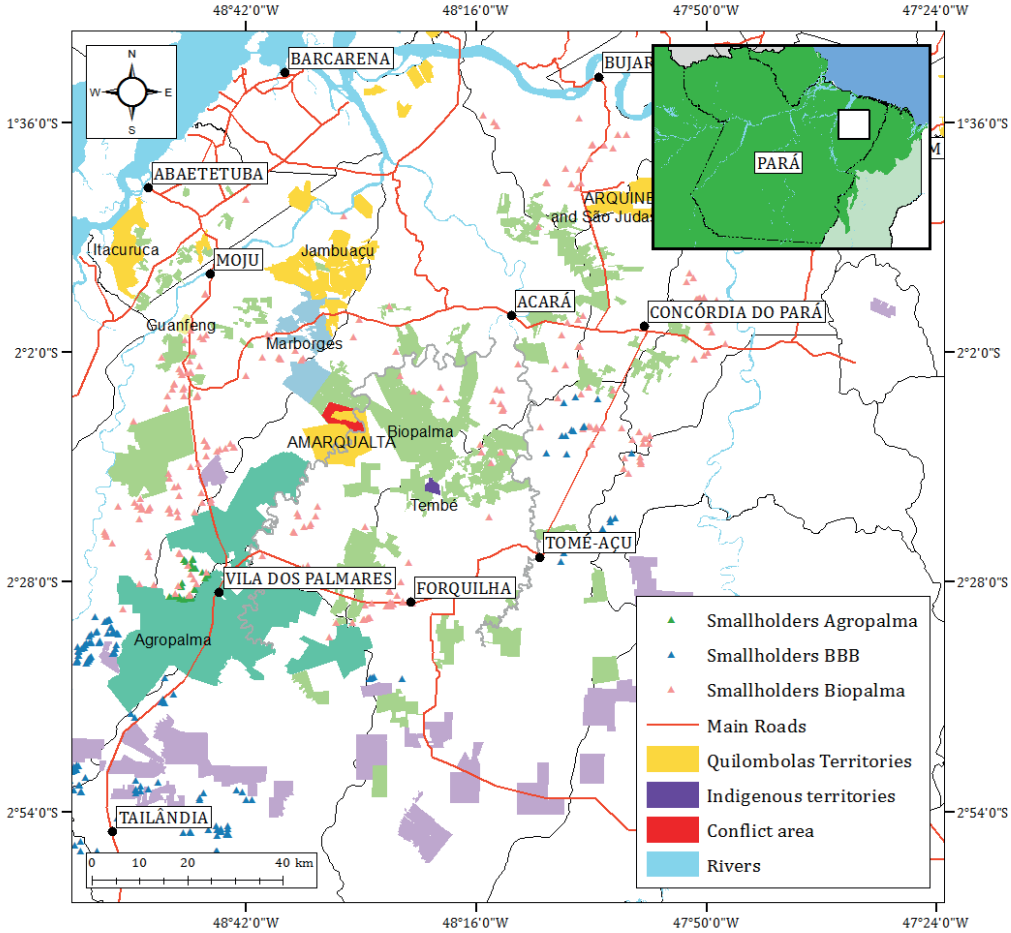
Upon being granted their collective territorial rights in 2009, the *quilombola* movement approved a collective statement that forbids the purchase of land from smallholders in neighboring regions and rejects Biopalma's smallholder contract farming scheme within their territories. Informants from governmental organizations explained that this social mobilization also further pressured the federal government to halt land acquisitions in other regions.[60]

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 other communities in the region. The company, however, claimed to be the victim of acts of retaliation, such as the destruction of equipment by the indigenous group. Although water contamination cannot be conclusively linked to oil palm cultivation,[61] this case highlights some tensions between companies and local communities.

60 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 the death of a local leader allegedly related to the land deal. In 2009, the local population of 1800 residents distributed over 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 to 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.

61 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.

Figure 4.3: Oil Palm landholdings: area of influence and surrounding communities



Source: Representation of own data, IBGE cartographic base, SIMLAM (2016); Geographic Coordinate System: WGS 1984

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 relatively similar land (45–50 ha) and family (4–5 persons) sizes across three regions. In contrast, socioeconomic strategies, political organization, and household head origins are more variable (table 4.3).

Table 4.3: 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 smallholder union	37%	38%	43%
Owning livestock	23%	21%	17%

Source: own data

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 blacklisted as a credit defaulter, a minimum area available for oil palm cultivation, and a minimum annual income to prove the ability to manage credit sums (see Chapter 5). Companies added a few criteria for economic viability (distance, logistics) and to ensure productive diversification (land and labor force to grow other crops). 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., the 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 their 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.[62] These expectations were partly shaped by the successful discourse built around Agropalma pilot cases and the frequent references to incomes of more than US$ 1000 per month after the initial years. As one of its contract farmers said:

> 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 on 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 afterward and if the price drops you can't adjust.

These and other testimonies show how farmers were confronted with mixed information regarding the benefits of and the threats posed by this activity, which was unfamiliar to many of them. That was partly reflected in the contrasting discourses of smallholder unions (STTRs in Portuguese) in different municipalities, which were more inclined to favor oil palm as an economic alternative to overcome the recent crises in the timber and charcoal sectors in Moju and Tailândia,[63] and more critical views of loss of autonomy over 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, to Tomé-Açu, some municipal unions and 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 1980s and 1990s, were still present in their memories, as numerous 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

62 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.

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

owner of one major hotel in Tomé-Açu said: "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 in 2014 hired nearly 13,000 rural workers (table 4.4).

Table 4.4: Employment generated in 2014

Company	Plantation jobs	Industrial	Administrative	Direct jobs
Agropalma	4194	724	36	4954
Biopalma	3880	510	137	4527
BBB	2200	0	150	2350
Marborges	875	170	75	1120
Total	11,149	1404	398	12,951

Source: own data

According to the Social Observatory Institute (Instituto Observatório Social, 2013), approximately 40% (i.e., 5000 people) were migrant rural workers.[64] Rural villages near 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 from Northeast Pará (e.g., Castanhal, Bragança, Irituia, and Igarapé Açu). Initially promoted by companies and intermediates (*gatos*), the influx was further maintained by the workers' networks, including relatives and friends who migrated with them to the same village and even the same company. Half of them brought their wives along, but only 7% of women were able to find a formal job.[65]

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 the available official statistics, which do not capture temporary mobility. In the rural village of Palmares, for example, while the local rural workers union estimated a population increase from 9000 in 2010 to 12,000 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 the

64 This number excludes family members of workers.

65 With the exception of fruit foraging, which is a typical female task, work in oil palm fields is mainly male-oriented. Between 2011 and 2015, for example, women made up only 10–13% of Agropalma's labor force.

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 provided by the municipal education secretary, nearly 30 schools were closed in remote rural areas between 2009 and 2015 due to a 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 (Instituto Observatório Social, 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. In addition to fixed monthly salaries and several work benefits, workers were eligible for productivity bonuses, which could double the base wage. As one of the union representatives explained:

> In 2015, we negotiated a monthly wage of 252 US dollars, which is above the national minimum wage. In addition to that, we have free transportation, *hora in itinere* [paid commute time], plus productivity bonus, for a maximum of 44 hours per week. In total, in the high season we are talking about between 1000 and 1250 US dollars, while in the low season income drops to between 400 and 600 US dollars.

In short, euphoria driven by increasing global palm oil prices and demands for an improved sustainable image among companies and the national government, matched local demands for economic alternatives to fill the gap left by policies aimed 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 the 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 with 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 following section.

4.5.2. Between disenchantment and adjustment (2015–17)

Despite the early optimism and the existing framework to promote investments, absolute oil palm expansion rates have been somewhat lower than 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 4.2). 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 (table 4.5).

Table 4.5: Plans announced by investors and hectarage achieved by 2016

	Company managed plantations			Smallholders total area (ha)		
Company	**Original plans (ha)**	**Achieved (ha)**	**% Achieved**	**Original plans (ha)**	**Achieved (ha)**	**% Achieved**
Petrobras/PBIO[66]	24,000	0	0%	12,500	0	0%
Petrobras/Galp/BBB	50,000	38,367	77%	10,000	3055	31%
Vale/Biopalma	60,000	56,772	95%	20,000	6543	33%
ADM[67]	6000	5500	92%	6000	2050	34%
Total	140,000	100,639	72%	48,500	11,648	24%

Source: Abrapalma (2017) and own data

Several elements influenced the underperformance. At the global level, palm oil prices dropped from an average real value of US$ 1014 per metric ton in 2011, to a minimum of US$ 638 in 2015 (World Bank, 2017), which was considered below production cost in Brazil (Brandão and Schoneveld, 2015). At the national level, the economic growth in 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 economies and national politics further limited the capacity of biodiesel policies to become a viable market for palm oil producers. No significant amount of palm diesel had been produced since the launch of the SPOPP. Finally, according to interviewed company managers, environmental factors impacted palm oil production in 2015 and 2016, with severe water shortages causing losses of 20–40% of total palm oil production.

The new context caused the euphoric narrative from investors and policymakers in the previous phase, to shift to disenchantment and concern. The new federal government quickly dismantled the progressive social and environmental agenda by changing institutions, policies, and programs. The MDA, which was in charge of the social inclusion component of the SPOPP, was relegated to a lower administrative level. As a result, its budget, operational capacity,

66 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.

67 Outside the researched area.

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 created by Biopalma and BBB. As highlighted by bank managers and company representatives, high levels of credit blacklisting (resulting from overdue debts related to previous PRONAF projects) turned into a major barrier preventing smallholders from applying for the PRONAF Eco credit line. In addition, 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:

> We were afraid to start to plant oil palm on our land... And we were afraid because we listened to other folks: If you plant oil palm 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 their eligibility such as bypassing their requirements and pressuring governmental agencies and banks to simplify the bureaucratic process. Despite these 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 of delivery of technical assistance and inputs, and collection of the fresh fruit bunches (FFBs). 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 its investments to a minimum.

With regards to rural workers, according to the National Association of Palm Oil Producers (Abrapalma), the number of direct jobs among their affiliates (eight companies) 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 inflow of migrants became an outflow in this period, which significantly reduced the urban population pressure. Disenchantment with labor security 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 in and disinvestment by the private sector were not the only adverse outcomes of the new context. The period 2015–17 was crucial for the social performance of the SPOPP, since the bulk of outgrowers' projects were progressing toward 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 the delivery of input and technical assistance by the companies, prevented smallholders from paying off their debts. As some ongoing research has found, smallholders have had differentiated results, ranging from very successful to virtual abandonment (Brandão et al., 2018). As one contract farmer mentioned:

> Twenty-five 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. Of the six contract farmers in this region, two are producing and four 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 the 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 dialogue with oil palm contract farmers. This institutional gap has been filled in some areas by the recently created oil palm associations; 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 exacerbated by the lack of capacity of smallholders to be represented in the federal and state chambers, which are now the main forums 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 the 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, 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 to develop alternatives to monocrop systems, and pilot activities with smallholder

farmers are starting to emerge.[68] 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.

It was also crucial to assess the environmental performance of the SPOPP in the period 2015–17. A recent study identified low and declining deforestation rates associated with oil palm in Pará (Benami et al., 2018). Between 2006 and 2014, oil palm mostly replaced pasture lands (91%), while the direct conversion of primary forests declined from 4% before the SPOPP (2006–10) to less than 1% since the SPOPP (2010–14). According to interviewed environmental experts, these results are partly a product of existing robust environmental frameworks, along with local civil society and global pressure to delink deforestation from commodity production.

In sum, the main outcomes of the new scenario are the withdrawal of the national 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.

4.6. 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 sustainable regional 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 later stage.

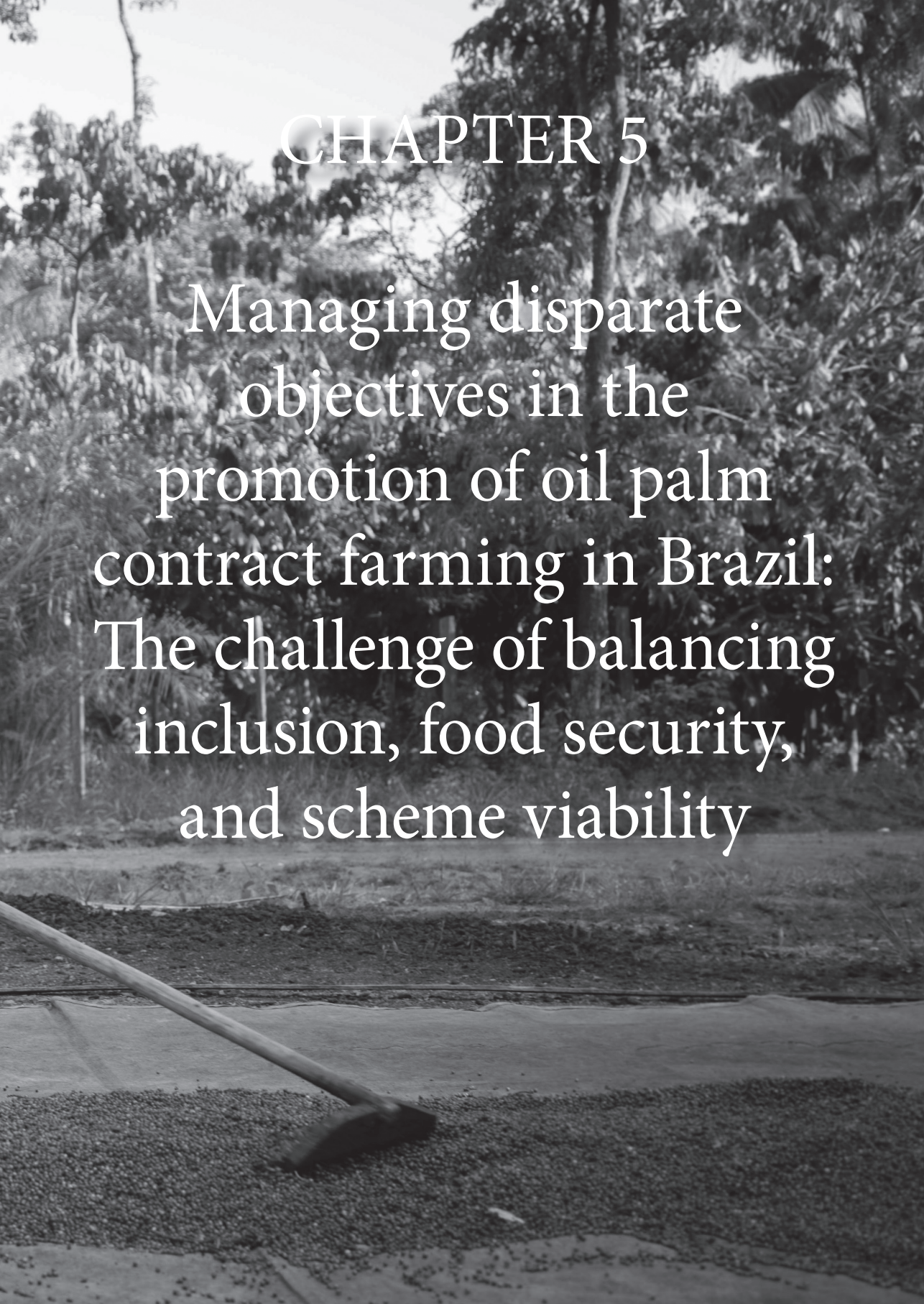
The dominant euphoric narrative attracted large investors seeking to increase their access to land and to a promising new biofuels market. This drove an expansion process leading to landscape transformation through land rush, the inclusion of smallholder farmers, and a fast influx of migrant rural workers. This rapid transformation led to apprehension and criticisms among some groups of smallholders, traditional communities, and urban residents. Yet, in contrast to previous state-centered 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 encouraging outcomes.

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

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 by 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 corporate social responsibility (CSR) mechanisms. Although the contractual arrangement and labor legislation ensured the ongoing commitment of companies toward 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, an 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 develop stable partnerships with small- and middle-scale farmers.

Regardless of participatory narratives, the SPOPP has some historical shortcomings. Like some previous 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 the 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.



CHAPTER 5

Managing disparate objectives in the promotion of oil palm contract farming in Brazil: The challenge of balancing inclusion, food security, and scheme viability

5.1. INTRODUCTION

Since the 1980s, processes of democratization in Brazil have enabled rural social movements to more effectively challenge structural sources of societal inequality that long underpinned rural poverty. In response to particularly rural trade unions becoming a powerful electoral support base, in recent decades the Brazilian government has adopted considerably more inclusive development policies. This has led to the formation of a number of important programs to improve smallholder[69] access to financial capital, land, technical assistance, insurance, and markets. Its low interest credit scheme—the National Program for the Strengthening of Family Farming (PRONAF)—emerged as one of the cornerstones of family farming policies in Brazil (Flexor and Grisa, 2016; Schneider and Niederle, 2010). Such policies were also intended to help address pervasive urban social problems associated with Brazil's high rates of rural–urban migration (Lapola et al., 2014). Although they contributed to improving smallholder access to productive resources and reducing the rate of rural outmigration, many of these programs failed to fully realize their potential, as they suffered from, inter alia, bureaucratic inefficiencies, high credit default rates, and poor quality of service delivery (Bianchini, 2015).

In the mid-2000s, the government's renewed commitment to developing its incipient biodiesel industry presented an important new opportunity for more effectively integrating family farmers into high-value commodity markets. This led to the ratification of the 2005 Biodiesel Law, which included provisions to incentivize companies to procure biodiesel feedstocks from smallholders through the so-called Social Fuel Stamp (SFS). This involves tax exemptions and preferential market access when smallholders are integrated into the producer supply chain. The introduction of these measures was partly motivated by a political imperative to enable smallholders to better benefit from Brazil's growing biofuel economy, with Brazil's well-established and highly concentrated sugar and soy sectors long being criticized for their poor social performance (Stattman et al., 2013; Andrade and Miccolis, 2011). Additionally, biodiesel development became an important new opportunity to enhance the effectiveness of family farming programs, especially since a market for biodiesel feedstock was seen to be guaranteed by the introduction of federal blending mandates (Andrade and Miccolis, 2011).

Within this context, the federal government decided to promote the cultivation of oil palm, due to the crop's comparatively high oil yields per hectare and the favorable global market conditions. To this end, it targeted the north, whose agro-ecology provides ideal growing conditions. Through the 2010 Sustainable Palm Oil Production Program (SPOPP), the government sought to promote inclusive and sustainable oil palm development by incentivizing companies to establish contract-farming arrangements with support from PRONAF and

69 The Family Farming Law (Law 11.326/2006) defines smallholders as farmers who (1) own less than four 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.

restricting development to degraded lands. This is framed under a third generation of public policies targeting smallholders that emphasizes market access, food security, and environmental sustainability (Grisa and Schneider, 2014). Through oil palm contract farming schemes, smallholders are guaranteed market access against fair market prices, while receiving technical assistance and access to quality production inputs. Since contracting companies are directly vested in the productivity of contracted smallholders, under such production arrangements the quality of service delivery is likely to be higher than the government coordinated or outsourced market development programs that prevailed previously (Brandão and Schoneveld, 2015).

Although contract farming is widely viewed as a comparatively pro-poor form of agribusiness expansion, whether it is genuinely inclusive of and accessible to the poorest and most vulnerable rural groups is debatable (Rehber, 2007). While self-selection biases shaped by household willingness to take risks partly underlies this (especially for crops such as oil palm that Brazilian smallholders have scant experience with), eligibility criteria often also shape scheme inclusion (Bellemare, 2012). For example, to enhance the economic viability of contract farming, contracting companies may be compelled to exclude those households that lack access land, human, and financial resources (Tobin et al., 2016; Cahyadi and Waibel, 2013). Similarly, governments may seek to limit participation when this could threaten to undermine household food security or excessively expose vulnerable populations to indebtedness or market shocks (Silva and Rankin, 2013). Although potentially protecting certain smallholders from participation risks, excluding the poorest and/or most vulnerable smallholders could exacerbate pre-existing societal inequalities and prevent such groups from benefiting from new development and production upgrading opportunities, thereby reducing the potential of contract farming to deliver on rural poverty alleviation goals (McCarthy, 2010).

Based on research conducted in five oil palm expansion hotspots in the Amazonian state of Pará, this article draws on cross-sectional survey data to analyze three aspects of contract farming that have featured prominently in contract farming literature and as a topic of public debate in relation to the SPOPP implementation. This relates, firstly, to the above discussion on inclusivity: How inclusive is the SPOPP and what factors determine patterns of inclusion and exclusion in practice? The second topic is interrelated to the first. As we show in this paper, due to oil palm's labor intensity, oil palm contracting companies in Brazil are reluctant to engage households that lack labor resources, because companies fear it will adversely impact smallholders' productivity and profitability. We analyze the factors that shape household allocation of labor to oil palm in order to determine whether labor-related participation criteria are a sufficiently useful indicator of household time investments in oil palm. The third topic that we analyze is the impact of participation in the SPOPP on the diversification of households' livelihood and food crop production activities. Several civil society organizations in Brazil (Glass, 2013; Carvalho, 2013) have cautioned that the diversion of land and labor from food crops to cash crops like oil palm will undermine household food security. To reduce the risk that households will replace food crops with oil palm, a limit on how much oil palm a household is permitted to cultivate

in order to qualify for credit access was set, and the government recommended the SPOPP participation to be conditional on adequate household access to land and labor. We analyze whether safeguards that arguably undermine scheme inclusiveness are necessary.

Critical analysis of these three topics contributes to a more evidence-based debate on the role and importance of the SPOPP participation criteria in shaping patterns of inclusion and exclusion, and options for better leveraging oil palm development in the Brazilian Amazon in support of inclusive development objectives. Although the findings are specific to the study's sectoral and geographic context, they also illustrate some of the challenges and dilemmas associated with private sector-led rural development initiatives more generally and the trade-offs that need to be considered when developing more inclusive value chains.

5.2. BACKGROUND

5.2.1. Contract farming and its contributions to rural development

Contract farming—which is sometimes also referred to as outgrower schemes—is an intermediate form of agricultural organization where exchange conditions between farmers and companies are established through formal or informal agreements. It can be seen as a form of value chain coordination somewhere between full vertical integration and spot market transactions (Silva, 2005). Three types of contracts typically govern these exchanges: market-specifying contracts where price, product, timing, and quantity attributes are specified; resource-providing contracts involving support from the contracting company to farmers in the form of inputs and technical assistance on credit (typically through formal contracts); and production management contracts where farmers are required to adhere to production and/or quality standards (Minot, 2007; Prowse, 2012). In practice, most contract farming arrangements combine elements of each of the three contract types (Minot 2007).

While contract farming has been a mechanism for linking smallholders to markets for more than a century, in the 1980s donors and governments began to more actively promote it as a tool to address structural market failures that underpin rural poverty and the large agricultural yield gaps in developing countries, especially in the context of reduced state intervention in the agricultural sector. This renewed interest in contract farming gained particular momentum in the 2000s, as concerns mounted over the detrimental social impacts of the rapid expansion of large-scale plantation agriculture in many developing countries (Vermeulen and Cotula, 2010; Oya, 2012). Additionally, with especially Western premium markets increasingly demanding producer compliance with food safety, sustainability, and product quality standards, many agribusinesses have been encouraged to exert more control over their supply chains and the practices within them, by developing traceability systems and adopting coordination strategies such as contract farming (Reardon et al., 2009). Furthermore, in sectors where processing is capital intensive or where crops are perishable, there tends to be a greater imperative to develop

contract farming arrangements in order to be able to more tightly control production (Minot, 2007). As a result, contract farming tends to be especially prevalent in the rubber, oil palm, sugarcane, cotton, tobacco, coffee, tea, cocoa, and horticulture sectors (Oya, 2012).

Contracting farming is generally considered to be a more inclusive form of agricultural production than plantation agriculture, since it productively integrates rather than displaces smallholder farmers. It also has the potential to help resolve such issues as input and market access that have long undermined the profitability and productivity of smallholder agricultural production in developing countries (Prowse, 2012). Many governments and bi- and multi-lateral institutions have argued that because contract farming combines the advantages of plantation agriculture (e.g., quality control, technical capacity, and market orientation) and smallholder agriculture (e.g., greater incentive, equity in land and income distribution), it has the potential to be a powerful instrument of rural development (Prowse, 2012; World Bank, 2007; UNCTAD, 2009). On the other hand, critics from especially civil society and academia have argued that contract farming could enhance smallholder exposure to volatile international commodity markets, undermine household food security as households shift from subsistence to cash crops production, and increase the risk of indebtedness (Action Aid, 2015; Pegler, 2015; White, 1997). Additionally, due to differences in bargaining power and familiarity with formal contracts, smallholders risk being tied into exploitative and monopsonistic contractual relations for long periods of time (Silva and Rankin, 2013). As a result, some question the development potential of contract farming, contending that contract farming is a strategy for agribusinesses to access land and labor cheaply without incurring significant production risks (Minot, 2007; Oya, 2012). Moreover, because for economic reasons few contract farming schemes are fully inclusive, especially of more marginalized groups, they risk exacerbating rural inequalities (Freguin-Gresh et al., 2012).

The actual impacts of contract farming have been extensively studied and examined from a wide range of disciplinary perspectives (see Glover and Kusterer (1990), Porter and Phillips-Howard (1997), and Minot (2007) for comprehensive literature reviews). The more quantitative impact assessments, typically employing econometric models to isolate treatment effects, have in particular contributed to a strong empirical evidence base. Many of these studies show how participation tends to positively impact smallholders' incomes and confirm the non-random nature of participation (Warning and Key, 2002; Simmons et al., 2005; Bolwig et al., 2009; Miyata et al., 2009; Bellemare, 2012; Narayanan, 2014; Briones, 2015; Herrmann, 2016; Cahyadi and Waibel, 2016). Similarly, a number of studies show how participation is often related to productivity enhancements (Minten et al., 2007; Bolwig et al., 2009). Only a few studies, however, explicitly examined spillover effects, for example, on household food security and labor burden (some that do include Simmons et al. (2005), Minten et al. (2007), Bellemare and Novak (2015) and Riera and Swinnen (2016)). Lacking the consensus of the income-oriented studies, the development of a stronger evidence base on other impact indicators is needed in order to fully

capture the different facets of welfare, and in particular the intended and unintended effects of eligibility conditions in shaping impacts.

5.2.2. The oil palm contract farming model in Brazil

Pará is the largest oil palm cultivating state in Brazil, with an estimated 207,252 ha planted with oil palm across 35 municipalities, predominantly in the state's northeast (Lameira et al., 2015). This represents approximately 88% of the total oil palm hectarage in Brazil (Abrapalma, 2017). Although commercial palm oil production in Brazil dates back to the 1970s (see Brandão and Schoneveld (2015) for a historical overview of sector development), the ratification of the Biodiesel Law in 2005—which established national blending mandates—and the launch of the SPOPP in 2010 were the primary drivers behind the entry of large corporations into the sector, and along with it a rapid expansion of Brazil's oil palm hectarage, which has tripled since 2000 (Brandão and Schoneveld, 2015). These include Brazil's state petroleum company, Petrobras, through its subsidiary Belém Bioenergia Brasil (BBB), US-based grain company Archer Daniel Midlands (ADM), and Brazil's largest mining company, Vale (through its controlling share in Biopalma). BBB and Biopalma began their operations in the late 2000s, responding in large part to new opportunities in both the Brazilian and the European biodiesel market (Brandão and Schoneveld, 2015). Incentives to engage family farmers through the SFS prompted these larger companies to actively include family farmers into their supply base from the outset. By 2016, six of the nine palm oil companies that dominate the sector were pursuing so-called nucleus-outgrower models (table 5.1). This involves both company-managed plantations and third-party sourcing through off-take contracts with small- and medium-scale farmers. In total, 1508 family farmers were contracted to cultivate oil palm in Pará, 95% of which by four of the companies. These family farmers account for an estimated 6.8% of the total oil palm hectarage in Pará (derived from Abrapalma (2017)).

The first initiative to promote smallholder inclusion in the Brazilian palm oil sector dates back to 2002, when Agropalma, the largest oil palm company at that time, entered into a technical cooperation agreement with the Municipality of Moju and various state and municipal agencies (see for example César and Batalha (2013) or Brandão and Schoneveld (2015) for a detailed analysis of this initiative). Through this agreement, 192 families were contracted by Agropalma through four separate projects. Projects I, II, and III entailed the establishment of 500-ha contiguous plantations (farm blocks) on land donated by the state government. The three plantations were partitioned into 10-ha blocks, which were allocated to family farmers in the area that wanted to participate. The last project, Project IV, took a different approach by requiring participants to plant oil palm on their own plots of land, with the expectation that this would enable and encourage farmers to better manage their plantations due to proximity to the farmers' dwellings.

Table 5.1: Oil palm planted area in Pará in 2016

Company	Total area planted (ha)	Company-managed plantations		Outgrowers' plantations			
		Total area (ha)	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	63,315	56,487	2007	6543	657	285	2
Agropalma	50,111	39,042	1982	1746	192	9323	49
BBB	41,422	38,021	2010	3055	310	346	1
Mejer	15,595	11,450	1994	0	0	4145	1
Marborges	8935	7761	1981	770	78	404	16
Dentauá	7944	3554	1980	0	0	4390	15
ADM	7550	5500	2012	2050	268	0	0
Palmasa	6480	3002	1985	30	3	3448	40
Denpasa	4667	1109	1974	0	0	3558	57
Others	1234	1234		0	0	0	0
Total	207,252	167,160		14,194	1,508	25,899	181

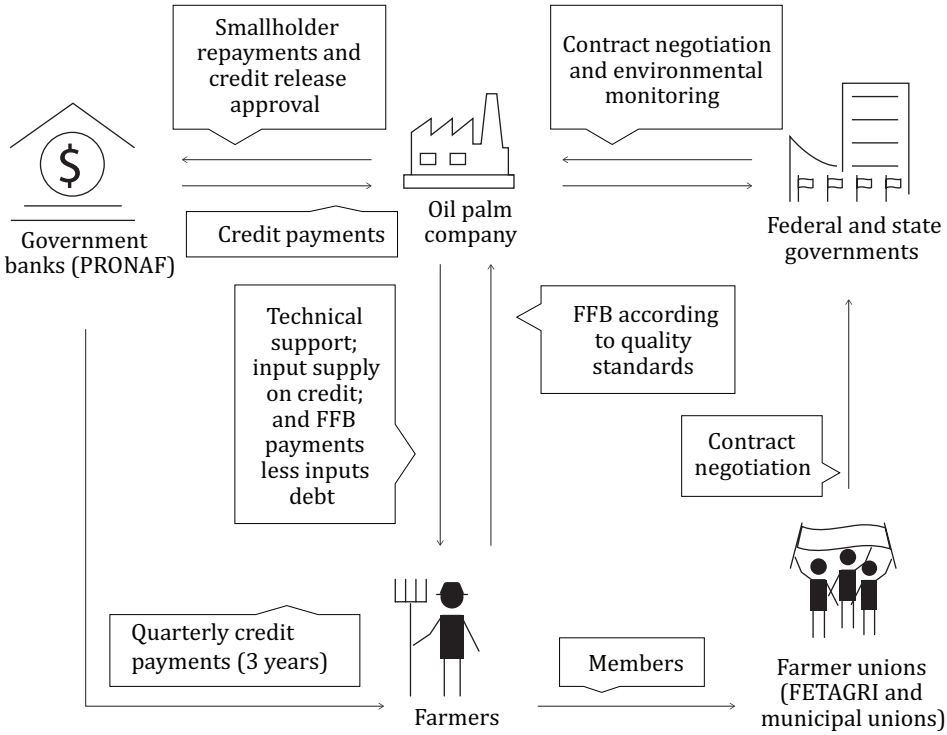
Source: Abrapalma (2017) and own data

Despite minor changes, these projects generally entailed input provision on concessionary terms by Agropalma and a guarantee to purchase all fresh fruit bunches (FFBs) at a guaranteed minimum price. Banco da Amazônia provided loans under PRONAF to smallholders for the establishment of their plantations and to cover living expenses until the palms started generating revenues after three years. Technical assistance was to be provided by the state government through the Rural Extension and Technical Assistance Company (EMATER). Due to problems with the quality and frequency of extension support from EMATER, Agropalma ended up taking over those responsibilities. Most of the smallholders' and all of Agropalma's plantations are currently certified under the Roundtable on Sustainable Palm Oil (RSPO).

The success of this pilot program, according to the claims of some institutions (Santos et al., 2014), was in large part responsible for the establishment of the SPOPP in 2010 and inspired the design of its family farmer integration component. Building on the SFS, which created the initial incentives to engage smallholders, the SPOPP amongst others sought to define the requirements and mechanisms through which smallholders are engaged. Due to the environmental benefits of integrating oil palm into existing farming systems, the SPOPP followed the structure of Agropalma's Project IV. Nevertheless, the SPOPP differs from the Agropalma projects in a number of critical ways. For example, while the early scheme involved a large grant component from Agropalma, the newer schemes operate on a full cost recovery basis. This implies that all costs related to land preparation and inputs are borne by the smallholder. In the case of new

schemes, smallholders receive a standard loan of US$ 25,600[70] to develop a 10-ha plot, while Agropalma smallholders were only required to take out loans of US$ 4800–7040 for a similarly sized plot. The new scheme also involves a performance-based quarterly financial contribution for the first three years to compensate for family labor expenses and to encourage farmers to adopt good plantation management practices during the critical early phases of plantation development. Figure 5.1 provides a stylized overview of the contract farming model under the SPOPP.

Figure 5.1: Oil palm contract farming model in Brazil



The SPOPP scheme falls under the federal PRONAF Eco framework, which sets the conditions for benefiting from financial support. In addition to standard PRONAF eligibility criteria, farmers are required to adhere to the SPOPP land zoning guidelines (Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon; ZAE–Palma),71 have their property registered in Brazil's Rural Environmental Registry (CAR), and obtain a DAP (Declaration of Aptitude to PRONAF) class V (proving a farmer has an annual income of at least US$ 6250) (table 5.2). In addition, companies apply specific criteria based on management and viability concerns or

70 Amounts have been converted from Brazilian real (BRL) at an exchange rate of BRL 3.2 per US dollar (1 June 2015).

71 ZAE–Palma is a zoning plan published by Embrapa (Brazilian Agricultural Research Corporation), which established the technical foundation for the spatial planning of oil palm cultivation in Brazil. It identified almost 30 million ha of suitable land in the Brazilian Amazon that is not classified as primary forests, indigenous territories, or conservation units. It was sanctioned as law through a Presidential Decree (decree 7172, 7th May 2010).

RSPO certification requirements. While this may differ slightly between companies, criteria typically relate to land suitability, access to infrastructure, and household labor availability (to ensure that adequate reserves of household labor are available to undertake proper plantation management). Companies pursuing RSPO certification also need to address a number of principles and criteria relevant to smallholders (e.g., ensure oil palm is not located on land deforested before November 2005 and that workers are hired in accordance with Brazilian labor laws).

Since risks of food security arising from specialization processes were continuously questioned during the SPOPP rollout by social movements, the federal government recommended that companies seek to preserve on-farm diversification.[72] As a result, most companies required farmers to have access to at least 25 ha in order to retain half (12.5 ha) as forestland,[73] develop 10 ha of oil palm, and cultivate at least 2.5 ha of other crops. Nevertheless, despite these requirements, it was observed that because it was difficult to find enough farmers who meet these requirements and internal incentives to expand the number of contracted farmers, some companies failed to fully adhere to their participation criteria.

Table 5.2: Family farmer eligibility criteria

PRONAF Eco criteria	Company selection criteria
Certified "family farmer" through a Declaration of Aptitude with annual income exceeding US$ 6250 (DAP-V)	Land suitable for oil palm and able to plant between at least 6 ha and at most 10 ha of oil palm without conflicting with food crops
Property registered in the CAR and observance with ZAE–Palma	Demonstrate financial and crop management capacity and availability of sufficient capable household labor
Documentation proving property ownership, partnership, or "peaceful" possession	Access to roads, located within certain distance to the company mill, and possibility to form farmer clusters
Not blacklisted as a credit defaulter	Own at least 25 ha of land
Signed outgrower contract	Comply with RSPO-relevant principles and criteria (select companies)

72 The Ministry of Agrarian Development (MDA), created to represent the interests of smallholders within the Federal Government, was remarkably active during the SPOPP design and initial implementation stages, being charged with monitoring the SFS. As concerns of food security risks were raised, the MDA urged companies to take those concerns into account.

73 The Brazilian Forest Code requires properties in this region to maintain at least 50% as forest reserve (known as legal reserve). In contrast to non-family farmers, family farmers are exempted from the legal requirement to reforest their properties if deforestation had taken place over more than 50% of the plot before 2008.

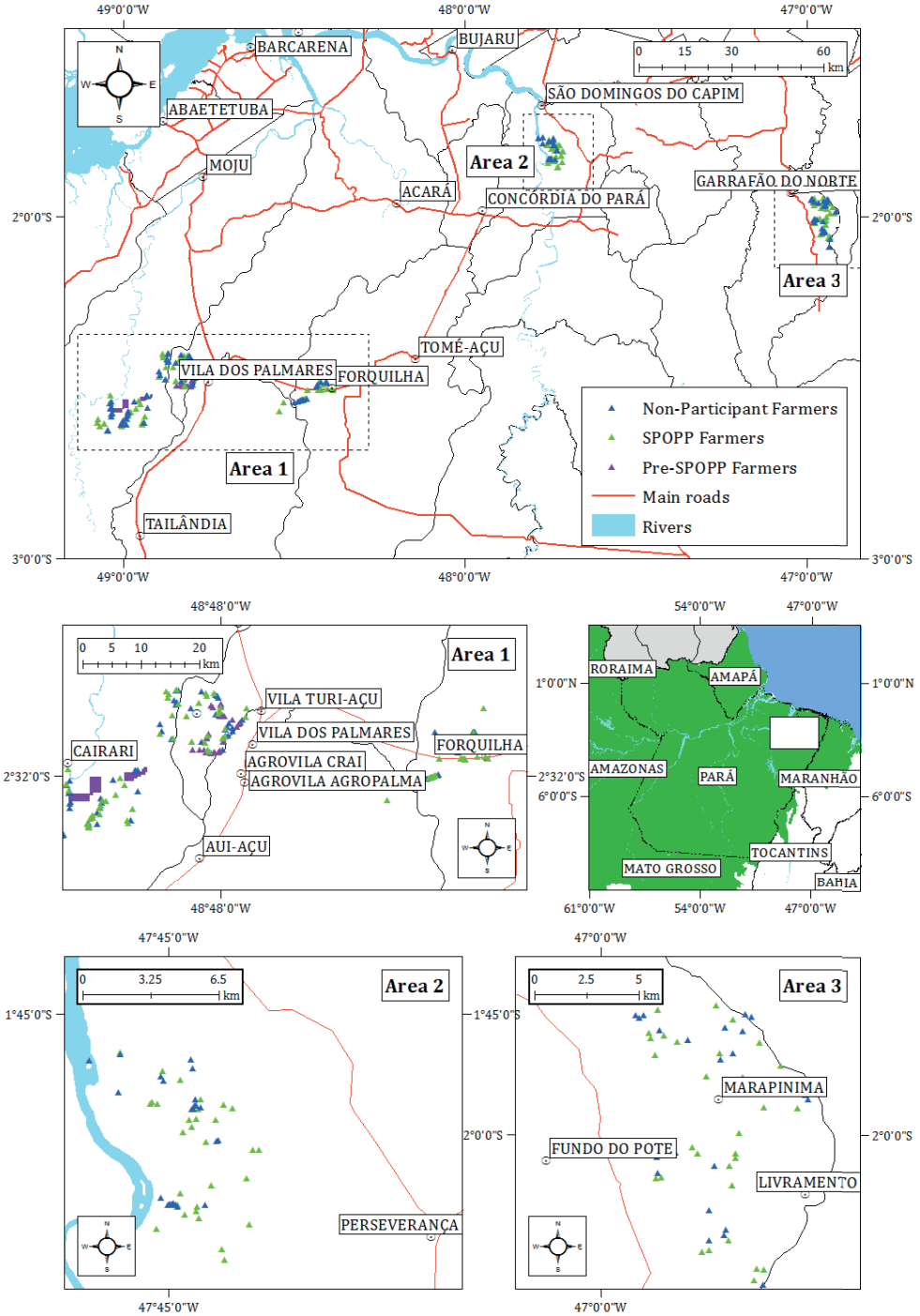
5.3. METHODS

5.3.1. Data collection

Data for this study was collected between January and August 2015 in four municipalities in northeast Pará (figure 5.2). We applied a cluster sampling approach in five communities to capture all major companies, including pilot projects. Communities were selected for their comparatively high density of contracted family farmers. Within each community, structured surveys were conducted with households belonging to three different clusters, namely pre-SPOPP participant households, SPOPP participant households, and non-participant households. A distinction was made between farmers who were contracted before and after the SPOPP in 2010 because, as explained above, pre-SPOPP farmers benefited from more favorable loan conditions and were subject to less stringent eligibility criteria. Therefore, differences in household characteristics and impacts of participation are likely. In order to obtain comparable sample sizes across the three clusters, for every community we attempted to survey 30 households belonging to clusters 2 and 3, while cluster 1 was subdivided into the four different pre-SPOPP/Agropalma projects. Lists of contract farmers were developed, with information provided by companies, community associations, and/or municipal smallholder unions. Thirty households per community per sub-cluster were randomly selected from these lists. Non-participant households were selected by surveying every fifth household along a community transect until 30 were surveyed.

In total, 420 surveys were conducted among farmers, namely 121 pre-SPOPP, 149 SPOPP, and 150 non-participant farmers. Therefore, 63% of Pará's pre-SPOPP and 12% of its SPOPP farmers were surveyed (see table 5.3 for an overview). A structured questionnaire was used to collect detailed information on household socioeconomic characteristics, sources of income, assets, land ownership, crop production, input use, and perceptions of wellbeing. Specific add-ons were developed for non-contract farmers to capture the reasons for not participating, and for contract farmers to capture the contract characteristics and oil palm-specific agronomic practices. Intra-household/gendered dynamics were not considered, since the household was the unit of analysis. The quantitative data were complemented with open and semi-structured interviews with key informants during extensive fieldwork activities between 2014 and 2015. These include 22 interviews with representatives of four of the five companies operating in the region, 29 representatives of municipal unions, 32 community leaders, 36 representatives of municipal governments including agriculture and environment secretaries, 18 researchers and representatives of NGOs, and four representatives of banks. A second fieldtrip took place in May 2017 to capture changes in local perceptions: 17 oil palm farmers, 3 union leaders, and 1 bank representative were interviewed. Finally, our results were also discussed and points of view were exchanged with the managers of three outgrowing schemes.

Figure 5.2: Location of research sites and survey smallholders



Source: Representation of own data; IBGE cartographic base; Geographic Coordinate System: WGS 1984

Table 5.3: Overview of survey clusters and sampling

Community cluster	Research cluster	N
1: Arauaí		
Agropalma P1	1: Pre-SPOPP	30
Agropalma P2	1: Pre-SPOPP	30
Agropalma P3	1: Pre-SPOPP	30
BBB	2: SPOPP	30
Non-participants	3: Non-participants	30
2: Calmaria		
Agropalma P4	1: Pre-SPOPP	31
Biopalma	2: SPOPP	29
Non-participants	3: Non-participants	30
3: Forquilha		
Biopalma	2: SPOPP	30
Non-participants	3: Non-participants	30
4: São Domingos do Capim		
ADM	2: SPOPP	30
Non-participants	3: Non-participants	30
5: Garrafão do Norte		
Marborges	2: SPOPP	30
Non-participants	3: Non-participants	30
Total		**420**

Source: own data

Recognizing the limitations of using monetary information such as income or consumption expenditure as an indicator of wealth (McKenzie, 2005), this research developed a welfare index using information on the ownership of 15 different assets. The index was constructed using principal component analysis (PCA), following the approach developed by (Filmer and Pritchett, 2001). Other indices relating to crop and livelihood diversification were also constructed, drawing on the approach proposed by the Intergovernmental Panel on Climate Change (IPCC) to monitor livelihood vulnerability (Hahn et al., 2009). Values for both indices range from 0.0 to 1.0, with lower values denoting increased diversity. Since we wanted to assess the effect of Bolsa Família[74] as a conditional cash transfer on household decision to participate in contract farming, we excluded it from the livelihood diversification index (Fried, 2012).

5.3.2. Descriptive statistics

74 Bolsa família is the largest conditional cash transfer program in the world, with 12 million beneficiaries. The program offers a monthly stipend to families under a minimum income threshold that meet certain conditions such as school attendance and basic healthcare examinations. See Fried (2012) for more details.

Table 5.4 provides a summary of the data and the variables included in the analyses presented in section 5.4. The data show that in terms of household characteristics, some statistically significant differences between clusters can be observed. For example, SPOPP households are more educated and have lower dependency ratios than pre-SPOPP and non-participant households. They also own more land than households in the other two clusters. Pre-SPOPP farmers in turn are less diverse in their crop production and more likely to be members of farmer associations than SPOPP and non-participant households, and less diverse in their livelihood portfolios than non-participants. Non-participant households in contrast are the worst off on the welfare index.

Table 5.4: Descriptive stats

Variable	Cluster 1	Cluster 2	Cluster 3	Total	F-value
	Pre-SPOPP (n = 121) Mean (SD)	SPOPP (n = 149) Mean (SD)	Non-participants (n = 150) Mean (SD)	Mean (SD)	
Household characteristics					
Household size (n) members)	4.579 (2.243)	4.490 (2.256)	4.393 (2.030)	4.481 (2.17)	0.240
Age of household head (years)	46.719 (11.016)	45.738 (13.089)[3]	49.000 (13.082)[2]	47.186 (12.574)	2.650*
Gender of household head (male dummy)	0.901 (0.297)	0.913 (0.283)	0.893 (0.310)	0.902 (0.297)	0.160
Highest educational level of household head (from 0 up to 5)	0.975 (0.811)[2]	1.208 (0.939)[13]	0.860 (0.859)[2]	1.017 (0.886)	6.100***
Household head migrated (migrant dummy)	0.636 (0.483)	0.584 (0.495)	0.660 (0.475)	0.626 (0.484)	0.960
Dependency ratio	0.902 (0.880)[2]	0.682 (0.680)[13]	0.925 (0.826)[2]	0.831 (0.800)	4.130**
Number of persons contributing to the household (n members)	2.430 (1.383)	2.617 (1.298)	2.313 (1.100)	2.455 (1.261)	2.220
Economic characteristics					
Area of land (in hectares)	32.983 (27.394)[2]	48.891 (31.729)[13]	39.209 (48.584)[2]	40.820 (38.068)	6.150***
Crop Diversification Index (CDI)	0.469 (0.329)[23]	0.284 (0.231)[1]	0.277 (0.204)[1]	0.335 (0.268)	23.630***
Calories produced per person per day	3285.041 (6253.207)[3]	7787.339 (16581.812)	10681.494 (30586.593)[1]	7523.875 (21208.213)	4.150**
Livelihood Diversification Index (LDI)	0.405 (0.101)[3]	0.388 (0.112)	0.376 (0.092)[1]	0.389 (0.102)	2.650*
Bolsa Família (dummy)	0.545 (0.500)	0.523 (0.501)	0.560 (0.498)	0.543 (0.499)	0.200
Welfare index	1.134 (0.112)[3]	1.125 (0.132)[3]	1.067 (0.157)[12]	1.107 (0.139)	10.020***
Member of community association (dummy)	0.83 (0.38)[23]	0.52 (0.501)[13]	0.339 (0.473)[12]	0.54 (0.499)	38.85***
Prior experience (dummy)	0.20 (0.4)	0.16 (0.375)	0.13 (0.341)	0.16 (0.371)	1.04

Source: own data

5.3.3. Empirical approach

The analysis was structured into three components—namely determinants of participation, determinants of labor allocation to oil palm, and impacts on livelihood and agricultural diversification—each employing a different econometric technique. Since the majority of SPOPP farmers were yet to generate an income from oil palm due to the immaturity of their plantations, we did not evaluate the impact of participation on income or other indicators of welfare. Besides, there are ample studies that have attempted to do so in the contract farming literature (Miyata et al., 2009; Rao and Qaim, 2011; Bellemare, 2012; Narayanan, 2014), with numerous studies also demonstrating the relative profitability of oil palm farming (Bellemare, 2012; Simmons et al., 2005; Cahyadi and Waibel, 2016; Alwarritzi et al., 2015). Brandão and Schoneveld (2015) demonstrated how oil palm is many times more profitable, both from a land and a labor perspective, than alternative crops in northeast Pará.

The first component employed a binary response model using a probit link function. Participation in the oil palm value chain was assumed to be a binary choice where farmers make their decisions based on the expected return, risks, or utility. The response variable was binary—participate or not participate in oil palm contract farming—which was regressed onto a vector that reflects household characteristics. The model excluded households in the pre-SPOPP cluster since, as discussed above, the criteria that apply to the SPOPP scheme participants did not apply to the Agropalma pilot projects. Our primary interest with this analysis was to scrutinize the inclusiveness of the SPOPP program. While credit blacklisting is likely to play a role in shaping scheme exclusion patterns, it was omitted from the model due to evidence that suggests many blacklisted households were reluctant to respond honestly and lack of access (due to confidentiality reasons) to blacking listing information from banks and companies.[75] There was no evidence of functional form misspecification.

For the analysis of component two, we assumed that the hiring of labor is endogenous to the total time allocated to oil palm. The unobservable factors that shape the decision to hire labor were likely to correlate with the unobservable factors that shape time allocation. In order to correct for endogeneity, we employed an endogenous switching regression (ESR) by full information maximum likelihood method (FIML) (see Maddala (1983) and Lokshin and Sajaia (2004) for its application in STATA). This model simultaneously estimates a binary selection equation and a continuous outcome equation in order to more accurately estimate the effect of hiring labor on time allocation; failure to account for endogeneity could lead to an over- or under-estimation of the treatment effect. To achieve identification of the model's parameters, we used years of education as an instrument. More educated household heads are better able to capitalize on local labor markets, but are not more inclined to allocate more labor to oil palm (e.g., more educated people are not likely to invest more time in agricultural work); weak correlation between time allocation

75 Only 3 out of 27 non-participants who declared an interest in planting oil palm conceded to being excluded as a result of blacklisting. This either demonstrates that blacklisting is not a major factor shaping exclusion or the magnitude of false responses.

and education support this. This model included both pre-SPOPP and SPOPP households since no differences in time allocation could reasonably be expected between households in the two clusters. Households with oil palms younger than one year were excluded from this analysis, since labor allocation in the first year is not indicative of time allocation in subsequent years.

The final component involved a "naïve" linear regression to determine whether oil palm farmers become less diversified in their livelihood and crop production activities the longer they are engaged in oil palm. We hypothesized that the longer households are involved in palm oil production and are able to appreciate the income generated from palm, the more they will tend to specialize in oil palm, to the detriment of other activities. For this analysis, we used the crop and livelihood indices described above as dependent variables, as well as calories per household member per day produced by the household through its food crop production activities. The latter involved converting household crop yields into its calorific equivalence. The crop diversification and calories variables were used here as proxies for food security (e.g., more diversified farmers are likely to be less susceptible to price fluctuations and crop diseases). Because pre-SPOPP households did not face the same participation barriers as SPOPP households, especially with respect to land availability, and were likely not to be representative of SPOPP households, the regression in component three only considered SPOPP farmers. Community fixed effects were included due to geographic variations in production systems.

5.4. RESULTS AND DISCUSSION

5.4.1. The determinants of participation

The descriptive statistics presented above suggest that participation is likely to be non-random, given statistically significant differences between groups. The results from the probit regression presented in table 5.5 confirm this. The model was able to accurately "predict" which cluster 68.5% of cases belonged to. Specifically, a positive statistically significant interaction was observed between participation and the level of education of the household head, a negative interaction with household dependency ratios, a positive interaction with the number of household members contributing to household livelihood activities, a positive interaction with land size, and a positive interaction with membership of a farmer association. Of the scheme non-participants, 81.8% claimed that non-participation was a choice rather than the result of involuntary exclusion. This suggests that non-participation is primarily a product of self-selection, though arguably awareness of potential ineligibility may have affected the household decision to not seek a contract.

Access to human capital clearly strongly shaped participation decisions and/or scheme eligibility. Arguably, more educated farmers are more inclined to participate in an oil palm contract farming scheme, because they are better equipped to evaluate the implications of scheme participation, willing and able to take risks, and better able to navigate the bureaucratic

process of obtaining loans and entering into contracts. At the same time, companies indicated that farmers with demonstrable capacity to adopt their agronomic guidelines were prioritized. Differences in education between scheme participants and non-participants could be a manifestation of this, though qualitative evidence suggests that companies did not actively consider this in their selection process.

Additionally, companies considered the availability of labor within the household an important indicator of household ability to make the necessary labor investments into plantation management. Households with lower dependency ratios and more people who contribute to household livelihood activities, are likely to be less burdened by care obligations and be able to better manage the reallocation of labor from other livelihood activities. Companies indicated that this was an important consideration in their selection process because of the perceived adverse impacts of labor shortages on productivity. Of the sampled households that were deemed ineligible, 33.3% claimed that household labor availability was the primary reason given. However, the number one reason for not wanting to participate in the scheme (mentioned by 63.6% of households) was the high perceived household labor burden. This highlights that non-participation is to a significant extent motivated by labor considerations.

Land size is most strongly related to participation, with every additional hectare of land owned by the household increasing the probability of participation by 37.6%. Because households are expected to retain sufficient land after oil palm cultivation for food crop production and legal reserve, companies pay attention to smallholder landholdings. This is reflected in the fact that of the households that were not permitted to participate, 33.3% claimed this was primarily attributable to a lack of sufficient suitable land. However, 45.7% of households that choose not to participate did so because of land constraints. This demonstrates that the availability of land resources is an important factor underlying what is predominantly voluntary exclusion from contract farming.

Finally, membership of community associations also strongly influences participation. Collective organization reduces the perception of risk by enhancing access to information, promoting social learning, and improving farmer representation, both politically and vis-a-vis contracting companies.

Interestingly, the results suggest that gender, Bolsa Família, welfare, and degree of diversification do not significantly influence participation. The weak relationship with Bolsa Família demonstrates how conditional cash transfer policies do not necessarily inhibit household entrepreneurship, as some suggest (Hall, 2012). Because the diversification and welfare indicators could arguably suffer from reverse causation (e.g., participation reduces the degree of diversification and increases welfare), the lack of a significant relationship with participation suggests that this is probably not the case, as results from section 5.3 also support. No multicollinearity was observed either. Since farmers only begin to earn an income from oil

palm when it begins bearing fruit, typically after three or four years, major impacts on household welfare are yet to be observed amongst the SPOPP farmers (e.g., since none of the households in this group had planted oil palm more than five years previously). Results from both endogenous switching and ordinary least squared regressions demonstrate that the treatment effect on welfare from SPOPP participation is insignificant (results not shown for sake of brevity). While reverse causality in this probit model is therefore unlikely to be a problem, the absence of a significant relationship between participation and welfare is a surprising result, since eligibility for PRONAF Eco credits requires a DAP-V, certifying that a household earns at least US$ 6250/year,[76] more than twice the statutory minimum wage. Smallholder families with this sort of income are considered middle-income family farmers in the region (Medina et al., 2015). Some of the local unions contend that the political pressure and desire to integrate as many farmers as possible into the oil palm contract farming schemes resulted in the widespread issuance by local entities[77] of DAP-V to farmers with incomes under the threshold.

5.4.2. Labor allocation

The capacity of the household to allocate labor to oil palm management activities strongly shapes processes of inclusion and exclusion, as the preceding section has shown. The results from the ESR model highlight that while human capital does influence the time households allocate to plantation management, whether or not a household decides to hire labor plays a considerably more significant role (table 5.6). For example, the outcome equation shows that households with lower dependency ratios are more inclined to allocate more labor to oil palm management. While this relationship is significant, the absolute effect is comparatively small (e.g., a two-parent household with two dependents allocates only 0.70 extra weeks of work per ha than a two-parent household with three dependents; equivalent to approximately 4.8% of the average time allocation (14.54 weeks per ha)). In contrast, if a household decides to hire labor to support the household in managing their plantation, an additional 14.15 weeks are allocated to plantation management. Moreover, labor allocation significantly increases once the plantation begins bearing FFBs, with harvesting activities for oil palm typically being highly labor intensive.

76 The rationale for this is that farmers have to have a minimum amount of yearly income in order to prove they are able to financially manage a large credit. For farmers earning less than US$ 6250/year, there is PRONAF-B which allows access to smaller amounts of credit.

77 DAP issuers are entities certified by MDA, normally local unions and EMATER offices.

Table 5.5: Probit model

Variable	Coefficient	Robust SE
Dependent variable: participation dummy		
Age of household head (years)	-0.009	0.008
Gender of household head (male dummy)	0.058	0.293
Highest educational level of household head (from 0 up to 5)	0.180*	0.081
Dependency ratio	-0.244*	0.146
Number of persons contributing to the household (n members)	0.144*	0.076
Land area (in hectares log)	1.023***	0.194
Crop Diversification Index	0.523	0.387
Livelihood Diversification Index	0.908	0.816
Bolsa Família	-0.187	0.187
Welfare index	1.027	0.679
Member of community association (dummy)	0.385**	0.167
Prior experience (dummy)	0.133	0.230
Constant	-3.347***	1.034
N	289	
Wald chi^2 (12)	61.130***	
R^2 (pseudo)	0.170	
Percentage correct predictions	68.51%	

Source: own data

Table 5.6: Labor allocation model

Variable	Coefficient	Robust SE
Outcome equation *Dependent variable: number of working weeks per ha*		
Age of household head (years)	0.034	0.063
Gender of household head (male dummy)	3.418	2.386
Dependency ratio	-1.407*	0.809
Number of persons contributing to the household (n members)	-0.176	0.527
Land area (in hectares log)	1.999	2.719
Crop Diversification Index	1.547	2.479
Block farm (dummy)	0.405	2.064
FFB production (dummy)	5.237***	1.899
Access to trainings (dummy)	1.437	1.545
Distance to farm	-0.010	0.026
Prior experience	0.042	1.852
Hired labor (dummy)	14.150***	3.339
Constant	-3.193	6.951
Selection equation *Dependent variable: hiring labor (dummy)*		
Highest educational level of household head (from 0 up to 5)	0.195**	0.089
Age of household head (years)	-0.002	0.008
Gender of household head (male dummy)	-0.093	0.307
Dependency ratio	0.282**	0.112
Number of persons contributing to the household (n members)	-0.171***	0.065
Land area (in hectares log)	-0.694**	0.320
Crop Diversification Index	-0.921***	0.327
Block farm (dummy)	-0.105	0.264
FFB production (dummy)	0.210	0.243
Access to trainings (dummy)	0.133	0.195
Distance to farm	0.004	0.004
Prior experience	-0.007	0.236
Constant	1.382*	0.768
Number of observations	232	
Log pseudolikelihood	-947.91	
Wald chi2(12)	52.76***	
Wald test for independent equations (chi2(1))	5.22**	

Source: own data

The importance of hiring labor to ensure that sufficient effort is expended on plantation management cannot be overstated. The significance of the Wald test for independent equations shows that the treatment–assignment errors are correlated with the outcome errors, validating our hypothesis that unobservables that increase household time allocation also influence the household decision to hire labor. The selection equation shows that more educated households, with higher dependency ratios, fewer household members who contribute to livelihood activities, greater crop diversification, and less land positively influence the decision to hire labor. This suggest that households with labor constraints are more inclined to hire labor, which has a positive net impact on total labor allocation. This calls into question whether the adoption of labor criteria in appraising household eligibility for scheme inclusion is necessary. A scheme feature that enables households to hire labor is household entitlement under PRONAF Eco to quarterly cash advances for the first three years, which improves household ability to cover hired labor expenses. Some company managers and farmers, however, expressed concerns that the loss of these advances after three years could undermine household time investments, since the returns from oil palm before the crop reaches maturity (between year 5 and 7) may not be sufficient to cover hired labor costs. The data, however, do not support these concerns (results not presented here).

Much of the labor that is hired by oil palm contract farmers is employed informally, and often not full time. Agropalma in particular has begun to promote the formalization of smallholder labor relations in order to facilitate smallholder compliance with RSPO criteria and indicators; Agropalma relies heavily on premium RSPO-certified markets (Brandão and Schoneveld, 2015).[78] This was met with much resistance from smallholders, since it both reduces the flexibility inherent in informal labor relations and increases the cost of hiring, since formalization involves a range of secondary benefits and tax obligations. Moreover, lack of farmer familiarity with formal contracting procedures acts as a major deterrent to hire labor formally. Arguably, such standards compliance barriers are not in the interest of pro-poor oil palm development, since they reduce the capacity of labor-constrained households to fulfill the labor demands of oil palm. With other companies in Pará recognizing the economic imperative of being fully RSPO certified, the pressure on smallholders to formalize their hiring is likely to increase in the future.

Agropalma did realize some successes in addressing these issues by establishing a consortium of oil palm farmers involved in the block farms in Projects I–III. This consortium is a legal entity that has the capacity to hire employees. The consortium hires workers under contract to collectively manage the plots of farmers who wish to use labor from the consortium. In the context of farm blocks, where oil palm farms are geographically consolidated, these types of arrangements are feasible and comparatively easy to manage. For this reason, Agropalma did not establish such a system with the geographically dispersed contract farmers of Project IV.

78 This is not necessarily a direct RSPO requirement. Rather, RSPO requires that producers adhere to national laws. In contrast to Southeast Asian countries, Brazilian labor regulations are notoriously stringent.

5.4.3. Impact on household diversification and food security

While impacts on household welfare are yet to be observed amongst SPOPP farmers, since oil palm absorbs both household land and human capital from the outset, spillover effects on other livelihood activities and household food security as land and labor are diverted from staple crops can be anticipated. While we showed in sections 5.3.2 and 5.4.1 that no significant difference can be observed between SPOPP and non-participant households, the descriptive statistics and the probit model could not adequately capture within cluster variations, specifically the effect of time on diversification and food security. For example, as farmers begin to appreciate oil palm's potential, processes of specialization can be anticipated, with associated spillover effects on food crops production and accessibility.

The results from the naïve regression across our three outcome indicators suggest that such processes cannot (yet) be observed amongst SPOPP farmers. No statistically significant relationship can be observed between the number of years a household has been managing an oil palm plantation and crop diversification, livelihood diversification, or the number of calories produced per household member from staple crops (table 5.7). Alternative models that excluded the role of time were also evaluated (e.g., ESR models with participation as a dependent variable in a selection equation), which produced similar results (results are not presented here). Therefore, we can conclude that households have not drastically changed their livelihood portfolios or their level of food production and self-sufficiency. Determinants of specialization rather relate to household land and human capital endowment.

While this analysis omitted pre-SPOPP households since they are not representative of participants of SPOPP and SPOPP's impacts, the large differences between pre-SPOPP/SPOPP and non-participants farmers with respect to their crop diversification and staple crop output does give reason to reflect on possible longer-term cash crop specialization trends (table 5.4). Additional descriptive statistics to help further unpack such trends are presented in table 5.8. This shows that pre-SPOPP households are comparatively specialized in oil palm, and less so in food crops. However, pre-SPOPP households are less likely to produce the region's most important staple crop (cassava) than SPOPP and non-participant households, being also more likely to abandon and/or reduce cassava production over the previous five years. Cassava yields and calories produced from food crops more generally are thus significantly lower than in the other two clusters. This suggests that oil palm cultivation has resulted in declining food crop production amongst pre-SPOPP households. Although the data would lead us to suggest that this has resulted in a comparatively large number of farmers no longer being food self-sufficient, with none of the household claiming that they ever had to reduce their food intake as a result, loss of self-sufficiency has not appeared to result in declining food security.

Table 5.7: Robust regression results

Dependent variable	Crop diversification index		Livelihood diversification index		Food production (in calories per person per day)	
Variable	**Coefficient**	**Standard error**	**Coefficient**	**Standard error**	**Coefficient**	**Standard error**
Age of household head (years)	-0.003	0.002	-0.001	0.001	261.731	273.482
Highest educational level of household head (from 0 up to 5)	-0.019	0.019	-0.029	0.018	-123.126	1280.486
Gender of household head (male dummy)	-0.059	0.081	0.021	0.049	8879.391	5964.047
Member of association	-0.085*	0.051	-0.005	0.033	5886.375	4665.546
Dependency ratio	-0.052*	0.031	-0.031*	0.018	-2727.717	2174.658
Number of persons contributing to the household (n members)	-0.023*	0.013	-0.017	0.010	-1616.018	1436.344
Land area (hectares log)	-0.119*	0.062	-0.115**	0.046	-3825.939	7230.726
Years since first oil palm planting	0.008	0.021	-0.026	0.015	54.827	2634.184
Man weeks worked on oil palm (per ha)	-0.002	0.003	-0.002	0.001	-140.404	228.004
Constant	0.719	0.197	0.109	0.043	8464.319	26311.810
Fixed effects	YES		YES		YES	
N	125		125		125	
F-statistic	2.220**		1.850**		1.770*	
R^2	0.290		0.247		0.185	

*** = signif < 0.01 ** = signif < 0.05 * = signif < 0.1

Source: own data

One of the reasons why such patterns are not discernable amongst SPOPP farmers could be differences in crop maturity. SPOPP farmers have benefitted from the regular income flows provided by oil palm for longer, and thus better appreciate its potential vis-à-vis alternatives. However, the SPOPP does differ from the pre-SPOPP scheme in that concerns over food insecurity, as voiced by some civil society groups, resulted in a strong emphasis by both government extension services and contracting companies on encouraging farmers to continue producing other crops. This resulted in some companies actively promoting cassava intercropping with oil palm. Moreover, the introduction of eligibility criteria related to land and labor availability were partly motivated by food crop competition concerns. Their evident application could have resulted in SPOPP participants being better resourced than pre-SPOPP farmers to maintain food crop production. As depicted in table 5.3, pre-SPOPP farmers generally have less land, are less educated, and experience higher dependency ratios than SPOPP farmers. This would

suggest that pre-SPOPP farmers are likely to have been less labor and land endowed than the SPOPP farmers from the outset.

Table 5.8: Supplementary descriptive statistics

Variable	Cluster 1 Pre-SPOPP (n = 121) Mean (SD)	Cluster 2 SPOPP (n = 149) Mean (SD)	Cluster 3 Non-participants (n = 150) Mean (SD)	Average Mean (SD)	F-value
Consumption Oriented Crops Index	0.569 (0.355)[23]	0.420 (0.295)[1]	0.452 (0.309)[1]	0.475 (0.324)	7.880***
Market Oriented Crops Index	0.812 (0.269)[23]	0.523 (0.268)[1]	0.519 (0.269)[1]	0.605 (0.299)	50.430***
Producing cassava (dummy)	0.595 (0.493)[23]	0.785 (0.412)[1]	0.793 (0.406)[1]	0.733 (0.443)	8.610***
Abandoned cassava (dummy)	0.353 (0.480)[23]	0.196 (0.398)[1]	0.169 (0.376)[1]	0.231 (0.422)	7.220***
Is sufficient cassava produced for consumption	0.549 (0.450)[23]	0.722 (0.449)[1]	0.75 (0.435)[1]	0.683 (0.466)	6.850***
Reduced cassava production	0.381[23]	0.412[1]	0.439	0.423	0.355
Cassava production (in kg)	3.084	6.312	7.326[1]	5.748	4.978***
Consume less (as a coping strategy)	0.000	0.000	0.000	0.000	0.000
Calories produced per person per day	3.368[23]	7.633[1]	10.681[1]	7.523	3.985**
Produce less than 2000 calories pp per day	0.636[23]	0.461[1]	0.433[1]	0.500	6.286***

Source: own data

5.5. CONCLUSION

The aim of the SPOPP is to enable family farmers to benefit from the expansion of Brazil's biofuel industry, having long been alienated from the soy and sugar sectors. However, civil society concerns over food security implications, corporate concerns over productivity and profitability, financial institution concerns over credit default, and government concerns over land use management have resulted in the formulation of a wide range of smallholder eligibility criteria. While research findings suggest that during the early implementation of the SPOPP many of these criteria were only selectively applied, our analysis shows than household availability of land and labor resources has strongly shaped patterns of inclusion and exclusion. This appears to be a bidirectional process, since resource-constrained households, on the one hand, self-select by voluntarily opting out and, on the other hand, are involuntarily excluded as

a result of ineligibility. While there is no evidence to suggest that excluded households are more marginalized than scheme participants from a welfare perspective, they certainly are from a land and labor endowment perspective. This could lead one to posit that oil palm contract farming has created new opportunities for households with adequate reserves of land and labor to more effectively exploit those resources in support of income generation. With oil palm in the region generating considerably higher returns to both land and labor than other accessible livelihood options when managed properly (Brandão and Schoneveld, 2015), as contract farmers begin generating a stable income from oil palm, differentiation between SPOPP participants and non-participants can be anticipated.

Considering this, the SPOPP in its current format should not be considered an inclusive development program by virtue of being inaccessible to a sub-population of family farmers. But, should a program like the SPOPP endeavor to be fully inclusive? As past PRONAF programs have shown, long-term indebtedness (and exclusion from future opportunities) is often a consequence of credits being allocated to households that are unable to optimally transform them into productive activities. Moreover, the reallocation of scarce land and labor to a crop that generates few consumptive co-benefits, could in theory undermine household food security and resilience. However, while our findings do not dispute that certain households are better off not participating in the program, they do dispute the use of land and labor criteria in order to reduce the chance that households allocate insufficient labor to crop management activities and/or become food insecure. Our findings clearly show that labor allocation is primarily a function of willingness or ability to hire labor, which increases when households are labor and land poor. Moreover, participation does not appear to significantly alter the composition of household and crop portfolios, and even when it does, it is unlikely to result in enhanced food insecurity.

These results give reason to reflect on whether eligibility criteria in schemes like the SPOPP produce their intended effects. Perversely, they may only serve to widen the rural inequality gap, rather than protect marginal households from adverse incorporation. In the case of the SPOPP, the results suggest that the focus may need to shift from household labor availability to supporting households in engaging local labor markets and the barriers that certain households face in doing so. This will help enhance societal co-benefits and enable non-participant households to more meaningfully benefit from sector development. This could involve extending periodic, perhaps performance-based, payments until plantations reach maturity, and support in mediating the linkages between smallholders and labor markets. Trialing variations of the Agropalma consortium structure should be considered, especially as smallholders are increasingly required to comply with the labor formalization demands of certified global markets. Such market pressures are likely to generate new participation barriers and/or unintended spillovers, especially for labor-constrained households as local labor markets become more inaccessible.

Despite the rising interest in inclusive business and value chain development, issues such as these that lie at the heart of project design are yet to be comprehensively assessed in research. This paper demonstrates how the social, environmental, and economic concerns that underlie the eligibility criteria that shape contract farming integration patterns and subsequent benefit flows are not always well founded. A stronger evidence base is clearly needed in order to more effectively inform academic and policy discourse on the role and potential role of contract farming in supporting inclusive rural development.

CHAPTER 6

Socio-environmental impacts of oil palm contract farming in the Brazilian Amazon: Implications for scheme design

6.1. INTRODUCTION

Contract farming is perceived as a pro-poor strategy to promote rural development and minimize the social impacts of large-scale agricultural expansion. By including smallholders in value chains through contracts with processors, often through mediation by governments or NGOs, smallholders are meant to benefit from improved market opportunities and access to quality inputs, such as improved varieties, technical assistance, and credit (Prowse, 2012). This is particularly strategic in remote areas where people have fewer livelihood opportunities and access to infrastructure and social services is restricted. A large number of studies have assessed the livelihood effects and their links with contract farming design features (Bellemare and Lim, 2018; Wuepper and Sauer, 2016; Abebe et al., 2013). Despite existing methodological challenges associated with estimating livelihood impacts, most studies have shown positive results (Bellemare and Bloem, 2018).

Surprisingly, little if any attention has been paid to the environmental impacts of contract farming schemes. Given that many of these processes take place in forest or other high-conservation value landscapes, ensuring that contract farming does not induce negative environmental impacts such as deforestation (or could even contribute to climate change mitigation) should be seen as a priority. Moreover, as in other sectors and academic debates, preventing negative environmental impacts involves tradeoffs with social goals such as poverty reduction (Garrett and Rausch, 2016; Sayer et al., 2013). As such, how contract farming schemes should be designed in order to maximize potential livelihood gains and minimize potential negative environmental impacts is a major knowledge gap. This paper fills that gap through a case study analysis of an oil palm contract farming scheme in the Brazilian Amazon and an assessment of its social and environmental outcomes, tradeoffs, and links to the scheme design.

The Brazilian Amazon is one of those places where providing for the livelihoods of the rural poor and conserving the environmental integrity of forest biomes is a tremendous challenge. Historically, governmental interventions have essentially focused on socioeconomic and geopolitical aims. Fiscal incentives, federal grants, infrastructure development, and colonization programs, particularly during the military regime (1964–1985), set the tone of Amazon's frontier expansion (Fearnside, 1984; Schmink and Wood, 2012). The arrival of both small- and large-scale actors in multiple waves and through different processes led to the conversion of nearly one fifth of the total forestland into other land uses, mostly pastureland, which caused widespread environmental destruction (Margulis, 2004). In some cases, frontier expansion allowed newcomers to improve their livelihoods, while in others to continue or even accentuate exploitation processes. The arrival of migrants and their complex interactions with traditional groups also resulted in countless land conflicts (Hecht, 1985; Perruci, 1999; Rivero and Cooney, 2010; Simmons, 2004; Pacheco and Benatti, 2015).

In the past few decades, however, federal interventions in the Amazon have changed driven by several domestic and global factors. At the global level, these include, for example, the increasing relevance of climate change debates (Angelsen et al., 2009), and market pressures (Lambin et al., 2018). At the domestic level, the rise to power of the Workers' Party (PT) in 2002 supported by a wide coalition of grassroots organizations, including environmentalist groups, traditional populations, and smallholder farmers, was fundamental to the emergence of a new development model, called socio-environmentalism. During PT governments, a number of socio-environmentally oriented policies have been implemented or strengthened. These polices have, for example, improved access to credit and technical assistance, created new "nested" markets for smallholders (van der Ploeg et al., 2012), and strengthened law enforcement and technical and operational capacity to tackle deforestation (Hecht, 2012).

It was in this context that the Brazilian government perceived contract farming as a promising strategy to promote rural development in the Amazon. Consequently, in 2010 the government launched the Sustainable Palm Oil Production Program (SPOPP). The program is mostly an overarching framework with rules and incentives to stimulate biodiesel production with a strong component of including smallholder farmers in the biodiesel chain through contracts with firms. Given its agro-ecological characteristics, oil palm was the crop selected for the Amazon region. Considering the negative environmental footprint of oil palm in Southeast Asia and the potential to contribute to restoration and carbon sequestration, the Brazilian government created specific rules to avoid deforestation and to restrict expansion into already degraded areas (Villela et al., 2014).

In order to establish whether Brazil's contract farming model has been successful in attaining its socio-environmental goals, we used a mix of quantitative and qualitative methods. These include the analysis of household surveys, remote sensing techniques, and in-depth interviews held in Calmaria II, an agrarian reform settlement directly executed by the Brazilian Agency for Agrarian Reform (INCRA)[79] located in northeast Pará. Calmaria II is the first INCRA settlement in Brazil where oil palm has expanded under contract farming and is nowadays the place with the highest concentration of contracted families. Focusing on a single case study and using mixed methods allows a deeper understanding of complex realities (internal validity) and complements econometric and large n comparative studies that typically focus on universal laws or fully generalizable findings (external validity). Our results will contribute to the discussion on how contract farming should be designed in order to maximize potential livelihood gains and minimize potential negative environmental impacts.

79 Nowadays there are six modalities of agrarian reform directly executed by INCRA. The most common is *PA - Projeto de Assentamento* (settlement project), which is characterized either by the distribution of available public lands or by the federal expropriation of private land and subsequent allocation to landless people, called agrarian reform beneficiaries. Expropriated properties are large-scale unproductive estates (such as in the case of Calmaria) or properties considered to be illegally obtained, which are normally flagged and occupied by landless movements. Upon regularization, beneficiaries are entitled to some benefits, such as access to credit for both housing and agricultural production, technical assistance, and access to basic infrastructure such as roads, water, and energy.

The paper proceeds as follows. After this introduction, we introduce the academic debates and the oil palm contract farming model in order to contextualize our case study. That is followed by a third section in which we present the research site and the methods for both environmental and social analysis. The fourth section presents the main results and discusses explanatory factors shaping those results. The fifth discusses the overall implications for contract farming scheme design. The paper ends with some concluding remarks.

6.2. BACKGROUND

6.2.1. Academic debates on contract farming

Contract farming, with a particular emphasis on developing countries, has been a topic of academic interest since at least the 1980s (Glover, 1984). In recent years, however, there has been an upsurge, partly related to the debates on the rapid expansion of plantation agriculture and its associated negative impacts on smallholders in many countries (Vermeulen and Cotula, 2010). This strategy has been promoted as a mechanism to address structural market failures and yield gaps that limit smallholder integration in the global economy. In theory, it also has the capacity to combine the advantages of plantation agriculture (e.g., quality control, technical capacity, and market orientation) and smallholder agriculture (e.g., higher incentives, and equity in land and income distribution) (Reardon et al., 2009).

However to what extent that actually has the capacity to improve smallholder livelihoods is still a major debate. Some authors claim that contract farming is merely a strategy for agribusinesses to access more land and cheap labor (Minot, 2007). In essence, contract farming is an intermediate form of agricultural organization where production and exchange conditions between producers (not necessarily smallholders) and buyers are defined through formal or informal contracts. As such, contract farming impacts largely depend on design features. A large number of studies have assessed the livelihood effects of contact farming (Warning and Key, 2002; Simmons et al., 2005; Briones, 2015); some of them also assessed their links with design features (Bellemare and Lim, 2018; Wuepper and Sauer, 2016; Abebe et al., 2013). Despite the methodological challenges associated with estimating livelihood impacts, such as self-selection biases, a significant share of the literature has identified positive impacts (Bellemare and Bloem, 2018).

Surprisingly, little if any attention has been paid to the environmental impacts of contract farming schemes, in particular deforestation. Of more than 60 journal articles on contract farming reviewed, only one mentioned environmental aspects (Morvaridi, 1995). Given that contract farming schemes are often implemented in forest frontiers or other high conservation value ecosystems, ensuring that contract farming does not contribute to deforestation should be perceived as key.

6.2.2. The oil palm contract farming scheme in Brazil

The idea of smallholder inclusion through contract farming in the palm oil sector emerged in the early 2000s, when the largest oil palm investor at that time in Brazil, started to pilot smallholder schemes in the state of Pará. Between 2002 and 2006, four projects were launched by Agropalma involving a total of 185 families. The schemes became popular (Langevin, 2011) and inspired the federal government to launch the SPOPP in 2010, which institutionalized the contract farming scheme and attracted new investors to integrate smallholders.

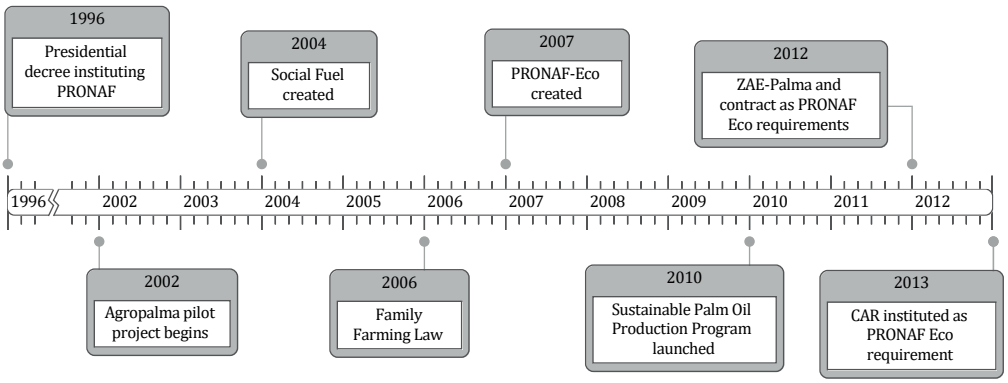
Despite some historical examples, contract farming, especially through governmental intervention, was a new thing in the Brazilian Amazon. Given the historical distrust between private sector investors and smallholders and the intense polarization between what is conventionally known as "agribusiness" versus "family farming" (Favareto, 2016), the strategy was not consensual. Critics feared that the program would benefit companies at the expense of smallholder farmers (Córdoba et al., 2018) and that oil palm could induce further deforestation (Butler and Laurance, 2009). Yet, in its heyday (when it had the support of 80% of voters), the government had no difficulty fending off most criticism and the SPOPP moved forward. In just a few years, nearly 1500 families engaged in the oil palm business in Pará, the state that concentrates around 80% of national production. In addition to Agropalma, four other investors (ADM, BBB, Biopalma and Marborges) developed smallholder schemes (see Brandão and Schoneveld (2015) for a full description of the sector).

Under the SPOPP, smallholders with an exclusivity contract with a palm oil processing firm were allowed to access a credit line created under the Program to Support Family Farming (PRONAF) to target oil palm (and rubber), to plant up to 10 ha of oil palm under monocrop system, called PRONAF Eco. With PRONAF Eco, farmers could benefit from free technical assistance and a guaranteed market at a minimum price of 10% of the Rotterdam price of crude palm oil (CPO) (a requirement of the Social Fuel Stamp).[80] The credit package covered quality seedlings, fertilizers, and other inputs for the first three years, as well as a fixed stipend to cover labor costs up to the third year, the period of time during which oil palm is considered unproductive (Brandão and Schoneveld, 2015). The inclusion of private firms directly interested in ensuring the scheme's success as buyers and service providers differs from typical smallholder credit packages implemented in the Amazon. Normally, they do not offer any market guarantee, while technical assistance is provided by public or outsourced firms. The latter aspect has shown poor results due to corruption and a lack of human and financial resources, among other inefficiencies (Bianchini, 2015).

80 The Biodiesel Law, ratified in 2005, specified national blending mandates for biodiesel, and established a social certification scheme (Social Fuel Stamp - SFS) which offered fiscal incentives to biodiesel producers to buy a minimum percentage of processed feedstock from smallholder farmers under specific rules and conditions.

The SPOPP also strictly forbade the conversion of forestlands to oil palm by adopting the Agro-Ecological Zoning of Oil Palm in Deforested Areas of the Amazon (ZAE–Palma)—a zoning instrument that identifies the areas available for expansion without conflicting with primary forest and indigenous territories. Both small and large investors are obligated to submit a CAR (Rural Environmental Registry), a geo-referenced cadaster that allows banks to check whether the area available to plant oil palm observes ZAE–Palma. Moreover, the CAR also allows banks to monitor deforestation, according to the official data provided by PRODES. These rules complement the existing environmental framework in Brazil, whose major instrument at the federal level is the Forest Code.[81] The Forest Code is operationalized at the state level through specific instruments, in the case of Pará though the Rural Environmental License (LAR). Due to their capacity to influence national policies, smallholders enjoy certain benefits. For example, they are excluded from having to restore areas deforested before 2008, as stated in the Forest Code, and are exempted from obtaining a LAR in Pará.[82] The following figure (6.1) presents a timeline of SPOPP's major rules in relation to contract farming.

Figure 6.1: Contract farming rules timeline



While we generally classify the criteria for the inclusion of smallholders under the SPOPP as homogeneous, in fact there are some nuances, as depicted in figure 6.1. These include a time lag between the SPOPP launch (2010), its requirements of ZAE–Palma observance (2012), and the obligation to submit a CAR (2013). Moreover, there are also some nuances regarding land tenure. For example, in INCRA settlements such as Calmaria II, given the public ownership of

81 The Forest Code created two important concepts, the Area of Permanent Preservation (APP) and the legal reserve. A legal reserve is a proportion of a rural property that should remain forested, while an APP is a sensitive area such as a riverside, hilltop, or steep slope that should be protected from conversion. Under the current rules, the Forest Code required that 80% of a rural property should be maintained as legal reserve in the Legal Amazon. State governments may however reduce the size of the legal reserve from 80% to 50% by designating certain areas as agricultural production zones through Ecological-Economic Zoning (ZEE) plans. This is the case of northeast Pará for example, where this paper is focused.

82 The "smallholder" statute observes the Family Farming Law from 2006 and is proven by the Declaration of Aptitude to PRONAF (DAP).

land,[83] the CAR is submitted at settlement level and not at property level. Moreover, access to credit in INCRA settlements is restricted by the observance of certain rules. For example, third parties such as technical assistance providers need to negotiate with INCRA to operate inside settlements. Moreover, the statute (DAP) that allows the enjoyment of smallholder benefits can only be issued by INCRA, while smallholders living in private areas can obtain it through unions or public technical assistance providers. Normally, these specificities make access to credit inside settlements more difficult and bureaucratic, which incentivizes bribery and other irregularities.

6.3. METHODS AND CASE STUDY

6.3.1. Research site

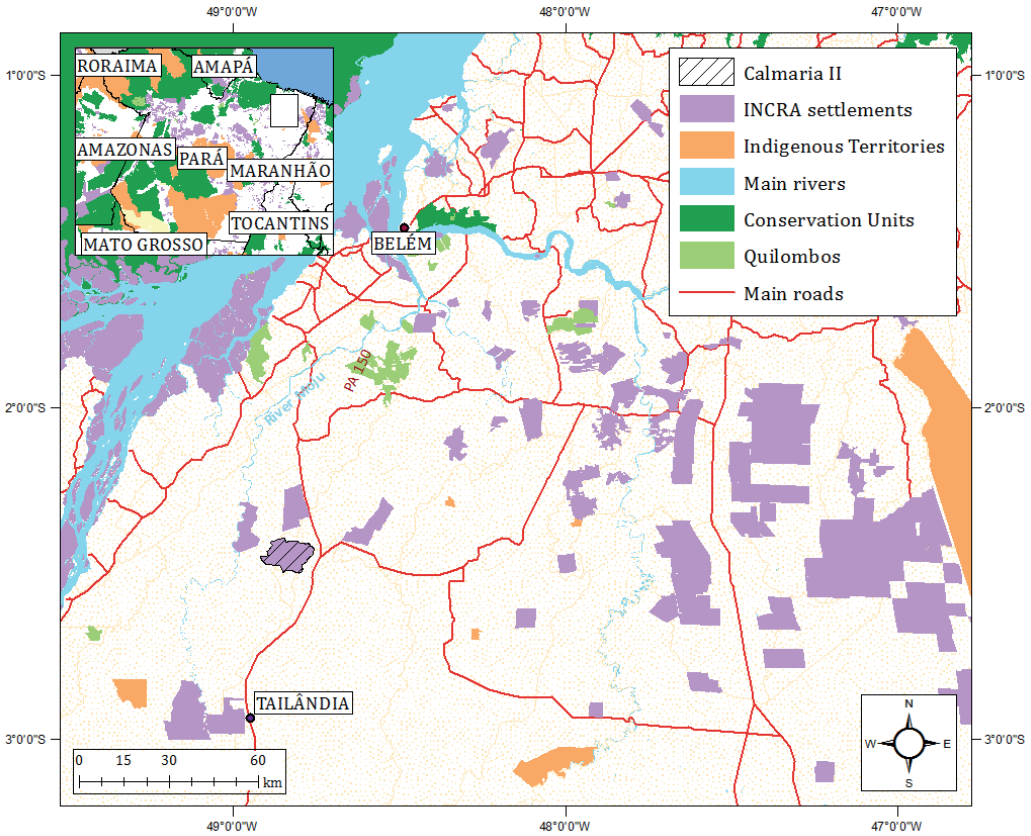
Calmaria II (hereinafter just Calmaria) is located in the tri-border between Moju, Acará, and Tailândia municipalities in the state of Pará (figure 6.2). For centuries, this territory was sparsely populated by traditional populations including the indigenous group Tembé and some riverside dwellers making their livelihoods based on extractive activities, subsistence farming, and sporadic trade with river merchantmen. The inauguration of the PA150 highway[84] in 1977 began to attract the attention of both investors and migrants, opening up a new deforestation frontier in the eastern Amazon (Prado, 2006), often inducing violent conflicts (Sacramento, 2012). The rapid influx of newcomers looking for new lands was linked to fiscal incentives and subsidies to attract investors to the Amazon, and colonization programs to reduce the demographic pressure and poverty elsewhere. Between the 1980s and early 2000s, the region underwent intensive timber and charcoal cycles, followed by the arrival of a number of investments in livestock and oil palm.

Part of the area that is now Calmaria was an abandoned ranch occupied and claimed by rural workers in 1998. INCRA formally recognized a total area of nearly 13,000 ha in 2005 (Andrade, 2009). The settlement not only included the claimed ranch but also a large area of forestland. At the time of the formal recognition, settlement deforestation rates were very high and most of the standing forests were already in advanced stages of degradation due to intensive selective logging. These actions, in Calmaria and elsewhere, made Moju and particularly Tailândia some of the municipalities with the highest deforestation rates at the time and attracted the attention of the federal government.

83 INCRA settlements are classified as federal lands. Individual land titles are only issued upon a settlement's emancipation, which normally can take several decades to take place.

84 The PA150 highway was constructed to connect the new investments in aluminum in Barcarena and the recently created Tucuruí dam.

Figure 6.2: Research site



Source: Representation of own data; IBGE cartographic base; Geographic Coordinate System: WGS 1984

In 2008, the unprecedented federal operation "Arc of Fire"[85] was launched to control high deforestation rates, illegal charcoal production, and timber extraction in the region. The operation gave rise to unemployment and an economic slowdown, which instigated major tension and social unrest. In this new context, oil palm emerged as a hopeful alternative. In fact, two years before the operation, Calmaria was selected for Agropalma's fourth pilot project, the first in an agrarian reform settlement. Moreover, expanding company-managed plantations in the region were increasingly demanding labor and since 2014 Biopalma has been also expanding

85 Arc of fire was launched in 2008 to fight illegal logging in critical municipalities identified by satellite images. Tailândia was the first town to be targeted by the operation early in February 2008. Although Altamira was planned to be the first municipality to be targeted, a violent popular reaction against the state-led *Guardiões da Floresta* operation few days before in Tailândia, changed the plan. Arc of Fire was run by IBAMA for 40 days and involved more than 1000 military, civil, and federal police agents resulting in BRL 23m in fines, the confiscation of illegal logs, and the dismantling of 14 sawmills, 25 charcoal companies, and 1175 charcoal ovens—which resulted in the mass unemployment of between 11,000 and 12,000 people.

its smallholder scheme in the settlement. By 2015, Agropalma had 35 contracts while Biopalma had already contracted 38 households from a total of 299 families formally settled.[86]

6.3.2. Data collection and analysis

Data were collected through both quantitative and qualitative methods during extensive fieldwork in the region between 2014 and 2017. The analyses performed are presented in the following two subsections.

6.3.2.1. Environmental analysis

The deforestation analysis was performed through the classification of high-resolution images for the period 2010–18. This period was defined for two reasons. First, the Brazilian regulatory framework established 2008 as the deforestation cutoff year. According to the Forest Code, deforestation before 2008 is not considered "illegal." The same logic is adopted by the SPOPP, which uses the same baseline. As such, the main question is the extent to which oil palm has been a direct driver of deforestation since 2009. Second, there is no free access to high-resolution images, which often involves costs that are unaffordable to research organizations. Thus, conducting deforestation and land-use analysis using high-resolution images is normally very difficult to perform, especially at larger scales, and requires accepting some limitations. We were able to access high-resolution images for 2018 from Planet's global constellation (3 m resolution) and, in the absence of equivalent images from 2009, we used SPOT 2010 (2.5 m resolution).[87] Besides the resolution, the major difference is the number of bands. Planet images have four bands (red, blue, green, and infra-red) while SPOT have three (red, blue, and green).[88]

We conducted a supervised classification using the maximum likelihood method in ENVI. Samples of nine different classes were created based on on-the-ground geolocation and visual interpretation. Classes were defined by their different spectral properties following similar methodologies applied elsewhere (Glinskis and Gutiérrez-Vélez, 2019; Balieiro et al., 2014). Post classification included the use of a majority filter of 9 x 9 in the Planet image and 5 x 5 in the SPOT image to reduce noise. Classification polygons were then manually edited based on visual interpretation to reduce further noise. To simplify visualization and interpretation, the number of classes was reduced to 5.[89] Finally, the two classification maps were cross-tabulated to generate the transition matrix and the Sankey diagram. This analysis allowed us both to understand the

86 In reality this number does not match as colonists informally buy and sell land. As INCRA does not recognize this process, there is a mismatch between official cadasters or surveys and reality on the ground. We estimate the current number of plots at around 230.

87 Access to both images was offered by the Pará State Environmental Secretary.

88 In this specific case, images accessed had the three bands combined into a single band, which further limits the classification based on spectral properties.

89 These are: (1) forest (including primary forests and degraded forests); (2) secondary forest and regrowth (including up to 5 years of regeneration/regrowth), non-oil palm plantations such as açaí, orange, etc.; and more than 5 years of regeneration; (3) pasture (including pasture and farmland); (4) oil palm; and (5) others (includes clouds, shadows, water, roads, villages, bare land, non-forest and burnt areas).

overall land use transition between 2010 and 2018 and to assess whether oil palm planted since 2010 has been at the expense of primary forests. Although the discussion on secondary forest is key to palm oil governance debates, we opted to leave it out as the analysis showed some inconsistencies due to imagery differences.[90] We further conducted a complementary analysis in Google Earth Engine (GEE)[91] to identify the likely year of deforestation. This analysis allowed a comparison of the deforestation pattern of smallholder plantations before and after the SPOPP.[92]

Through a number of functions and successive remote sensing techniques, a time series of Landsat imagery (30 m resolution) between 2000 and 2018 was created, and vegetation indexes were computed over a sample of oil palm polygons previously identified and classified under pre-SPOPP (planted in 2006), SPOPP (planted since 2010), and forest (control group). Smallholder deforestation patterns were captured through the variance of average vegetation indexes over time and comparison with the control group. Considering the low resolution of available imagery, likely edge effects and the expected deforestation patterns (smallholders are not expected to deforest large areas,) this method is not able to provide a crystal-clear year of deforestation. Yet, when combined with the previous high-resolution analysis results, they have shown to be robust.[93] The analysis was finally enriched by the use of Brazil's official data on deforestation (PRODES), qualitative insights obtained through semi-structured interviews (detailed below), and local observations. All details can be accessed via data repository.[94]

6.3.2.2. Social analysis

Data for the social analysis were collected through the use of surveys. In total, 90 questionnaires were filled out between February and March 2015 with the support of four field assistants. A structured questionnaire was applied to household representatives who were clustered in three groups: smallholders with contracts with Agropalma, smallholders with contracts with Biopalma, and a control group of smallholders not engaged in oil palm (hereinafter "non-participants" or "non-adopters"). The clustering between Agropalma and Biopalma groups has two main reasons. First, Agropalma-contracted farmers have mature plantations (around year nine), so they are expected to have been influenced by oil palm income, which normally starts after year four and increases after year six. As Biopalma households planted in 2014/15, at the time of the survey they were still at an early stage (year zero or one). Second, the Agropalma group benefited from *ad hoc* conditions which differ to some extent from the smallholder schemes generally developed under the SPOPP, as is the case of the Biopalma group. Major

90 Moreover, the SPOPP and PRONAF did not introduce any rules concerning secondary forests. Since 2015, the state of Pará has forbidden the conversion of secondary forests after 5 years of regeneration; however, given that at the time of oil palm expansion in Calmaria, this rule was not yet in force we cannot assess how effective it was.

91 This is a powerful tool that allows fast remote sensing analysis through an online code editor platform with access to a large database of satellite imagery.

92 There is also a grey area between 2008, the baseline year set by the Brazilian regulatory framework, and 2010, the classification year.

93 See the link here: https://code.earthengine.google.com/672d7d1b92555f830eab1b2d818d3dbd

94 https://zenodo.org/record/3549827

differences include selection criteria and environmental requirements that are much less stringent in the case of the pilot group. As such, we also refer to the Agropalma group as "pre-SPOPP" or "pioneer participants" (or "pioneer adopters") and the Biopalma group as "SPOPP" or "recent adopters" (or "recent participants"). The following table (6.1) summarizes those differences.

Table 6.1: Cluster sampling

Cluster	Surveys (n)	Year of plantation	Size of plantation	Rules and conditions	Label
Agropalma	30	2006	6 ha	ad hoc (no environmental constraints)	pre-SPOPP, early or pioneer participants (or adopters)
Biopalma	30	2014/15	normally 10 ha	set by SPOPP	SPOPP, recent or new participants (or adopters)
Control group	30	n/a	n/a	n/a	non-participants (or adopters)

Source: own data

Cluster sampling was performed with the support of local community leaders. In the case of pre-SPOPP and SPOPP participants, the sample nearly represents the total universe, while in the case of non-participants we randomized the sample by selecting every second plot. The questionnaire captured GPS locations and data on household characteristics, economic and agricultural activities, social capital, assets, and perceptions in relation to the introduction of oil palm and its socioeconomic implications. In order to identify the main issues and to provide inputs for survey design, two focus groups were held in the settlement in December 2014, during which the process of oil palm inclusion, company rules, and other oil palm-related issues were discussed. The analysis was complemented with qualitative data collected by visiting the facilities of the two companies operating in the settlement, through interviews with company managers, and 36 semi-structured interviews with smallholders, representatives of municipal governments, banks, associations, unions, and community leaders.

The livelihood analysis was performed through the construction of a linear index from asset ownership and housing characteristics indicators as a proxy for wealth. This is a common procedure to estimate a household's long-run socioeconomic status in the absence of reliable data on income or expenditure, which are often difficult to capture without longitudinal research designs (Filmer and Pritchett, 2001). Through a principal components analysis (PCA) performed in R, we identified the meaningful variables, derived its weights, and constructed an asset index for each household by simply summing up the weights multiplied by 0 or 1 (table 6.2). The exclusion of some variables is related to the existence of some requirements to build an asset index. We compared oil palm adopters and non-participants using ANOVA tests to identify significant differences at means.

Table 6.2: Asset index variables and weights

Variable	Explanation	Weight
walls	0 - mud or wooden; 1 - masonry	0.188
toilet	0 - no toilet or wooden; 1 - masonry	0.365
electricity	0 - no access to electricity; 1 access to electricity	0.922
ventilator	0 - no; 1 - yes	0.782
fridge	0 - no; 1 - yes	0.912
tractor	0 - no; 1 - yes	0.021
tv	0 - no; 1 - yes	0.742
cellphone	0 - no; 1 - yes	0.432
car	0 - no; 1 - yes	0.125
cooking	0 - charcoal or wood; 1 - gas	excluded
water	0 - no access to drinkable water; 1 access to drinkable water	excluded
electric iron; bed; washing machine; heating stove; bike; motorbike; PC; couch; generator; boat; canoe	0 - no; 1 - yes	excluded

Source: own data and analysis

6.4. RESULTS AND DISCUSSION

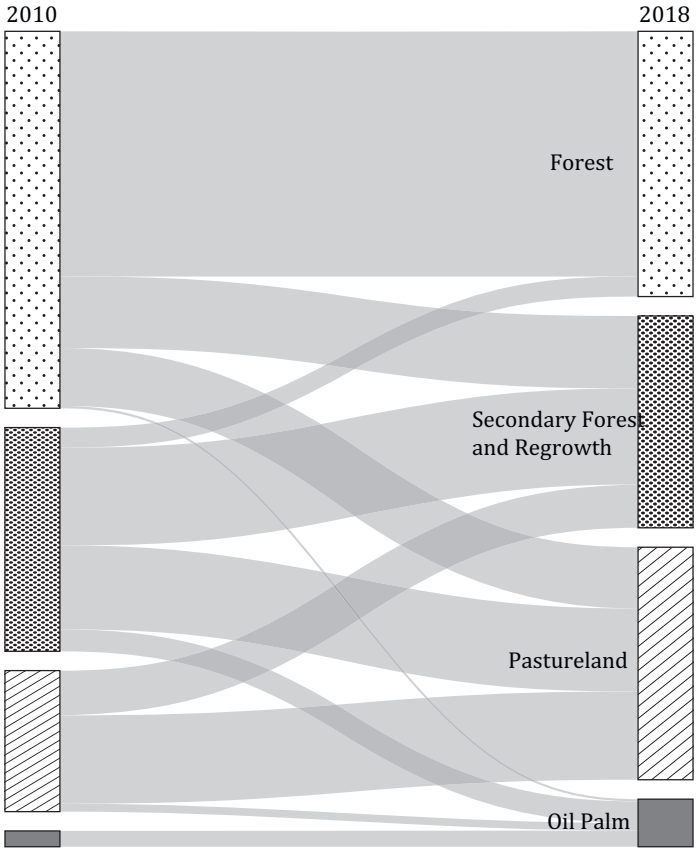
The following subsections present the results of both the environmental and the social analysis and discuss several explanatory hypotheses.

6.4.1. Did smallholders plant oil palm on previously deforested areas?

The land use change analysis for the period 2010–18 (figure 6.3) shows that around 5% of the oil palm area planted since 2010 was planted on converted primary forests. Most new plantations converted secondary forests and regrowth (63%) and pasture or farmland (31%). A visual analysis confirmed that deforestation of primary forests was found in four out of the 38 new plantations identified. Deforestation sizes ranged from 1 to 6 ha (figure 6.4).

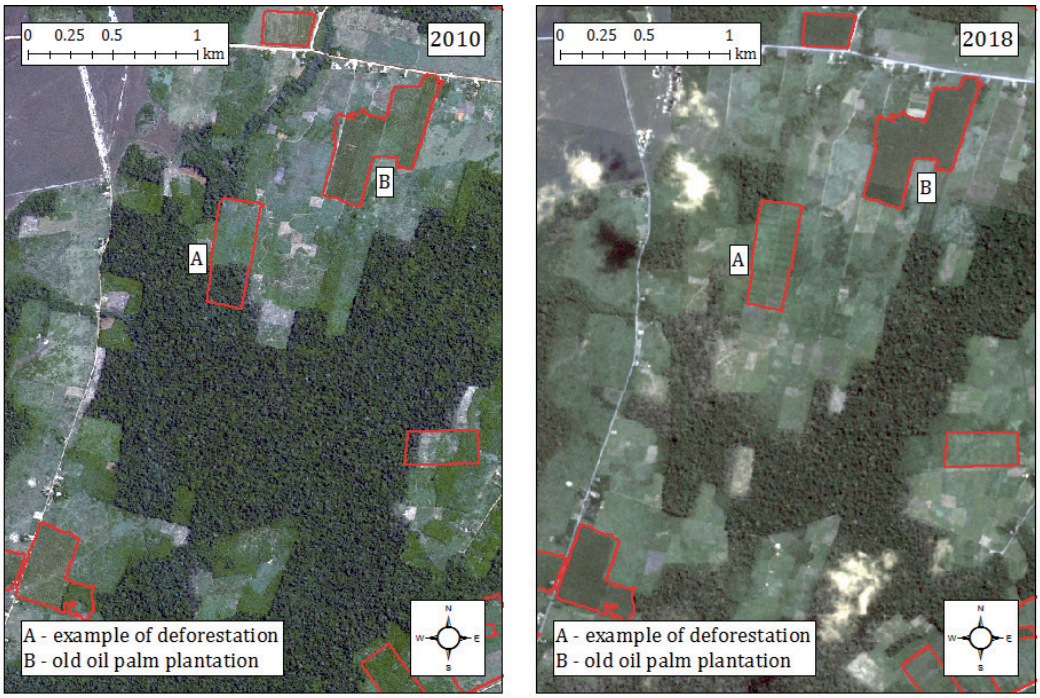
These figures indicate that the major SPOPP goal of avoiding expansion into primary forests was not fully achieved, although the deforestation of primary forests can be considered low.

Figure 6.3: Calmaria land use change between 2010 and 2018



Source: own data and analysis

Figure 6.4: Example of deforestation pattern



Source: Representation of own data; IBGE cartographic base; Planet 2018; SPOT 2010; Geographic Coordinate System: WGS 1984

6.4.2. Explaining deforestation outcomes

Under PRONAF, since 2013 credit allocation has been limited to areas deforested before 2008. As smallholders need to submit a property CAR and identify the area for expansion, the bank responsible for providing credit is able to monitor deforestation and refuse credit to those who deforested primary forests. We tested this hypothesis comparing SPOPP and pre-SPOPP deforestation practices. The complementary analysis of Google Earth Engine (table 6.3) shows no major differences between the groups. Most SPOPP smallholders deforested the areas that are now devoted to oil palm in 2000 or earlier (39%), while 22% recently (2007–09) deforested their areas. In the case of pre-SPOPP smallholders, around two thirds deforested the area that is now oil palm in 2000 or before (66%), whereas 24% cleared primary forest directly to plant oil palm one or two years previously. This indicates a variety of land use practices, but in most cases both pre-SPOPP and SPOPP farmers have selected areas previously deforested to plant oil palm.

Table 6.3: Likely year of deforestation

Likely year of deforestation	SPOPP		pre-SPOPP	
	plots	%	plots	%
2000 or earlier	14	39	19	66
2001–03	4	11	3	10
2004–06	10	28	7	24
2007–09	8	22	-	-

Source: own data and analysis

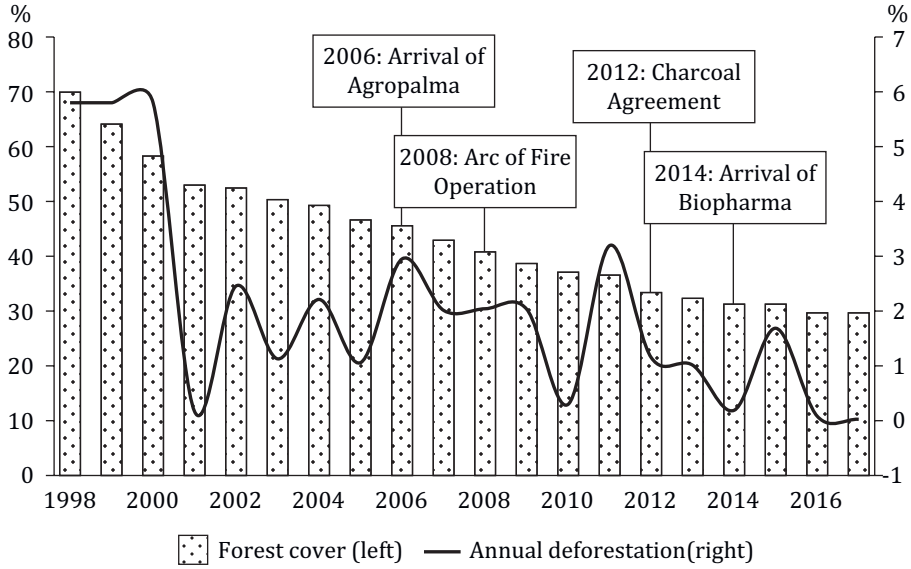
This leads to an alternative explanation: Oil palm was not a major driver of deforestation of primary forests, because when it was introduced there were few forests left and enough deforested land was available. Our results show that oil palm is still small compared to the expansion area allowed by the SPOPP, in this case pasture, farmland, and secondary forests and regrowth. As such, there was and still is enough available area to expand oil palm without clearing the remaining primary forests.

Yet, even without quantitative evidence on a determinant role of the SPOPP preventing deforestation we shouldn't consider it insignificant. In fact, interviews with bank representatives indicate that the environmental monitoring system was fully implemented at the time of credit analysis and was able to identify and reject several cases of non-compliance for environmental reasons.

The Calmaria case should be also analyzed within the context of regional deforestation and occupation processes. The following figures (6.5 and 6.6) depict Calmaria historical deforestation and occupation trends.[95] Deforestation rates were very high in the late 1990s, which coincides with the occupation process. Colonists were arriving and the process of occupying and claiming land was based on clearing forestland. Throughout the 2000s, deforestation rates were consistently between 1–3%, showing not only the arrival of new migrants but also the opening of new areas within plots or the sub-division of existing plots. The formal creation of the settlement in 2005 did not stabilize the migrant influx. Only about half of the respondents are considered original settlers (2005) while only 15% were living in the region before the settlement recognition process started in 1998. It is worth noting that approximately two thirds (69%) of the total sample have declared that they purchased their plots, although INCRA rules do not allow colonists to sell their lands.

95 Given the absence of yearly data before 2000, we calculated indicating values based on averages (1997–2000) for visualization purposes only.

Figure 6.5: Calmaria historical deforestation trends



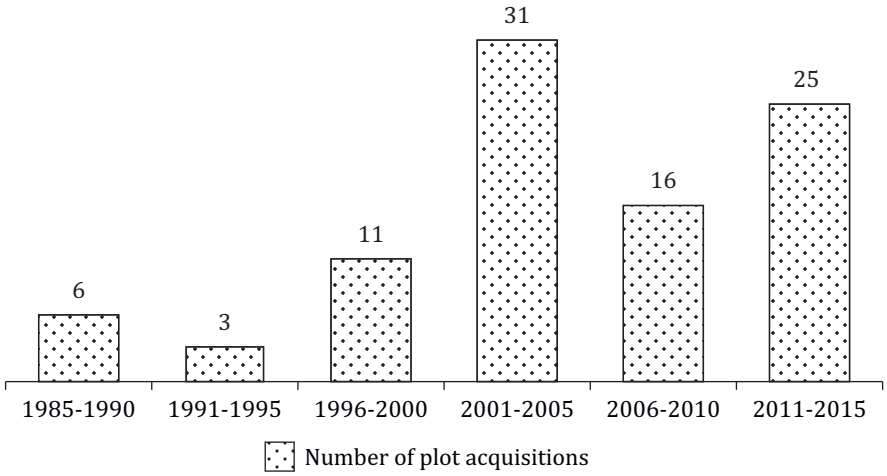
Source: PRODES (INPE, 2019)

These numbers show the ambiguities of agrarian reform in the Amazon. In most cases, original settlers have short-term objectives such as selling the plot following regularization or exploiting the existing timber resources and then moving on (or have failed and abandoned their plot). In a few cases, however, original settlers have a farming or ranching vocation and stay on their plots. The absent original settlers are replaced by second-, third-, or even fourth-generation settlers who normally have a farming-oriented project, given they have invested some money to buy their plot. This is shown by, for example, the following testimony: "I bought the benefit at that time because INCRA does not allow land purchasing. As this plot was not yet formally under the cadaster, I was able to get onto the agrarian reform list."

In this period many colonists in Calmaria were engaged in the charcoal sector, and those with access to less degraded forests in selective logging. As a respondent said:

> It was like this: you arrive to a settlement with nothing. You have no income but you have a family to maintain, so what are you going to do? You are going to find a way to survive. If you plant cassava you have to wait for six months or one year. Are you going to wait? I didn't. And the only thing we knew how to do was slash, burn, and use the residues to produce charcoal.

Figure 6.6: Calmaria historical occupation trends



Source: own data

As described, the typical land-use change process upon arrival included selective logging, followed by charcoal extraction through burning the remaining biomass. While in some cases colonists were only targeting short-term gains and after the charcoal cycle they moved on to a new area, in other cases the opened-up area was converted into agricultural land (mostly cassava) or pastureland, in many cases supported by existing credit packages.

As such, when Agropalma and later Biopalma arrived at the settlement proposing a contract farming scheme, there was not only a considerable amount of deforested land but also the local perception of oil palm as a long-term agricultural activity. Opportunistic settlers looking for short-term gains in timber or charcoal were not interested in long-term investments, while settlers with a ranching vocation were not adapted to the labor-intensive calendar of clearing, pruning, and harvesting required by oil palm. Nevertheless, some settlers with an agricultural vocation perceived oil palm as an alternative to use already depleted soils resulting from several years of ranching or swidden agriculture. This explains, for example, the oil palm deforestation pattern found since 2010 (5%), which was mostly a matter of deforesting a few hectares to have a large enough contiguous area (normally 10 ha) to plant oil palm rather than opening up new areas.

Finally, it is likely that the national context played an important role in reducing deforestation pressure. At least two of these factors were highlighted by respondents. On the one hand, the Arc of Fire operation in February 2008 in neighboring Tailândia and several later command and control actions in Calmaria were a strong sign of federal commitment to halt deforestation. Many sawmills and charcoal ovens were dismantled in the region, which sent an imperative sign to those engaged in deforestation-related activities. As one colonist said: “Everybody became

unemployed and while some tried to engage in agriculture, others moved away. The settlement was strongly engaged in those activities and the operation strongly affected the population." On the other hand, in 2012 the industrial sector agreed to stop buying charcoal from deforested areas. As charcoal prices decreased due to reduced demand, the profitability of the activity was significantly compromised, which further reduced the incentive to stay in this activity. At the time of our survey, only one household was still engaged in charcoal production; however, several families had inactive charcoal ovens on their properties.

Consequently, people who had engaged in deforestation-related activities in the past were compelled to move to other regions or convert to agriculture. The frontier stabilized and a new post-frontier context emerged where the use of previously deforested areas became more favorable and economically viable than continuing to destroy the remaining forests.

6.4.3. Did oil palm contributed to livelihood improvements?

As a new cycle began in Calmaria, it was our goal to check whether oil palm under contract farming has in fact contributed to livelihood improvements. The comparison of asset indexes did not identify significant differences at means between groups, and in fact oil palm pioneer adopters have on average slightly lower values. This indicates that despite benefiting in theory from a stable income source for a reasonable period of time, pre-SPOPP farmers do not have significant differences in terms of asset composition compared to other groups (table 6.4).

Table 6.4: Asset index

Cluster	Asset index	
	Mean (sd)	**F-Value (p)**
Pre-SPOPP	3.3 (1.489)	
SPOPP	3.8 (0.978)	0.812 (0.447)
Non-participant	3.5 (1.22)	

Source: own data and analysis

These findings, although they do not allow us to attribute causality, offer some nuance to several studies, including on Agropalma pilot schemes, which identify higher net income as a consequence of oil palm adoption (Homma et al., 2014; Menezes et al., 2015). Yet, if oil palm is well known for its relevance in terms of income generation and poverty reduction both locally and elsewhere, how can we explain these results?

6.4.4. Explaining social outcomes

One of the reasons is that there is an endogeneity problem. In other words, participant and non-participant families were not randomly selected and had different characteristics at the time they started to participate. In this case, we can say that participant families had a lower welfare

status when they started and through participation they were able to catch up with the other groups. A descriptive analysis of the data collected (table 6.5) shows that smallholder families clustered in the three groups have many characteristics in common but also some differences.

Common characteristics include having on average 4 or 5 family members, normally a couple and few kids, but there also larger families with up to 10 or 12 members and smaller households, such as a single person or an old couple. The person declared as the household head is normally a migrant man between 30 and 60 years old and his education level varies between no education at all to middle school. Normally, offspring have higher education levels given the overall improvements in education in Brazil, although a few have even reached technical or graduate schools. Despite some criticisms of associations, many farmers (60%) are members of community associations, in part given that many of the benefits from INCRA settlements and smallholders in general require having an association and smallholder unions (40%).

However, some variables have shown significant differences ($p = <0.05$, highlighted in bold). The most relevant is that pre-SPOPP and non-participant households are living in the current plot for a longer time, while recent adopters are also more recent arrivals. As there are no differences between the ages of household heads, this suggests that pioneer adopters and non-participants are part of an earlier settler generation. As discussed in the previous section, older generations that remain in the settlement are more likely to have transitioned from selective logging and charcoal production to agriculture, while recent generations are more likely to have agriculture as a major background or at least as a major goal. The fact that recent adopters grow more crops compared to the other groups corroborates this analysis. Moreover, it is likely that many of the recent adopters were not in the settlement at the time of the pilot scheme. As such, in those cases participation was not a matter of choice but rather of impossibility.

These differences indicate that participation is not random and recent adopters have in fact different characteristics, which might produce different outcomes. Yet, this hypothesis does not explain why pre-SPOPP and non-participants had similar results in terms of welfare improvements. The only differences between these groups are prior experience with oil palm and market orientation. The former is probably a reason why pre-SPOPP households decided to participate (they were more familiar with oil palm), and the latter is probably a consequence of oil palm adoption, since pre-SPOPP families tend to specialize in oil palm and reduce their production of other market crops.

The second reason is that the source of income is not a critical aspect to differentiate consumption and expenditure patterns in assets and housing characteristics. Instead, contextual factors such as agrarian reform benefits and other public policies are more relevant. As these policies target participants and non-participants equally, all groups are able to benefit, and consequently there are no visible differences.

Table 6.5: Descriptive statistics of sampled farmers

Variables	Pre-SPOPP[a]		SPOPP[b]		Non-participants[c]		F-value (p)
	mean	sd	mean	sd	mean	sd	
Household members (n)	4.2	2.261	4.8	1.953	3.9	2.187	1.3 (0.275)
Age of household head (years)	49.9	12.844	45.7	11.757	52.1	12.554	2 (0.138)
Highest education level of household head (1-5)	1.2	1.023	1.2	1.300	0.9	0.980	0.7 (0.482)
Highest education level within the household (1-5)	1.8	1.214	2.3	1.306	1.5	1.225	2.9 (0.06)
Dependency ratio	0.7	0.695	0.7	0.414	0.7	0.572	0.1 (0.882)
Migrant household head (dummy)	1.0	0.180	1.0	0.186	1.0	0.000	0.5 (0.607)
Living in current plot (no of years) [ab bc]	**12.0**	**6.501**	**6.9**	**5.436**	**11.4**	**7.898**	**5.2 (0.008)**
Household labor (n)[ab]	**2.0**	**0.983**	**3.0**	**1.700**	**2.3**	**0.844**	**5.2 (0.007)**
Prior experience with oil palm (dummy)[ac]	**0.6**	**0.502**	**0.4**	**0.501**	**0.2**	**0.430**	**4 (0.022)**
Female labor ratio	0.3	0.271	0.4	0.222	0.3	0.242	2.1 (0.124)
Income sources (n)	3.4	1.455	3.6	1.659	3.8	1.827	0.4 (0.664)
Bolsa Familia (dummy)[ab]	**0.3**	**0.445**	**0.6**	**0.494**	**0.4**	**0.490**	**4.6 (0.013)**
Association membership (dummy)	0.7	0.445	0.6	0.501	0.5	0.507	1.5 (0.222)
Union membership (dummy)	0.4	0.502	0.4	0.501	0.4	0.498	0 (0.988)
Land size (hectares)	41.7	23.498	41.9	21.559	49.7	33.817	0.9 (0.418)
Crops (n)[ab]	**2.8**	**2.247**	**4.1**	**1.791**	**3.8**	**2.223**	**3.1 (0.048)**
Market crops (n)[ac]	**0.9**	**1.076**	**1.4**	**1.150**	**1.9**	**1.447**	**5 (0.009)**
Consumption crops (n)	1.8	2.024	2.5	1.920	2.8	1.884	1 (0.38)
Livestock (dummy)	0.3	0.445	0.1	0.351	0.2	0.407	0.67 (0.518)

Source: own data and analysis

In fact, given that INCRA has offered houses as part of the agrarian reform process, housing characteristics are not generally different, though in some cases households may invest in some improvements, and for a number of reasons not all have benefited from housing credit. Also, many households have access to electricity as the major accomplishment of the "Electricity for All" program introduced in the mid-2000s, or due to organizational capacity or logistical proximity to establish illegal electricity connections. Besides, as mentioned by numerous respondents, consumption patterns and access to social services have significantly improved in the period ruled by the PT government, which introduced and facilitated smallholder-oriented

consumption credit.[96] As such, context matters and it played a role in promoting overall livelihood improvements and blurring possible differences derived from oil palm participation.[97]

An analysis of pre-SPOPP farmers' gross and net oil palm incomes strongly suggests that oil palm produces differentiated results within groups. In other words, not all households are able to succeed and enjoy its benefits. As such, oil palm might be a valuable livelihood option for some groups but not for others. Nearly one third of the people who declared their production figures are below expected productivity (20 tons/ha/year). Most of the underperforming cases represent households that have acquired the oil palm project from someone else, often in a bad or an abandoned condition (25% of the original contracted families abandoned the project). This shows that there are important differences within participant families. While a good farmer can achieve a net revenue of US$ 820 per month, a bad farmer might achieve less than US$ 300. With fertilizers and credit instalments as fixed costs, the availability and allocation of household labor to the oil palm project is a key element to ensure a fairly good income. Moreover, the adoption of the required agronomic practices is also a critical element to ensure good productivity. As it was commonly referred by company technical assistants: "Oil palm is like a kid: If you take good care, productivity will be high and after several years returns will be good; however, if you don't take good care it will cause you problems." In sum, despite benefiting from similar conditions, oil palm participation under the current model has produced different outcomes.

6.5. IMPLICATIONS FOR CONTRACT FARMING SCHEMES

The Calmaria example of oil palm contract farming introduced under the SPOPP has some strengths but also some limitations. The fact that only residual smallholder expansion has been into forestland is obviously a positive sign. Given that most smallholder expansion in northeast Pará has taken place in areas with large reserves of previously deforested lands, suggests that the Calmaria example is likely to be representative of the overall sector in Pará (see Chapter 7). This contrasts with a number of cases elsewhere, where smallholder expansion has led to the conversion of large areas of forestland (Bennett et al., 2018). Yet, under the current policy design, the environmental monitoring system has not proven to be 100% robust to target smallholder expansion, and the overall positive results cannot be dissociated from other factors.

96 A family normally has access to fridges, TVs, cellphones, or motorbikes, while richer households might have a car or a tractor.

97 In addition to housing and consumption patterns, there were also no differences in terms of access to education or health. Indeed, primary and elementary education is directly provided in the settlement while high school is provided in Palmares. In all cases, school buses drive students to school every day; however, particularly in the rainy season respondents complained that it was difficult to drive on dirt roads. In Palmares there is also a health center and a police station, recently created given the social pressure created by the influx of migrants to work in company plantations, particularly since the SPOPP.

The low deforestation rates associated with oil palm should not be delinked from the facts that there is enough land deforested before 2008 that settlers can convert to oil palm, , that there is an overall decline in deforestation in the region, and that the local people see oil palm as a suitable crop to grow on soil depleted by several years of ranching or swidden agriculture. Consequently, it is not advisable to allow expansion into areas with large amounts of forestlands. Oil palm could be a viable option to increase per hectare yields and restore soil fertility at the forest margins (in areas where previous cycles such as charcoal or ranching have been intense), but can hardly be an option for frontier areas. As such, it is recommended to restrict expansion into frontier areas and to prioritize investments in areas with a high availability of deforested areas. Settlements or other areas located in or near frontiers should be targeted by different programs to promote other livelihood options.

While oil palm expansion under contract farming has been shown to have prevented direct deforestation, we are not able to say whether there are any indirect land-use changes. The fact that by increasing per hectare income oil palm could increase the pressure to open up new lands elsewhere is still a possibility. As such, efforts to control deforestation in settlements should be articulated with overall strategies to halt deforestation, including the maintenance of command and control actions and incentives to adopt new practices and other livelihood alternatives. In terms of deforestation monitoring, the official deforestation system (PRODES) is outdated and no longer adequate to run analysis at the property level, particularly small properties. High-resolution monitoring systems already exist. The state of Pará is monitoring deforestation and issuing LARs with real-time Planet imagery (spatial resolution of 3 m), which has considerably improved the accuracy.[98] Yet, as smallholders are exempted from obtaining an LAR, they are not monitored through this system. Thus, in addition to updating the existing monitoring system we also recommend including smallholders in the regularization process, however by creating a simplified system in order to avoid burdensome bureaucracies and unnecessary difficulties for smallholders.

Yet, even if oil palm is introduced under the recommendations mentioned above in order to prevent deforestation and contribute to restore degraded areas, oil palm under the current model may still result in different livelihood outcomes among households. Some households can be very successful in the oil palm business, while others may fail. Failure in the contract farming scheme may result in the blacklisting of those households that have high debts and they will face limitations in terms of access to other credit options.

A systematic analysis of successful and unsuccessful oil palm farmers, complemented by interviews with smallholders and company managers, identified five critical aspects: (a) stage of

98 Through the recently created CIMAM (Integrated Center for Environmental Monitoring) and the "Olho na Floresta" program, an algorithm created to identify deforestation is intended to run every two days and identified deforestation info is immediately sent for the municipal environmental secretary for ground-checking.

life, (b) spirit, (c) household labor, (d) vocation, and (e) context. Successful households are more likely to have these characteristics rated as A while unsuccessful families tend to have more characteristics graded as B. The following table (6.6) summarizes those results.

Table 6.6: Critical factors shaping success and failure

Criteria	A	Specification	B	Specification
Stage of life (rural succession)	Young to middle age	Household head usually <60 years or if there is a son taking over	Declining or retirement	Households reducing production, head often >60 or 70 years, without younger family members interested
Spirit (soft skills)	Commercial or entrepreneurial	Willingness to invest and diversify production, often cash crops, less likely to produce food crops, in some cases also invest in trade or cattle	Traditional or subsistence	Less diversified, often producing food crops for subsistence and occasionally to sell
Household labor	Abundant	Often two or more family members to work, normally men, not necessarily living in the same household	Shortage	Often one or no family worker, some households with high dependency ratios or health problems
Vocation	Agricultural	Households whose major activity and background is related to agricultural	Non-agricultural	Households with non-agricultural background such as public servants, small tradesmen, or service providers but for some reason engage in oil palm
Context	Favorable	Favorable logistics, no major problems with inputs and climate	Unfavorable	Problems with input provision, fires, logistical difficulties, and droughts.

This means that the current SPOPP contract farming scheme is likely to benefit and work well for younger people with a more commercial and entrepreneurial spirit, enough available household labor, and an agricultural vocation. Families that do not meet these criteria are likely to fail. Moreover, contextual factors such as difficult logistics, delays in input provision (as happened in many cases among SPOPP participants), fires, and hydraulic shortfall (has happened in 2015 and 2016) may make it even more difficult to succeed. This leads to two important implications.

First, under the current scheme, selecting the right households or establishing the appropriate inclusion criteria is critical for the success of the scheme and to prevent failures. Companies and banks should not assume that oil palm is the best option for every household. Families that are at an advanced stage of life (often with a household head of around 60 or 70 years and no younger family members interested), have a traditional and subsistence mentality, and have little household labor and/or little agricultural vocation are more likely to fail. Households meeting two or more of these criteria should not be included or should be included with precaution.

This leads to the second issue. While accepting that the current model for oil palm only works for certain households, it is critical to have strategies for the unsuccessful ones, either by changing the model or having alternative public policies. Changing the model includes, for example, the possibility to significantly reduce the plantation size (from normally 10 ha to less than 5 ha), which reduces both the risk and the labor demand. It also includes the possibility to promote oil palm under agro-forestry systems as it is being currently tested in some places. Farmers could intensify and diversify their per-hectare production; however, this option probably requires household labor, an agricultural vocation, and an entrepreneurial spirit, which suggests that it may not work for many of the excluded households.

For those cases, existing public policies such as rural retirement pensions, nested markets, and credit packages for other crops should be maintained and strengthened. The last-mentioned option, for example, could also benefit from the oil palm contract farming experience. Replicating models where critical successful factors such as a guaranteed market, free technical assistance, long-term and stable production, and stable prices over time could work for other crops. Açaí, pepper, or cacao have the potential to be important livelihood alternatives.

6.6. CONCLUDING REMARKS

Under Brazil's contract farming model, oil palm can be a viable option for smallholder farmers to improve their livelihood standards without destroying forests in the Amazon. However, this article has shown that this does not apply to every region and that different households may respond differently to the same scheme. Brazil's scheme can work for households with an agricultural vocation and a commercial spirit in areas with an abundant availability of degraded lands, but can hardly be a solution for frontier areas and subsistence or more dependent households.

To both reduce poverty and prevent deforestation in tropical landscapes through contract farming, there is a need to combine a multitude of policy options in the scheme design, including differentiating the introduction of schemes in frontier and post-frontier areas, more refined systems to monitor deforestation, and adjusting the model to fit the needs of excluded groups. There is also a need to invest in alternative livelihood options for excluded groups. As such, countries that are willing to develop contract farming schemes elsewhere should not only consider these conclusions for scheme design, but also acknowledge that no single model is likely to work for everybody and everywhere.

CHAPTER 7

The challenge of reconciling conservation and development in the tropics: Lessons from Brazil's oil palm governance model

7.1. INTRODUCTION

Few tropical commodities have been as controversial as oil palm. The sector's large social and environmental footprints have in recent decades made it a primary target for civic action, driving the emergence of several transnational regulatory innovations (Rival and Levang, 2014). Initiatives such as the certification scheme developed under the Roundtable on Sustainable Palm Oil (RSPO)—a multi-stakeholder platform led by non-state actors—and corporate commitments to zero deforestation[99] are examples of highly influential strategies to enhance the sector's sustainability in which public governance has virtually no role. Moreover, consuming country initiatives such as the European Union Renewable Energy Directive (EU-RED) and green procurement policies have also been promoted as demand-side strategies to enhance the sustainability of palm oil supply where producing countries have also little to no influencing capacity (Jopke and Schoneveld, 2018).

These governance arrangements were partly a response to societal pressure and the recognition of the inability of domestic public governance to effectively address the socio-environmental "externalities" of commodity production (Pattberg and Stripple, 2008). This is particularly relevant in the context of ongoing trends such as globalization, privatization, and decentralization (Lemos and Agrawal, 2006; Lagendijk et al., 2009). They were also a reaction to the limited state capacity to enforce rules and operationalize incentives in certain countries, particularly in remote areas where agricultural investments normally take place (Nepstad et al., 2013).

Despite their overall socio-environmental ambition, transnational governance processes have been questioned due to concerns about effectiveness and equity arising from how tradeoffs between economic, social, and environmental goals are managed. Examples of problems are innumerous and have been presented in Chapter 1. In general, criticisms of the RSPO include the depoliticization and commercial dominance (Dauvergne, 2018; Higgins and Richards, 2019), the problem of bifurcation of markets (Jopke and Schoneveld, 2018), non-compliance, and a lack of adequate criteria regarding, for example, secondary forests (Houten and Koning, 2018). Furthermore, the effectiveness of corporate zero-deforestation commitments has also been questioned, for example, due to the lack of consistency of deforestation definitions, leakage, and high monitoring costs (Lyons-White and Knight, 2018).

A particularly problematic issue that is normally undervalued in academic and policy debates is the social dimension. For example, there are concerns that certification under RSPO tends to exclude smallholders from benefiting from formal certified markets due to factors such as limited knowledge, difficult access to quality inputs, limited access to credit, and

99 According to Supply Change (http://www.supply-change.org), as of 2018, 285 corporations along the palm oil value chain (producers, processors, traders, have announced commitments at global level, including on certification (267), no deforestation of any type (109), and to develop traceability systems (90).

inadequate incentive mechanisms such as price premiums (Astari and Lovett, 2019). Therefore, transnational initiatives such as RSPO might privilege large players over local actors' interests such as smallholders or local governments (Pichler, 2013; Brandi et al., 2015; Nesadurai, 2018). This is why they are sometimes regarded as green colonialism; in other words, environmental narratives that maintain the exploitation of developing countries by inhibiting their economic development and undermining national sovereignty (Pye, 2018).

In this paper we analyze to what extent palm oil producing countries may create alternative governance models that are better equipped to reconcile conservation and development, more precisely to manage trade-offs between typical domestic demands such as economic development and poverty alleviation, and transnational concerns about forest conservation and its strong link to climate change. Specifically, this paper identifies the social, economic, and environmental outcomes of a recent oil palm expansion process, while discussing tradeoffs between outcomes and their connections with the governance system in place. In Brazil, the federal government is driving oil palm expansion in the Amazon through the Sustainable Palm Oil Production Program (SPOPP), which it launched in 2010. The aim of the SPOPP is to create the enabling conditions for expanding oil palm plantations and industrial capacity while simultaneously restricting expansion into degraded areas—thus contributing to the prevention of deforestation and the promotion of restoration as part of the climate mitigation agenda—and promoting social inclusion through targeted incentives for companies to engage smallholder farmers in their supply chains (Brandão and Schoneveld, 2015).

By analyzing the Brazilian case, this article evaluates whether a public-sector driven sustainability program like the SPOPP could serve as a positive reference point for the development of commodity governance models premised on national sovereignty principles, also called the legality approach (Brack, 2019). This is particular relevant since a number of countries have been pursuing domestic strategies partly as a reaction to transnational governance initiatives. The most important and discussed examples include the Indonesian Sustainable Palm Oil (ISPO) initiative and the Malaysian Sustainable Palm Oil (MSPO) standard. From domestic perspectives, these initiatives are strategies to better align domestic interests—such as economic growth and poverty reduction—with global interests, for example, climate change and biodiversity conservation. Some observers, however, have seriously questioned the credibility of domestic standards and their ability to deliver the required socio-environmental change (Schouten and Hospes, 2018). This raises doubts about the effectiveness and whether producing country initiatives are simply strategies to undermine RSPO and to greenwash. By looking at alternative governance models such as Brazil's and broadening the geographical scope of palm oil-related governance debates, we aim to understand whether that is the case.

The paper proceeds as follows. After this introduction, a background section (7.2.) briefly introduces the analytical framework and the methodological approach. This is followed by a synthesis of findings on environmental, social, and economic outcomes (section 7.3.). Outcomes

and their connection to the governance system are then discussed in section 7.4. The paper then reflects on trade-offs between different types of outcomes (section 7.5), before concluding with a reflection on the findings and implications for governance debates (section 7.6).

7.2. BACKGROUND

7.2.1. Analytical framework

The SPOPP is principally a policy intervention that aims to alter the decision-making parameters that influence the behavior of smallholders and companies (actors with direct influence), and to a lesser extent state agencies (indirect influence), with respect to land use, production models, and benefits sharing arrangements, amongst others. This ultimately affects the supply chain's overall sustainability performance. However, only by developing an understanding of the context, the multiple dimensions of governance (politics, polity, and policy), and their interplay, which has a bearing on outcomes, can we identify causes of success and failure in sustainability governance. Making accurate causal inferences, though, presents a major analytical challenge that is beyond the scope of this paper (Young, 2011).

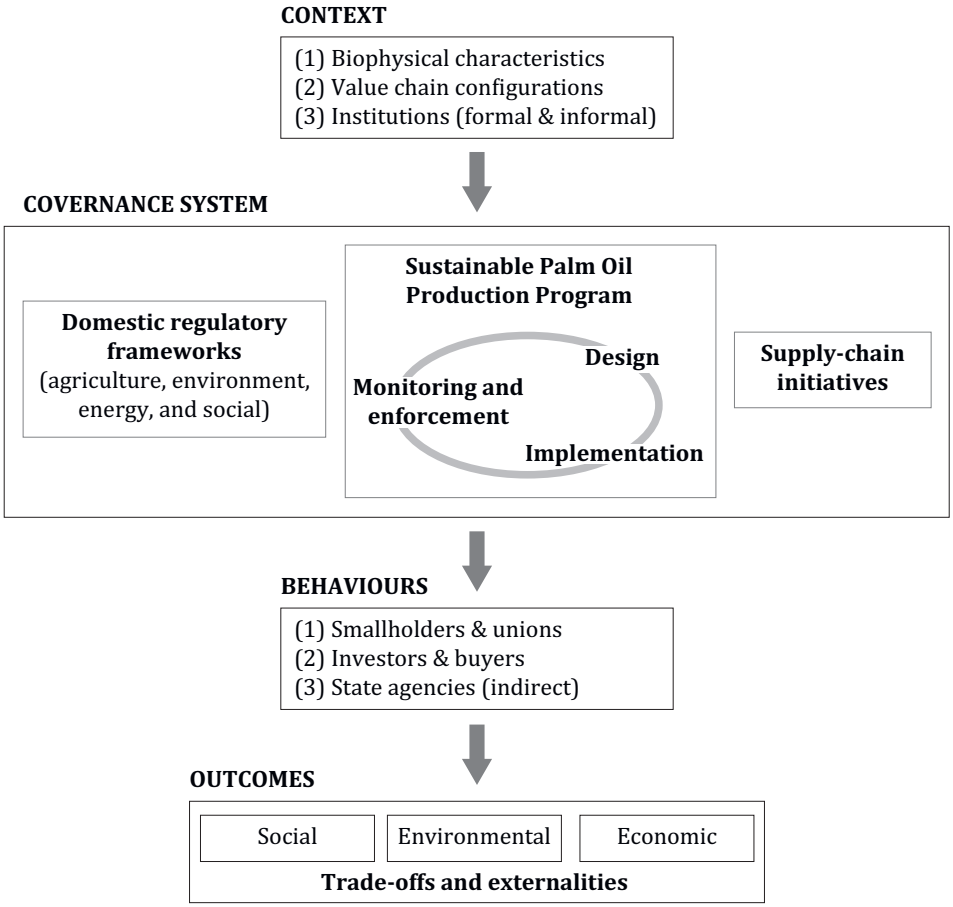
In order to guide the analysis and trace the links between possible factors shaping identified outcomes and to uncover evidence of causal mechanisms at work, the paper develops a framework inspired by Howes et al. (2017) and Abbott and Snidal (2009) (figure 7.1). Factors shaping outcomes are divided into (1) context- and governance-related factors. The latter are further subdivided into (2) intervention-specific (SPOPP) elements and (3) domestic governance elements (i.e., policy coherence and alignment), while (4) supply-chain initiatives encompass the existing transnational governance arrangements. Let's briefly explain them.

First, any intervention or set of interventions takes place in a given context (1), which is a broad category that includes specific local aspects such as infrastructure, technologies, markets, institutions, climate, and geographic characteristics. These are also called the enabling environment (factors that can be modified through the targeted intervention) and conditioning factors (those out of reach of specific interventions) (Börner and Vosti, 2013).

Second, the SPOPP as the main intervention in question (2) should be analytically isolated. In similar line to other studies (Gulbrandsen, 2014; Chaplin-Kramer et al., 2015), we adopt the policy cycle approach simplified in three stages, namely design, implementation, and monitoring/enforcement. The first stage includes the agenda setting, policy formulation, and decision making, or in other words the identification of the problem, negotiations, and the promulgation of the actual regulations, incentives, and other instruments (Abbott and Snidal, 2009). The implementation phase includes the activities that support the organization, interpretation, and application of the policy package among those who are responsible for

endorsing, executing, enforcing, or demonstrating compliance (Schut et al., 2014), or in other words, when policies are translated into action (UNEP, 2009). The monitoring and enforcement phase includes the overall supervision of the program, which can be performed by internal or external agents. This stage identifies to what extent the policy package has been correctly implemented and uses rewards and penalties as a response to issues related to compliance or a lack thereof (Abbott and Snidal, 2009).

Figure 7.1: Analytical framework



Third, the SPOPP as a specific governance arrangement cannot be isolated from the broader governance system. In fact, the specific instruments introduced by the program (see section 3.3.2.) build on and complement the existing socio-environmental regulations (see section 2.5 for a review of tenure, environmental, family farming, and energy regulatory frameworks). As such, (3) policy coherence and alignment refers to the analysis of synergies, complementarities, and antagonisms between the SPOPP and the broader domestic regulatory frameworks. Fourth,

and finally, (4) supply-chain initiatives include transnational efforts such as sectoral standards (e.g., certification schemes) and corporate zero-deforestation commitments and codes of conduct (company internal policies for sourcing) (Lambin et al., 2018). Although in principle not as relevant as in other countries given the current domestic market orientation of Brazil's palm oil, these factors should not be excluded from the analysis.

Together, these factors produce specific outputs that influence actors' decisions. It is important to note that none of this is static over time; all of it evolves and adapts to new circumstances based on complex interactions. For example, the three stages of the policy cycle are not necessarily linear and sequential. In many cases, they are characterized by feedback loops and multiple cycles without a clear starting point (UNEP, 2009) (e.g., monitoring and enforcement activities may change implementation practices or even the program design). Moreover, context factors such as infrastructure or technologies may change during the process, which will in turn create a new context shaping the governance system, which may create a new output.

7.2.2. Methodological approach

A two-pronged analysis was performed to quantify outcomes and discover the possible causes that shape outcomes. To begin with, the SPOPP outcomes were mapped and then further characterized into direct objectives and externalities, as specified in the following table (7.1).

Table 7.1: Outcome categories

Sector	Parameter	Characterization
Environmental	**Deforestation**	Direct objective
	GHG emissions	Direct objective
	Water and soil pollution	Externality
	Biodiversity	Externality
Social	**Smallholder inclusion and livelihoods**	Direct objective
	Tenure and land conflicts	Externality
	Employment and labor rights	Externality
	Migrant worker influx	Externality
Economic	Biodiesel diversified feedstock	Direct objective
	Sector development and competitiveness	Direct objective

This categorization was based on the formal SPOPP objectives derived from government statements,[100] and externalities identified in the literature. In order to narrow the scope of the paper to better target the most relevant aspects of oil palm sustainability governance debates and Brazil's potential contribution to the debate, the bulk of the analysis focused on three main issues: (1) preventing deforestation, (2) promoting effective smallholder inclusion, and (3) sector expansion and competitiveness. Some of the remaining outcomes are briefly mentioned as externalities.

In order to quantify the outcomes, we conducted a literature review. Outcomes with insufficient or unreliable information were identified in order to conduct further primary data collection. This involved developing a database of published journal articles and grey literature in English and Portuguese that referred to palm oil in Pará—Brazil's largest palm oil producing state. References were found through keyword search in databases, complemented by cross referencing for further relevant publications and requesting information from relevant colleagues and other researchers. As this paper is concerned with oil palm developments under the SPOPP, only papers published since 2010 were considered (102 in total). Relevant papers were those providing empirical evidence relevant to one or more of these categories (46 references).

Areas lacking information were (1) preventing deforestation, where data on the direct conversion of primary forests by smallholders was missing; and (2) promoting effective smallholder inclusion, where there was no clear way to measure the degree of success of smallholder schemes. In order to check whether smallholders have deforested to plant oil palm, we collected 551 Rural Environmental Registries (CARs)[101] with contracts with four companies, which represent nearly one half of those who planted after the SPOPP. CARs were intersected with official data on deforestation (PRODES) for the period 2009–17 (since 2008 is the cutoff year for deforestation analysis), which identified 38% of properties with deforestation polygons. In order to confirm whether deforestation in fact occurred (there are often resolution problems associated with official data in small polygons, known as false PRODES) and whether that was directly linked to oil palm, we conducted visual inspection of high-resolution imagery (SPOT 2009/10 and Sentinel 2 2018). Given the difficulty of accessing high-resolution imagery for the whole area, we selected the region with higher concentration of deforestation polygons and analyzed 147 smallholder properties.

100 There is no official document clearly indicating the SPOPP objectives, instruments, and aims. For example, journal articles mentioning the SPOPP (e.g., Villela et al., 2014; Benami et al., 2018; Córdoba et al., 2018) always refer to secondary sources or PowerPoint presentations by government officials. For the sake of this paper, we combined information from different sources, such as the presidential speech in Tomé Açu in 2010, Presidential Decree 7172 in 2010 that instituted the ZAE-Palma, Project Law 119 from 2013 that instituted the SPOPP (though is still waiting for Congress approval), and two MDA booklets that are available (http://www.ebah.com.br/content/ABAAAgTmcAI/livreto-palma-oleo-producao-sustentavel) and http://www.mda.gov.br/sitemda/sites/sitemda/files/user_arquivos_64/Biodiesel_Book_final_Low_Completo.pdf.

101 In some cases a list of CARs was directly obtained in some others we collected GPS points and/or names and matched them with available public information on CARs. Given that some companies were not willing to facilitate the information and that public databases have several gaps we were not able to trace the full list of smallholder engaged in oil palm contract farming in Pará.

In order to measure the degree of success of smallholder schemes, data were collected on farmer productivity and quality of crop management practices from the three largest oil palm companies in Pará, which collectively source from approximately two-thirds of Para's oil palm contract farmers (1,031). Though we recognize the limitation of using productivity and degree of adoption of prescribed crop management as proxies to measure success, this was the only feasible way to make a consistent comparison across companies.

The second part of the analysis focused on identifying the factors behind the outcomes. Given the impossibility to attribute and quantify the role of each factor shaping the outcome, qualitative data collection activities contributed to test causal inferences. For that, we relied on the framework developed, whose hypothesis were tested through the analysis of data collected through 193 semi-structured interviews with key informants[102] and field visits to companies, communities, and municipal capitals.[103] The analysis was also enriched by participation in the most relevant events in this period, the examination of published papers, and secondary data sources. The analysis covers the period between 2010 and 2017. All details are can be accessed via data repository.[104]

7.3. IDENTIFYING OUTCOMES

7.3.1. Industrial and smallholder related deforestation

The results show that, overall, Brazil managed to prevent deforestation from oil palm expansion. According to Benami et al. (2018), who have made the most comprehensive assessment of deforestation on industrial plantations, only 0.8% of planted oil palm involved the deforestation of primary forests and 3% involved the deforestation of secondary forests since the SPOPP started in 2010. This is an improvement over the period before the SPOPP, when 4.1% of oil palm was established at the expense of primary intact forests and 4.9% at the expense of secondary vegetation in 2006–10 (Benami et al., 2018). In earlier expansions, namely between 1989 and 2013, 39.4% of the area expanded into primary forests (Vijay et al., 2016) (similar figures are presented by Furumo and Aide (2017)). These figures are also aligned with Agropalma's acknowledgement of 35% of expansion into primary forests in its own areas until its zero-deforestation commitment in 2002 (Agropalma, 2013).

102 Including 65 representatives of civil society at state, municipal, and community levels; 34 individual farmers; 33 representatives of municipal institutions; seven policymakers at state and federal levels; 32 representatives of companies; 12 researchers; five representatives of banks; one representative of RSPO, and three other individuals.

103 Including visits to eight of the nine companies operating in the state; several visits to nine municipalities where oil palm is expanding (Acará, Baião, Bujaru, Concórdia do Pará, Mãe do Rio, Mocajuba, Moju, Tailândia and Tomé-Açu), and 55 visits to communities directly or indirectly affected by oil palm expansion, including communities engaged in contract farming and/or wage-labor, communities with complaints about water or soil pollution, and communities with reports of land or other oil palm related conflicts.

104 https://zenodo.org/record/3553102

In terms of smallholder-related deforestation, our primary data analysis indicates the following: Although 38% of the sampled properties presented some degree of intersection with official deforestation polygons, of these, only 7% were in fact confirmed as areas where primary forests were directly converted to oil palm. The majority (59%) was constituted by deforestation identified since 2008 in other parts of the properties that were not converted to oil palm. Residuals or unclear (18%) and false PRODES (16%) were the other important categories identified. Extrapolating these figures to the whole sector, we estimate that only 2–3% of smallholders have planted oil palm in areas deforested since 2008. This shows the system has been able to prevent the major deforestation of primary forests.[105]

A more worrying figure indicates that 16–23% of smallholder properties engaged in the sector in Pará evidenced deforestation not directly linked to oil palm. This is particularly the case in regions with higher percentages of forest cover such as the municipalities of Moju and Tailândia; and includes both areas inside and outside settlements. When looking at the property-level, it is often the case that areas closer to the main road (previously deforested) were converted to oil palm while areas further inside the property were deforested more recently. It is not clear whether deforestation occurred before or after the planting of oil palm (as such, there is not yet a causal link with indirect deforestation) but there is an indication that in areas (and properties) with higher forest cover, the risk of indirect deforestation is greater, since Brazilian regulations for oil palm only target direct deforestation. Finally, there is also a strong indication that smallholder deforestation is related to company practices and markets. Companies wanting to target international markets and certification mechanisms are more likely to adopt careful expansion strategies. In sum, since the launch of the SPOPP in 2010, oil palm has led to the conversion of only 0.8% (industrial plantations) and 2–3% (smallholder plots) of primary forests (table 7.2). Though not perfect, this points to remarkable progress since the pre-SPOPP era.

Table 7.2: Deforestation outcomes

	Industrial plantations	Smallholders
Direct deforestation since 2010	0.8%	2–3%

Source: own data and Benami et al., (2018)

7.3.2. Smallholder scheme success

Our analysis indicates that the social pillar of the SPOPP was not resoundingly successful. The overall sectoral figures indicate that 1313 smallholder families have been contracted under the SPOPP since 2010. In total, this represents only 24% of the total company commitments at the time the program was launched (4850 families) (Brandão et al., 2018). Results show that the scheme supported through PRONAF Eco has not enabled the palm industry to incorporate smallholders at the desired scale. In landscape terms, and including pre-SPOPP

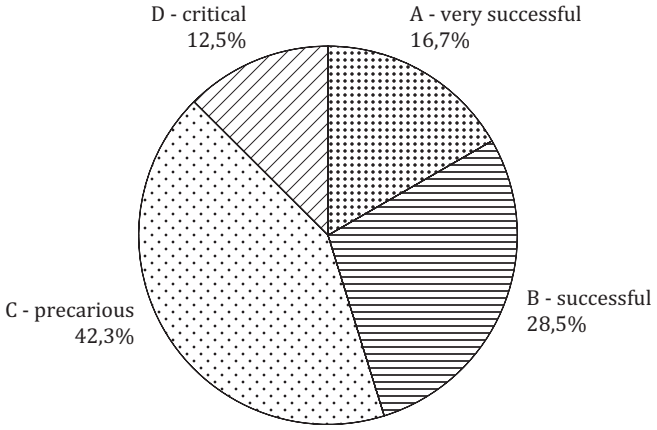
105 Problems related to imagery resolution could be improved through investments in high resolution monitoring.

contracted farmers, oil palm is planted in only 1% of Pará's smallholder properties. Even in the municipalities with higher concentration of contracts, oil palm has not become a primary crop (6% in São Domingos do Capim, 7% in Tomé Açu, and 8% in Tailândia).[106]

In terms of the success or failure of those who were contracted, we used productivity and degree of adoption of prescribed crop management practices as proxies and divided smallholders into four groups. Group A comprised motivated farmers who had adopted best management practices, with above average productivity. Group B consisted of average farmers with average productivity, while Group C consisted of farmers with below average productivity, who typically failed to devote the necessary time to oil palm or lacked the capacity to comply with agronomic guidelines. Finally, Group D comprised farmers who (typically due to personal issues) were systemically neglecting or had had abandoned their plantations.

The results (presented in figure 7.2) show wide differences across farmers' performances, ranging from complete success (Group A: 17%) to near abandonment (Group D: 12%). However, the majority of farmers (54%) failed to meet productivity expectations, with companies expressing concerns about the capacity of these farmers to develop economically viable oil palm operations over time and, thus, be able to fulfill their debt obligations. With a number of major oil palm companies facing difficulties in making a profit due to economic and social challenges nationally, in some instances the quality of extension services and input support has suffered. The performance of farmers who fail to meet standards has, as a result, suffered further. This is particularly critical within Group D, whose members will probably fail and become indebted.

Figure 7.2: Performance of SPOPP contract farmers (%)



Source: own data and analysis

106 Figures obtained through SEAD (Special Secretary for Family Farming and Agrarian Development), which replaced MDA in 2017.

These results contrast to some extent with studies on Agropalma's pilot schemes that identified positive results in terms of income generation (Santos et al., 2014; Homma et al., 2014). Possible explanations for that may be the pilot nature of Agropalma's schemes (which took place in a different political and institutional setting) or the quantification of income and profitability based on best-case scenarios and not stratified per smallholder group.

In order to complement the analysis of livelihoods and look beyond income, we also analyzed food security as several reports cited food security risks because of competition with staple food crop (cassava) production (Glass, 2013). However, empirical analyses failed to validate this (Brandão et al., 2018; Silva and Navegantes Alves, 2017) under the recent expansion of the SPOPP. Patterns of productive diversification do not differ significantly from control groups (Brandão et al., 2018). In Agropalma's pilot schemes, limited broader livelihood impacts and processes of specialization were identified; however, participant smallholders had established their plots in a different regulatory context (Brandão et al., 2018; Gemaque et al., 2015). In short, since the SPOPP, oil palm contract farming schemes have failed to include smallholders at a desirable scale, produced divergent results in terms of smallholder performance (very successful and unsuccessful farmers), but managed to prevent food security risks.

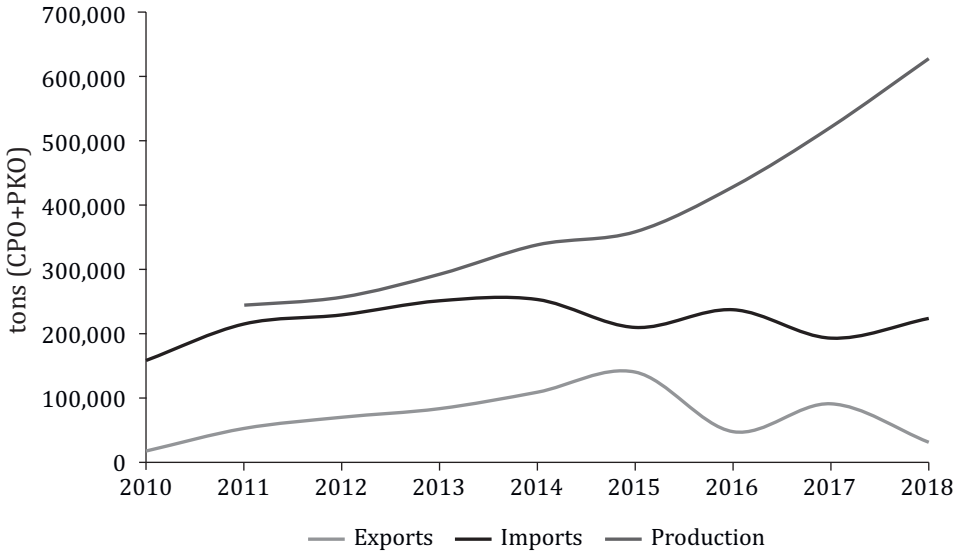
7.3.3. Sector development and competitiveness

An analysis of the palm oil sector in the Amazon indicates the total planted area tripled between 2006 and 2014. Georeferenced data indicates a growth from 70,691 ha to 116,748 ha in 2010, and to 218,917 in 2014 (areas > 9 ha) (Benami et al., 2018). Official figures indicate 207,000 ha (including smallholders) (Abrapalma, 2017). Despite the ambitious plans announced, by 2016 the three new entrants have only managed to achieve 72% and 24% of their expansion goals in terms of own area and contract farming area, respectively. In terms of processing capacity, only two out of six announced extraction plants were in fact built by the new entrants and none of them with the capacity to produce biodiesel. In 2016, the sector had a processing capacity of 731 metric tons (MT) of fresh fruit bunches (FFBs) per hour, significantly below the 1020 MT announced in the initial plans. In terms of market trends, no major changes were observed. Despite total output growth, Brazil largely maintained its domestic market orientation and trade deficit (figure 7.3)

Moreover, Brazil did not manage to improve sectoral competitiveness. Official or reliable data on production costs is hard to obtain since this is a competitive market with companies and countries struggling to maintain or improve their relative positions. Moreover, US$/local currency fluctuations (with implications, for example, for fertilizer costs) and variable yields (depending, for example, on plantation maturity, variety adopted, climatic factors, occurrence of diseases, etc.) make palm oil markets very dynamic and the comparison of production costs

across countries very imperfect.[107] Yet, it is possible and useful to establish comparisons between the main producing countries.

Figure 7.3: Palm oil market trends 2010–18



Source: COMEXSTAT, MDIC (2018) and Abrapalma (2017)

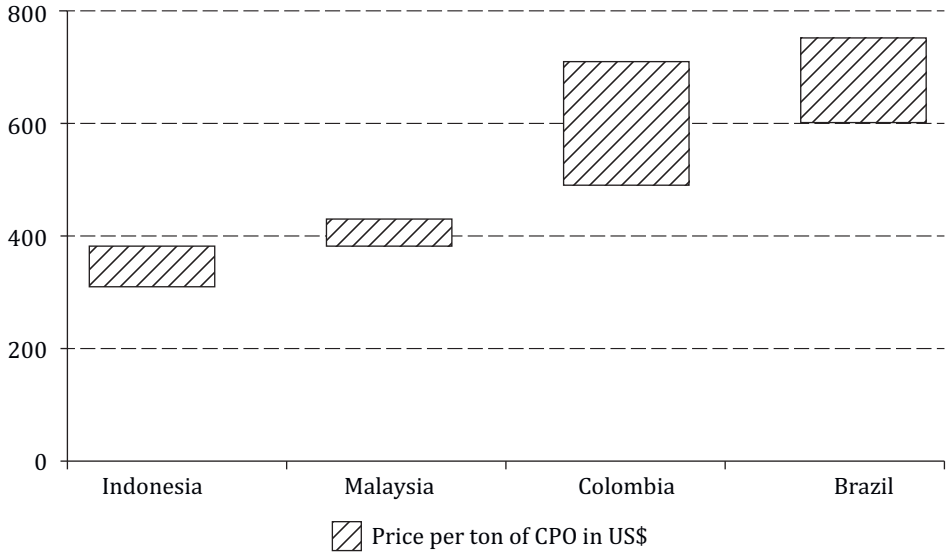
Based on data collected from various sources and crosschecked with experts, an estimate of production costs and price composition of CPO shows that Brazil has the highest production cost of all major producers, namely Indonesia, Malaysia, and Colombia (figure 7.4). Depending on the reference year, the price in Brazil varied between US$ 600 and US$ 750 per ton between 2010 and 2015 (Fry, 2016; Yokoyama, 2017; Brito, 2014b; Veiga and Rodrigues, 2016), while labor costs are the main component of CPO production cost (59% according to Alves (2011)). Some company managers even claim labor costs can be as high as 75%. Labor standards in Brazil are considerably higher than elsewhere (in addition to receiving fixed monthly salaries that are slightly higher than the statutory minimum wage, workers are typically eligible to receive productivity bonuses and benefits such as transportation and food allowances). This is related to well-developed institutional structures to promote constructive dialogue between trade unions and companies, and a long history of social struggles regarding labor rights in Brazil. According to Abrapalma, an average worker in Brazil costs US$ 11,783 per year, while in Colombia the figure is US$ 10,250, in Malaysia US$ 6135, and in Indonesia US$ 2686 (Yokoyama, 2017). Fertilizers are the second most relevant cost. Although they are likely to be higher than

107 In addition, CPO is not the only product commercialized in global markets. PKO, a number of refined blended oils, organic, and certified oils (certified sustainable oil palm (CSPO) for example) are also important products derived from oil palm.

in other countries, environmental costs (legal reserve opportunity costs and environmental regularization) tend to be residual sunk costs and mostly concern the implementation phase.

Thus, despite sectoral expansion, overall results were below expectations and Brazil did not manage to build a competitive sector in global terms. Brazil's palm oil has maintained its historical domestic market orientation, while only RSPO certified oils—which are still a niche activity in the Amazon—have been exported.[108]

Figure 7.4: Production cost variation between 2010 and 2015



Source: Fry (2016), Yokoyama (2017), Brito (2014b) and Veiga and Rodrigues (2016)

7.4. GOVERNANCE ANALYSIS

The three most important parameters identified showed the recent oil palm expansion cycle has achieved positive results in terms of preventing deforestation, mixed results in terms of smallholder inclusion, and poor results in overall sector expansion and improving competitiveness. The following subsections present some hypotheses to explain these outcomes.

7.4.1. Explaining positive deforestation outcomes

The positive outcomes with respect to deforestation can be attributed to a both contextual and governance factors; however, evidence suggests that Brazil's environmental governance

108 There was probably also a temporary flow of Brazilian CPO exports to Colombia to fill a sudden demand for biofuels in that country.

framework has been the most important factor, while a favorable geographical context and the SPOPP's specific instruments were also relevant.

The Brazilian Amazon in general and the municipalities where oil palm expanded observed an overall deforestation decline of 70–80% in the studied period, which is unique compared to other tropical countries. That was partly a result of the federal commitment to reduce deforestation, which included major regulations such as the Forest Code and the Environmental Crime Law, along with permanent surveillance by federal and state agencies. This was further strengthened by technical factors such as the availability of satellite imagery, the implementation of the CAR system, and the capacity building of environmental agencies. Because they expanded in the same period, it is highly probable that oil palm investors followed the same trend as most landowners in the Amazon and adopted more careful land-use practices. At the same time, civil society monitoring by influential NGOs operating in the Amazon and reputational concerns played an important role in enhancing private sector responsiveness to public regulations. For example, the constant pressure on oil palm investors from civil society actors and negative media reports has certainly impelled companies to avoid deforestation practices.

However, unlike in the beef and soy sectors (Nepstad et al., 2014), supply-chain initiatives in the palm oil sector do not seem determinant of environmental outcomes. In fact, only one investor has formally made a commitment to eliminate deforestation from its supply chain,[109] while only one of the new entrants implemented its investments with intention to certify under RSPO (following the rule that prohibits plantations in areas deforested since 2006). These initiatives only influenced two investors out of eight and represent a small proportion of the new areas planted since 2010. Given that most production supplies Brazil's domestic market (which does not require any certification and the bulk of buyers have not made any sort of zero-deforestation commitment),[110] there is no additional pressure from suppliers rather than complying with domestic regulations.[111]

The second most important factor seems to be the context. In fact, oil palm investments were mostly located in post-frontier landscapes with substantial availability of degraded lands and lower deforestation rates, as is the case in most of northeast Pará. Given a number of factors such as high implementation costs, intensive labor requirements, high transportation costs, and conflict risks, frontier areas were not attractive for companies and consequently less pressure was put on old-growth forests.

109 Agropalma adopted a zero-deforestation commitment in 2002.

110 Only Natura, among the main domestic buyers, has formalized a zero-deforestation commitment.

111 Following the soy and beef sectors, there were attempts to establish a supply chain agreement in 2014. However, negotiations between the Agrarian Public Prosecutor's Office and private sector representatives stalled. In response, the private sector signed a socio-environmental protocol gathering state bodies such as SAGRI, PMV and EMATER, but without a major involvement of civil society organizations. The instrument is considered irrelevant.

But does the SPOPP have any additionality that justifies positive results in preventing deforestation? It seems so, particularly for smallholders that in Brazil are not able to plant oil palm without access to credit.[112] With the obligation to submit a CAR to apply for a PRONAF Eco and the decree approving the ZAE–Palma introducing provisions to restrict access to credit, the system was able to prevent the expansion of smallholder oil palm plantations in areas illegally deforested (see section 3.3.2 on SPOPP specific instruments). Interviews with company managers and bank representatives endorse this overall analysis, while the existing problems (2–3% of smallholder deforestation) can be explained by loopholes. According to some respondents, there are irregularities in some bank agencies partly due to the pressure exerted by some companies to approve smallholder credit. Moreover, several analysis in the Amazon (Assunção et al., 2017) have concluded that Brazil's environmental governance framework has been less effective in terms of tackling smallholder deforestation (higher transaction costs and technical difficulties), which provides further evidence to support the additionality of SPOPP. It is also important to mention the synergies resulting from the alignment between SPOPP's instruments and the overall regulatory framework. For example, the design of ZAE–Palma—the SPOPP's main environmental instrument—offered clear rules on areas designated for production, which helped guide companies' land acquisition practices.

Finally, despite overall positive outcomes, there are governance gaps to consider. For example, the use of a loose concept of degraded land by ZAE–Palma is a controversial issue (Carvalho et al., 2015). By only excluding primary forests (and indigenous territories) from direct conversion, some high biodiversity conservation value and natural regeneration areas were allowed to be converted (4% of deforestation of secondary forests since 2010 according to Benami et al. (2018). This is a similar problem elsewhere, as evidenced by the global discussions on HCS and HCV (see Chapter 1). Progress was made in Pará through IN 08/2015 (Juquira Law), which established rules to allow the removal of secondary forests until a certain stage of regeneration at state level (Vieira et al., 2014). However, because expansion has been halted since 2015, is still too early to assess the effectiveness of the law prohibiting expansion into secondary forests.

7.4.2. Explaining the mixed social outcomes

The mixed outcomes with respect to the success of the smallholder scheme (limited number of farmers included, enormous disparities between smallholder performances and avoided food security risks) are more challenging to assess given the complexity and diversity of family farming in Brazil.[113] Yet, it is possible to suggest that many of the observed problems were related to an unfavorable (and changing) context, which was further worsened by SPOPP-specific factors, such as incorrect implementation by companies. Given the lack of capacity to adjust

112 Unlike in other countries, so far there are no independent farmers in Brazil, that is, smallholders planting oil palm by their own means and without any contractual arrangement with a mill.

113 Criteria identified by the Family Farming Law (2006) are ample enough to include different groups such as agrarian reform settlers, quilombolas, more traditional subsistence farmers, riverside dwellers, or small entrepreneurs, for example.

instruments and minimize implementation problems, it is proposed here that ineffective SPOPP monitoring (and further instrument fine-tuning) is the major problem of Brazil's governance model for smallholder inclusion. Still, considering the number of successful cases, the SPOPP's instruments have shown positive strengths, which can be also related to the existence of strong smallholder movements and their proximity to the government (until a certain period).

Let's start with positive aspects. Existing instruments under biodiesel policies (particularly the Social Fuel Stamp) and the specific creation of PRONAF Eco (linked to incentives for companies) managed to incentivize companies to contract smallholders, particularly in the SPOPP's initial years, by reducing production risks by, for example, externalizing establishment costs. For those who were included and delivered successful or very successful performances (around 45%), the scheme design has shown several positive aspects, such as the provision of free technical assistance, the existence of a minimum price, the 25-year contract, and the guaranteed market. All these rules and provisions were important to mobilize smallholders and provide them with a profitable and rewarding livelihood option. That was particularly relevant, since smallholders often face structural problems such as lack of technical assistance, access to markets, and price fluctuations. Innumerous interviews with smallholders and unions confirmed this analysis.

Even including the least successful cases, compared to other credit schemes, PRONAF Eco has shown very limited rates of credit default, according to bank managers.[114] Part of the scheme's success is also related to the existence of strong smallholder movements and their proximity to the government—which is an important characteristic of Brazil's social governance system. That took place particularly at any early stage, which contributed to the design of smallholder-oriented policies, including the abovementioned rules, and during early implementation when unions closely monitored compliance with the rules.

In terms of food security, the PRONAF Eco design was also fundamental. The rules included a maximum of 10 ha of oil palm area in order to prevent smallholders from converting large proportions of their plots to oil palm. Moreover, during implementation concerns about food security were raised by civil society movements. As a result, despite not being regulated anywhere, companies and governmental agencies adopted a diversification discourse: Farmers wanting to apply for PRONAF Eco should have at least 25 ha in order to keep half as legal reserve (12.5 ha), the regulated maximum of 10 ha of oil palm, and the remaining 2.5 ha with food crops.[115]

114 In several cases, unsuccessful smallholder projects have been informally taken over by successful neighbors or relatives. This has been regarded as a viable alternative to prevent credit default; however, it may also promote inequality.

115 Furthermore, the Social Fuel Stamp requirement of free technical assistance to food crops was also important to signal the importance of food security and productive diversification. According to some managers, companies adopted the rule of offering technical assistance to food crops, even if the Social Fuel Stamp was not effectively working.

The negative aspects concern the limited number of contracted smallholders and a large share of farmers in a precarious or critical situation (around 55%). What seem to have been key factors explaining the limited number of farmers included are context and the SPOPP design. First, prior credit defaulting is a structural problem in the region with many households being considered blacklisted for PRONAF Eco purposes for a number of reasons.[116] Second, Brazil's economic slowdown together with corruption scandals involving major economic players have had negative implications for many companies, particularly since 2015. In was in this period that companies halted the expansion of both plantation and outgrower schemes. Third, the SPOPP design also contributed to promoting exclusion. As discussed in Chapter 5, criteria designed for PRONAF Eco and operationalized by companies, including the availability of a minimum amount of land and labor, meant that land- and labor-constrained groups were indirectly excluded from the program.

Outcomes in terms of unsuccessful participation are also related to SPOPP-specific factors, such as bad implementation, and to contextual factors. In the first case, despite the introduction of the DAP-V requirement (which certifies that the smallholder is able to manage larger sums) and the creation of company-specific criteria to minimize default risks, companies were in many cases unable to fulfil that requirement and those criteria, and contracted smallholders who lacked the capacity to succeed. This is partly explained by inefficient planning and lack of local knowledge (several new investors were not familiar with the Amazon reality).[117] As a result, some of the schemes ended up dispersed across a large territory with scattered groups of farmers, leading to increased costs to deliver technical assistance and inputs, and to collect FFB.

With companies and smallholders facing difficulties on the ground, the program was not able to effectively monitor and understand these concerns in order to find solutions. This is why we consider the lack of monitoring and action to minimize problems (such as instrument fine-tuning) the major problem of Brazil's governance model for smallholder inclusion. A careful analysis of the state and federal chambers' agendas clearly shows that none of the abovementioned problems was a priority in the discussions, nor were smallholder organizations able to benefit from participation. By not creating effective means such as monitoring mechanisms, multi-stakeholder platforms, and the like to promote participation, the program failed to minimize many of the social problems identified. As opposed to top–down bureaucratic governance, Brazil should have focused on adaptive governance strategies that provide more flexible and collaborative ways to deal with changing contexts (Wyborn, 2015).

116 The scale of this problem is illustrated by the case of Concórdia do Pará. Of the 530 families interested in planting for Biopalma, only 34% were accepted. The major reason for exclusion (50%) was being credit blacklisted; two fifths of which was due to failure to repay small consumption credits and three fifths for previous PRONAF projects, particularly cattle and pepper. In the case of Marborges, in the first year 326 farmers demonstrated an interest in their program in Garrafão do Norte. However, only 53 of these farmers were not credit blacklisted, with only 20 finally being approved by the bank.

117 Given the internal pressure to contract smallholders, many companies tried to increase eligibility by any means. That included withdrawing internal requirements and pressuring banks to simplify and facilitate credit approvals. In several cases, farmers in difficulties were clearly beyond the eligibility criteria (for example single-person households and elders).

This aspect was further worsened by an unfavorable political and economic context. In addition to the abovementioned economic slowdown, the impeachment of the former president and the arrival of a conservative right-wing coalition introduced important political changes, such as the relegation of the Ministry of Agrarian Development (MDA) to a lower administrative and operational level. As such, smallholder organizations have seen their access to resources and political influence significantly reduced, which reduced their role and capacity to represent smallholders.[118]

In it also important to mention that there is certain level of farmer agency that is beyond the scope of any scheme design. Changing livelihood priorities (death, illness, offspring leaving the household), lack of capacity or motivation to adopt management practices, or wrong motives to join the scheme (just to access loans) are examples of factors that also shaped results. Finally, what can we say about the role of supply chain initiatives? Not much. The existence of some codes of conduct (such as company-specific inclusion criteria) prevented food security risks; however, most drivers and rules to engage smallholders were linked to domestic policies.

7.4.3. Explaining poor economic outcomes

We consider the outcomes identified (limited expansion rates and lack of sectoral competitiveness) a product of context, ineffective implementation, and ineffective monitoring to fine-tune instruments and contradictions between SPOPP and overall domestic economic frameworks. While several contextual factors were mentioned above (economic and political turmoil), and labor rights are discussed in more detail below, it is important to add logistics and technology. Let's start with technology.

Developing the most appropriate and productive planting material is key to improving competitiveness. In Brazil, the African oil palm (*Elaeis guineensis*) is the most common variety, as it the most productive. It can potentially reach yields of up to 7 tons of CPO per hectare. Yet, the overall sector productivity per hectare in 2015 was around 1.5 CPO tons (partly as a result of a large proportion of immature plantations), while the most productive company achieved only around 3.2 (Abrapalma, 2017). This is by far below potential productivity, which contributes to overall limited competitiveness. One of the identified reasons is the susceptibility to bud rot, a disease characterized by leaf yellowing that is common to other Latin American producing countries. Since the 1980s, public and private investments in R&D have led to the introduction of several improved varieties[119] and managed to reduce overall bud rot incidence rates, but haven't yet been able to make significant improvements in CPO production per hectare. The problem of yields was even more critical in a context where water shortfalls resulted in losses of up to 40% of oil palm fruit in 2015/16.

118 Changes in the union movement, including the split of rural unions into rural workers and smallholder farmer organizations have further reduced the financial capacity of traditionally powerful smallholder organizations (e.g., Union of Rural Workers - STTRs - in Tailândia, Concórdia and Tomé-Açu).

119 Including seven African oil palm intraspecific new cultivars and an interspecific hybrid cultivar of African oil palm and caiaué: BRS Manicoré.

The second contextual factor is logistics. According to Veiga and Rodrigues (2016), it is cheaper for Brazil's main palm oil buyers in São Paulo to source from Malaysia (even including transportations and tariffs) than from the Amazon. Many companies ascribe the comparatively high transportation costs to the lack of return loads on freight exchanges between ports. This exerts a downward pressure on domestic prices, which reduces profit margins. Moreover, high transportation costs in northeast Pará (related to large distances between smallholders and mills, inefficient planning, and dirt roads) further contribute to reduce competitiveness, particularly that of smallholder schemes.[120]

The economic framework developed under the SPOPP is linked to biodiesel incentives and investments in R&D; however, these instruments have shown little capacity to change the situation. First, biodiesel incentives only worked to the extent that they attracted investors to the region, but failed to create a palm-based biodiesel market. Although the National Agency of Petroleum, Natural Gas and Biofuels sets a maximum reference price for its biodiesel auction, between June 2013 (the 31st auction) and April 2015 (the 42nd auction), the average selling price at all auctions but one exceeded the average cost of production.[121] Therefore, with current market conditions (some industry representatives claim it was never a viable option), there is a lack of incentives to produce palm-based biodiesel and no company is targeting the energy market. As such, the Social Fuel Stamp ended up not working and no stamps were attributed to oil palm companies (only ADM through investments in soybean). While these problems have become clear since the beginning of the program, the inefficiency of biodiesel incentives was not adjusted during implementation.

Second, investments in R&D (the SPOPP announced the sum of US$ 18,750,000 for R&D mainly to continue research on genetic improvement and for seedling production) have also shown very little importance and weak implementation. According to industry insiders, given the current economic situation, the budget allocated under the SPOPP was cut and research eventually stopped.[122]

These problems were even exacerbated by antagonisms between the SPOPP and the overall domestic economic framework. Custom policies, for example, have been discriminating against the Brazilian sector by not imposing import tariffs on CPO from Colombia and Ecuador (while the opposite flow pays 5%) and the decrease in the import tariff from 10% to 2% for PKO (Brito,

120 In some cases companies pay for transport costs, while in other cases the costs are paid by smallholders.

121 The average biodiesel selling price in the auction amounted to US$ 0.62 per liter, while average crude palm oil (CPO) production costs (excluding transportation costs and transesterification) amount—according to Abrapalma—to approximately US$ 0.67 per liter (Brito, 2014b).

122 Some companies such as Denpasa, Marborges and Agropalma, continue to invest but mostly by their own means.

2014a).[123] In other cases, despite the alignment of state development programs such as Pará Rural and Pará 2030,[124] which aim to address bottlenecks such as logistics, attempts to incentivize the sector outside the realm of the SPOPP have had very limited positive impact, according to company managers.[125] Regarding supply chain initiatives, as these do not target economic aspects, nothing relevant was found to mention.

7.4.4. Externalities

Whereas the outcomes discussed above are the most relevant aspects of oil palm global debates, it is also important to highlight other aspects classified here as externalities. Negative externalities in Pará include adverse impacts on biodiversity, the emergence of land-related conflicts, and social disruption driven by the rapid influx of migrant workers. Positive externalities include job creation with a level of formalization. For the sake of space, we briefly discuss the rapid influx of migrant workers and its negative consequences on social infrastructure particularly in rural villages near plantations.

Industrial oil palm plantations generate significantly more employment than other local alternatives such as soy and cattle. Yet, the arrival of 5000 migrant rural workers between 2008 and 2013 has, according to our interviews with community leaders and unions, contributed to raising concerns about social disruptions such as increasing sexual diseases, alcoholism, and violence. These problems result partly from local governments' general lack of capacity to deliver social services, particularly during temporary peaks in the high season. Some companies adopted initiatives to ameliorate the problem such as investing in transportation in order to avoid concentrations of workers near plantations and funding NGOs projects; however, they had a very limited reach (Peabiru, 2014). In some cases, public and private actors disagreed on who should pay the bill.

These problems also relate to ineffective participation and a lack of adaptive governance. The lack of articulation between several municipal governments affected the possibility to tackle a common problem by several municipalities. Moreover, disarticulation between other actors, such as local civil society, the state government, and companies, has been visible. This is partly explained by the lack of an appropriate governance body. The existing federal and state oil palm chambers were to a large extent designed and controlled by companies to promote and secure their interests vis-à-vis the federal and state governments. The fact that municipal governments

123 Recognizing this problem, there is an ongoing debate in the Federal Chamber on tariff protection with consumer industries lobbying for tariff reduction and palm oil producers for tariff increase. The sector managed to temporarily protect the sector in 2016 by increasing the import tariff for CPO from 10 to 20%, but overall the domestic industry consumers have had more capacity to influence trade policies, according to industry insiders.

124 The program Pará Rural was led by the Secretary of State for Strategic Projects and focused on infrastructure and logistics (mostly road pavement and bridge construction). The program Pará 2030 is currently in place. Being led by the Secretary of State of Economic Development, Mining and Energy it focuses on addressing problems of land regularization, environmental licensing and improving the image of Pará as sustainable agricultural producing state.

125 Yet, five companies benefited from BNDES (FINAME) subsidized credit.

do not have a seat and that smallholder representatives have seen their political capacity significantly reduced as explained above, justify this conclusion.[126]

7.5. TYING UP THE LOOSE ENDS: HOW DOES BRAZIL MANAGE TRADEOFFS?

While discussing different types of outcomes in isolation helps to better identify why they have taken place in the specific context, in reality what is fundamental for governance debates is also the way tradeoffs are managed. In other words, how environmental, social, and economic aims are aligned.

Tradeoffs within Brazil's smallholder scheme derived from the SPOPP are largely relevant, in particular given the eligibility criteria for contract farming participation. First, while excluding blacklisted and poorer (and indirectly labor-constrained) farmers is probably a good option for scheme viability, it might also have negative implications for rural development purposes since a significant number of farmers, in particular those who require more policy support, have no opportunity to enjoy the potential benefits. While participation may not be a desirable livelihood option for all, excluding some groups generates social inequality, particularly in areas where there aren't many other alternatives. Moreover, in order to increase the scheme's economies of scale (delivering technical assistance, input provision, FFB collection), companies tend to favor larger plantation sizes (10 ha) and the possibility to create farmer clusters in areas that have access to roads and are near mills, which further excludes certain groups. In a sector that has the highest production cost among the main competitors, these aspects introduce extra hurdles for companies operating with smallholder schemes. In short, the economic success of the scheme (and the sector) in some cases opposes the success of individual farmers and broader inclusivity and rural development demands.

Second, deforestation restrictions imposed on smallholders at the property level, together with the private sector favoring larger plantation sizes (10 ha), also contributes to excluding some groups, in this case those who are more land constrained. Interdictions on direct forest conversion have, as a side effect, also restricted the amount of area available for expansion and the possibility to form plantation clusters (and reducing transportation and technical assistance costs, for example). In addition, minimizing food security risks through land requirements (i.e., to have at least 25 ha) has also further contributed to exclude land-constrained farmers. In this

126 An extensive analysis of meetings' minutes shows little to no reference to smallholder or migration related issues, which proves our analysis. Yet, some outflux in recent years as a consequence of disinvestment has ameliorated the situation. However, if a new expansion takes place the problem is likely to emerge again. This requires reformulating the existing governance bodies (federal and state chambers) in order to strengthen the role of municipal governments and local unions. The participatory micro-zoning instrument could be a solution, for instance by identifying the areas were migrant workers are more likely to concentrate in temporary peaks or if a new expansion wave takes place. For example, the area around Arauaí is expected to demand more labor given the already high concentration and the expansion of new smallholder projects.

case, deforestation and food security concerns mismatch inclusivity demands and possibilities for companies to achieve economies of scale.

Reducing participation requirements in this context may undermine deforestation and food security concerns. Instead, improved inclusivity can be achieved through technical fixes. For example, permitting smaller plantation sizes in order to include land- and labor-constrained groups can be a viable option. Moreover, allowing smallholders with smaller areas of land to participate by, for example, promoting oil palm intercropping systems is also a possible alternative. This would enable smallholders to remain diversified,[127] whilst reducing the risk of undesirable land-use competition with food and other crops. However, these options may contribute to decreasing economies of scale and higher transaction costs for companies, for example, deriving from smaller plantations. As such, to make them viable they should be complemented by strengthening efficiency, for example through logistical improvements or more efficient incentives for the private sector to adopt or expand smallholder schemes (at least temporarily).

What about sectoral expansion and overall competitiveness? Are there relevant tradeoffs linked to the SPOPP and Brazil's domestic regulatory context in general? Apparently only those mentioned above related to smallholder schemes and reduced economies of scale. As the production costs analysis showed, Brazil's most important disadvantages are labor costs and logistics. Direct environmental costs (legal reserve opportunity costs and environmental regularization) do not constitute a major burden while they help the provision of vital environmental services, such as pollination, pest control, and irrigation. Thus, the environmental orientation of Brazil's model is not a problem, or a reason why the sector did not expand. Instead, social aspects such as high labor costs and, to a minor extent, smallholder schemes' lack of economies of scale made it less viable for Brazil's sector to compete either domestically or internationally.

Downgrading labor rights—the so-called race to the bottom—is certainly not a desirable strategy to build a sustainable sector in any place. Instead, the focus should be on finding other alternatives to promote more competitiveness in the sector. Recent developments indicate a renewed interest in biodiesel production due to increasing percentages in the energy mix in the coming years (10% in 2019, 15% in 2025, and 20% in 2030). The increasing biodiesel demand expected in the coming years might give the sector a renewed impetus. Yet, that will largely depend on the capacity to compete with soybean and remain dependent on attracting investment for biodiesel plants (Yokoyama, 2017).

As the SPOPP premise has long been that oil palm will serve the domestic biodiesel market, no efforts have been made to explore other domestic market approaches, such as raising consumption standards (e.g., through certification requirements or tariffs protection). Likewise,

127 Diversification should, however, be promoted with caution, since it is more labor intensive than monocrop systems.

strategies to realize competitiveness enhancements through value chain upgrading still have room for maneuver. This relates in particular to reducing the costs of production through process upgrading (e.g., mechanization, improved varieties, and logistics).

One of the main options for companies to circumvent high labor costs is to reduce vertical integration by outsourcing supply to third parties through the expansion of smallholder schemes and specialization in milling and refining activities. With more than 80% of the land under cultivation still directly managed by companies, again there is some room for maneuver. According to industry insiders, that is already taking place; however, it should be done together with efforts to reduce transaction and transportation costs through more efficient smallholder schemes.

What about enhancing product value through product upgrading (e.g., access to RSPO premium markets or other certifications)? Is it a viable alternative? As largely explored throughout this paper, Brazil's strategy to enhance palm oil production was never linked to transnational governance processes and there were no efforts to align domestic regulations with RSPO, for instance. To what extent that could be easily done is not clear, but taking into account Brazil's socio-environmental merits compared to those of its main competitors can be a valid option. According to industry insiders, with reduced premiums over time and under the current model of high certification costs (in particular for smaller companies, dispersed investments, and smallholders), RSPO is not considered a viable business for Brazil. To make it more attractive, efforts should be made to reduce certification costs through, for example, jurisdictional approaches to certification. However, it is largely uncertain whether markets would be willing to pay more for certified products.

7.6. CONCLUSIONS AND IMPLICATIONS FOR GOVERNANCE DEBATES

This paper has shown that domestic governance strategies can be a valuable way to minimize the socio-environmental footprint of commodity production. Unlike the case of Southeast Asia, Brazil's domestic strategy was able to expand palm oil production without converting its primary forests. By genuinely committing to reducing environmental problems, Brazil's governance model for palm oil production indicates that domestic initiatives are not necessarily strategies to greenwash or circumvent transnational regulations. Yet, considering the identified socioeconomic outcomes—for example, constraints in terms of inclusivity and profitability—Brazil's model for smallholder inclusion has shown some weaknesses. This contradicts the assumption that domestic strategies are better equipped to align environmental efforts with domestic goals such as economic growth and poverty reduction. This suggests that there is no governance silver bullet to reconcile conservation and development, and both domestic and

transnational strategies have their strengths and weaknesses.

Still, four aspects seem critical for building sustainability interventions. First, context does in fact matter. Landscapes have different biophysical characteristics and social backgrounds; value-chains have specific dynamics and markets orientations; and local institutions, both formal and informal, obviously diverge across countries and regions. Without a correct understanding of the context it is likely that any strategy will see its chances of success reduced. In that matter, domestic governance strategies seem stronger than transnational efforts as they are closer to the ground and are more aligned with local actors. This links to the second aspect. As contexts change over time and policy design or policy implementation might encounter problems, there is a need to invest in monitoring mechanisms and effective participation. In other words: Adaptive governance (Wyborn, 2015), as a flexible and collaborative process to facilitate decision-making processes, is a practical and useful way to identify and solve problems at the right moment. Investing in transparent and inclusive participatory bodies in which virtually all stakeholders are represented, should be an important element of any domestic (or transnational) strategy. Building flexible or adjustable regulations over time could be also a valuable option. This is also important to deal with negative externalities, a problem that Brazil didn't manage to solve effectively. In this case, neither domestic nor transnational examples have shown clear advantages.

Third aspect: Horizontal alignment—that is, aligning specific initiatives with overall domestic frameworks—is essential. The Brazil case has shown that policy alignment was particularly relevant to reduce deforestation risks, while the lack of alignment among economic policies has contributed to reduced economic viability. While Brazil's palm oil domestic market orientation minimized the role of transnational initiatives, countries that want to compete in international markets, or have at least some export orientation, should also consider alignment with transnational standards. This links to the fourth and final conclusion: Any attempt to enhance the socio-environmental standards of commodity production should be grounded in economic viability. Depending on aspects such as production costs, logistics, and market orientation, producing countries have different competitive advantages to explore. Considering that palm oil supply is a profitable and growing business, promoting governance interventions through, for example, price premiums or additional socio-environmental restrictions, will always create winners and losers. For the whole model to work, those who improve their standards must be the winners; however, so far neither domestic nor transnational strategies have shown particular advantages to solve this issue.

CHAPTER 8

Concluding remarks

8.1. SYNTHESIS OF FINDINGS: THE CHALLENGE OF RECONCILING CONSERVATION AND DEVELOPMENT

This dissertation has shown that despite avoiding major socio-environmental impacts, reconciling conservation and development through oil palm expansion remains a challenge in the Brazilian Amazon. Why is that? The following three subsections summarize this dissertation's main findings while the fourth presents the implications for academic debates. This chapter ends with some final reflections.

8.1.1. Is oil palm expansion synonymous with socio-environmental disaster?

This dissertation has shown that expanding one of the most controversial crops in one of the world's most complex socio-ecological systems is not synonymous with socio-environmental catastrophe. This first overall conclusion may sound awkward to certain readers. Considering the negative reputation oil palm has acquired in recent decades (especially in relation to Southeast Asia) and the impact certain commodities in the Amazon have had (particularly beef and more recently soybean), combining words such as "oil palm" and "Amazon forest" in the same sentence would normally be synonymous with bad news. However, that is not the case.

As shown in Chapters 6 and 7, both small- and large-scale expansions in the 2010s in Pará have taken place predominantly on previously deforested lands, mostly pastureland. Clear sectoral expansion guidelines and credit mechanisms introduced by Brazil's palm oil program were important to ensure positive results, particularly given they were aligned with an overall favorable domestic regulatory context that managed to significantly reduce deforestation across the Brazilian Amazon in the studied period. Moreover, these accomplishments are clearly related to the existence of strong civil society pressure in Brazil, led by local NGOs and Prosecutor Offices, and the perception of sustainability as a business case by the private sector's leading actors. In short, the policy (instruments), the polity (institutional context), and the politics (actors) dimensions of governance were aligned and favored positive outcomes in terms of preventing deforestation.

On the social side, the results indicate that successful smallholders with mature plots are, on average, able to generate almost five times more income from oil palm alone than the regional average household income. This highlights that oil palm expansion in the Amazon, and smallholder integration into agribusiness supply chains more generally, could make important contributions to delivering on Brazil's family farming policies and addressing rural market failures. The model has enabled smallholders to overcome technical, financial, and market barriers to participation that obstruct smallholder adoption of high-value crops that involve high establishment costs and/or long maturity periods. The fact that processors assume a guaranteed market, free technical assistance, and quality seedlings and fertilizers at market price, and have a direct interest in ensuring smallholder success is determinant. This is unique in the Amazon

context. For example, typical credit packages often include technical assistance provided by public or third-party providers that are beset with various problems, such as corruption, a lack of human and financial resources, and other inefficiencies. Given that the technical assistance provider is directly interested in improving contracted smallholders' productivity, the system has less room for the abovementioned problems.

Moreover, for banks, the fact that processing firms guarantee stable payments is a form of collateral. Consequently, these institutions are happy to finance oil palm. This contrasts with other crops such as cassava, which has historically high credit default rates, which is partly associated with informality. In addition, the prices offered to smallholders have remained stable over time and do not undergo major fluctuations between seasons. Oil palm is also harvested twice a month, which means that farmers may benefit from a stable source of income every month. This contrasts with, for example, pepper, which historically has highly volatile prices and is harvested once a year, or cassava whose market is controlled by intermediaries with high bargaining power. In a context of disinvestment in public policies, extension services, and family farming policies in general, alternative development models where the private sector assumes certain roles might be an option. This is particularly relevant in contexts such as Pará where family farming policies tend to be widely ineffective, rent seeking, and poorly managed.

Nonetheless, the strengths of Brazil's contract farming scheme are related not only to the policy dimension of governance (instruments), but also to the politics (actors) and polity (institutional context). In fact, the existence of strong smallholder movements and their political proximity to the government are important specificities of Brazil's social governance system. Specific policies targeting oil palm were designed and implemented in a context where family farming was a topic high on the political agenda. This certainly enabled smallholders to strengthen their bargaining power vis-à-vis private interests and contributed to the design of friendlier policies for smallholders.

8.1.2. Is oil palm a silver bullet for sustainable development in the Brazilian Amazon?

Residual deforestation rates and improved livelihood options for smallholders derived from higher average household incomes are certainly good news and positive aspects of Brazil's oil palm governance model. But does not being synonymous with socio-environmental disaster mean that it should be promoted as a rural development strategy? Considering the socio-environmental risks and the complexity and diversity of Amazonian landscapes, oil palm and agricultural production in general shouldn't be seen as a silver bullet for local development. Oil palm, as implemented under the current model in Brazil, may only work in certain places, certainly far from old-growth forests and active frontiers, and may only include certain groups, typically migrants with higher entrepreneurial, commercial oriented, and agricultural backgrounds.

As shown in Chapters 6 and 7, positive environmental results cannot be dissociated from the distance to frontier areas. In fact, unlike in other cases (e.g., in Indonesia), oil palm in Brazil has mostly expanded into areas of extensive agriculture, normally far from old-growth forests, as is the case in most of northeast Pará. High implementation costs (which also increase the economic risks of illegality), labor and logistical requirements, and long maturity periods (normally 25 years) make oil palm a less "logical" activity for frontier areas in the Amazon. As such, oil palm is a more suitable land-use in areas of extensive agriculture, which contributes to intensification processes. In other words, oil palm can increase per-hectare profitability in comparison to several of the most common local land use alternatives for both for smallholders and larger landholders, such as cattle ranching or swidden agriculture. On the contrary, cattle ranching and swidden agriculture—which have lower implementation costs, fewer labor and logistical requirements, less technical complexity, lower per-hectare output, etc.—are more likely to develop in frontier areas. Consequently, these activities are often linked to deforestation. That is why increasing the per-hectare output of extensive activities, most importantly cattle ranching, is a major component of current anti-deforestation strategies in the Amazon.

Despite not being a major driver of direct deforestation, the jury is still out regarding possible indirect impacts. As investments are still concentrated in a circumscribed area and expansion rates have been slow, it is difficult to assess whether oil palm has spared land (thus reducing pressure on old-growth forests) or has caused the "Jevons paradox" (thus increasing pressure to clear up new areas). Considering the factors mentioned above, it is not likely that oil palm has yet caused the Jevons paradox among large-scale plantations; however, as the sector progresses toward maturity, expansion barriers may be reduced and pressure for uncontrolled expansion may increase. Moreover, the identification of relevant deforestation polygons in smallholder properties engaged in oil palm (but not in areas converted to oil palm), suggests that indirect effects at the property level are taking place, particularly in municipalities with higher rates of forest cover.

It is thus strongly recommended to maintain the current model of "sticks" to prevent expansion into forestlands, and "carrots" to incentivize plantations into degraded areas. Maintaining and strengthening the existing policy and regulatory framework for frontier areas including indigenous territories, both strictly protected and sustainable use conservation units, and incentives for certain economic activities such as n*on-timber forest products* (NTFPs) and ecotourism are also advisable. Exploring carbon funds linked to REDD+ mechanisms or others can be a viable strategy to compensate for any reduced economic viability (at least initially) of these alternatives.

Other environmental aspects beyond the deforestation of primary forests should also be considered when local development is under discussion. For example, the use of a loose concept of degraded land excludes only primary forests from direct conversion. As such, some high conservation value and natural regeneration areas may be converted, and important issues

such as connectivity are not considered. While much of the debate in Brazil is still focused on avoiding the deforestation of primary forests, there is a need to give more emphasis to these issues. Progress was made in 2015 through the "Juquira" Law, which established rules at Pará state level to allow the removal of secondary forests until a certain stage of regeneration. Since expansion had been halted, it was not possible to assess its effectiveness. Nonetheless, the move toward landscape-level approaches to agricultural production that define, for example, in a participatory and technical way, areas in which to encourage natural regeneration according to their ecological relevance is highly advisable. Moreover, as water and soil contamination could be occurring as a result of widespread pesticide use, state environmental agencies should pay more attention to these environmental impacts, which are more difficult to monitor. Companies and research institutions should sponsor investments in environment-friendlier agronomic alternatives.

On the social side, Brazil's governance model has also shown relevant weaknesses. As the results presented in Chapter 5 demonstrate, the model is not particularly inclusive of smallholders and tends to exclude marginalized groups. These more marginalized smallholders are unable to benefit from oil palm's income-generating potential, typically because they lack the required land and labor resources. Moreover, as discussed in Chapters 6 and 7, participation does not necessarily or immediately translate into wellbeing. Evidence suggests that oil palm, at least in the format it has been promoted in Brazil, and the current technological package may not be a desirable livelihood option for all smallholders. The results show wide differences across farmers' performances, ranging from complete success (17%) to near abandonment (12%).

There are various reasons for success or failure. While contextual aspects, such as climatic factors and delays in input and technical assistance provision, certainly play an important role, differences within smallholder families—most notably stage of life, spirit, availability of household labor, and agricultural vocation—are major aspects explaining why some households are more likely to succeed and others to fail. This suggests that oil palm, at least under the current model, can be a viable livelihood option for some groups, but certainly not for all. As such, it should not be considered *per se* the single and most appropriate livelihood option for smallholders, and its promotion under the current model should be made with caution. This highlights, for example, the importance of horizontal coordination and integrated planning across different economic sectors.

Incorporating more flexibility into the existing technological package—including permitting smaller plantation sizes (areas < 10 ha) and promoting oil palm intercropping systems (as opposed to the current monocrop model)—may also increase both inclusiveness and performance. Moreover, sustaining and improving existing smallholder policies—including subsidized credit, technical assistance, nested markets, cash transfer policies, rural retirement benefits, etc.—are fundamental initiatives to reverse increasing inequalities between oil palm

outgrowers, and smallholders failing or not cultivating oil palm. Local alternative crops such as açaí, black pepper, and cocoa have shown great economic potential, which makes them viable options. Diversification of livelihood portfolios including oil palm and but also other crops should also be considered a priority, as it increases resilience and reduces dependence on a single livelihood option.

In addition to aspects linked to contract farming, the Brazilian cases have shown that other social impacts—which are considered externalities, as they were not directly targeted by programs—can create additional harm. Conflicts over access to land as a result of company-led plantations expansion, as described in Chapter 3, may exacerbate land concentration processes and detract from the sector's potential to contribute to broad-based growth. Moreover, social disruptions driven by the rapid influx of migrant workers can create additional difficulties in poorly developed regions. While these aspects result to a great extent from structural problems, such as lack of tenure clarity or poorly funded social services, they were triggered by a governmental intervention. Without any specific policy instrument to address these issues, and in the context of ineffective participation and a lack of adaptive governance, the Brazilian model has shown difficulties in dealing with negative externalities. The low level of participation of smallholder organizations, the absence of municipal governments, and the virtual irrelevance of smallholder-oriented demands was evident in the existing governance bodies.

8.1.3 Is Brazil's model viable?

This dissertation has also shown that Brazil has not managed to expand production and diversify biodiesel feedstock. As detailed in Chapter 4, contrary to governmental intentions and to what many observers anticipated, after an initial expansion period during which the sector more than doubled in size, oil palm expansion rates halted. By 2017, the total area under oil palm cultivation in Pará was approximately 200,000 ha, which represents less than 2% of the suitable land identified by the zoning instrument. Overall, Brazil's area under cultivation represents only 1% of the global market.

The main reason for this failure is linked to the lack of sectoral competitiveness. As specified in Chapter 7, in the current situation, Brazil's palm oil production costs are considerably higher than its competitors, particularly those in Southeast Asia but also in Colombia. This limits the capacity of Brazilian producers to compete in international markets and even to compete with imports in domestic markets. This is a more important competitive disadvantage for the palm oil sector than for the soy and beef sectors, for example, which have comparatively lower labor intensity. That explains why, in the overall context of growing commodity production in the Amazon, palm oil did not follow the main trend.

Overall sectoral lack of competitiveness not only impacts local economies, but might also undermine the socio-environmental orientation of Brazil's model in the long run. As any attempt to enhance socio-environmental standards of commodity production should be grounded in economic viability, it is fundamental to understand how much of the existing socio-environmental regulatory context contributes to higher production costs. As other domestic strategies, such as those of Malaysia and Indonesia, tend to favor economic (and social) over environmental aims, the main question is how Brazil has dealt with socio-environmental tradeoffs related to sector competitiveness.

As extensively discussed in Chapter 7, there are important tradeoffs between social and environmental aims under the current design. The most important is the exclusion of vulnerable smallholder groups—mostly land and labor constrained, credit blacklisted, and in remote areas—from enjoying the potential benefits of participation. This is an effect resulting from existing rules to improve the likelihood of successful participation. Moreover, deforestation and food security concerns are also mismatched with inclusivity demands. Yet, although it is clear that the palm oil program did not manage to reduce production costs, tradeoffs between the contract farming model and environmental standards do not seem fundamental to explain Brazil's lack of competitiveness.

Direct environmental costs (mostly legal reserve opportunity costs and environmental regularization) are not significant in the overall production cost composition. Moreover, although the implementation and maintenance costs of the contract farming scheme have been high, that is only to a limited extent related to the governance system in place. Increased production costs vary between companies and in this case mostly relate to inefficient planning contributing to a lack of economies of scale. These result in the more expensive delivery of technical assistance and inputs, and collection of the fresh fruit bunches (FFBs).

The factor that explains Brazil's lack of competitiveness is labor costs, which represent 59–75% of CPO production costs. This is Brazil's most important disadvantage vis-à-vis the major palm oil producers. An average worker in Brazil costs US$ 11,783 per year—which is around 15% more than in Colombia, twice as much as in Malaysia, and more than four times more than an average worker in Indonesia earns. However, this factor is not directly linked to the governance system designed to shape oil palm expansion, but a structural dimension of Brazil's socioeconomic position. Its labor standards are higher than those of its main competitors. Without a significant change in this situation (mechanization, improved labor standards elsewhere, or reduced labor standards in Brazil), Brazil's palm oil won't be competitive globally, at least not in non-certified markets.

8.2. IMPLICATIONS FOR GOVERNANCE DEBATES

8.2.1. Transnational versus domestic governance

This dissertation shows that state-centric endogenous approaches have considerable merits compared to transnational governance efforts. By aligning zero-deforestation concerns with local development priorities such as poverty reduction through smallholder inclusion schemes, the Brazilian case demonstrates that domestic strategies are not necessarily strategies to greenwash or circumvent transnational regulations as identified in other cases (Schouten and Hospes, 2018). In fact, unlike the main palm oil producing countries whose sustainability concerns have long been externally driven by transnational governance initiatives, Brazil has managed to minimize the socio-environmental footprint of commodity production through domestic environmental safeguards and mechanisms to promote smallholder integration.

This is clearly related to having ownership of governance processes, rather than just accepting external dictates. Considering that most efforts at the global level have been dedicated to developing and implementing transnational initiatives and arrangements, these findings call for alternative approaches that offer stronger roles to states, domestic initiatives, and bottom-up processes in developing countries. This is particularly relevant since transnational governance efforts have been criticized for favoring environmental goals over issues of inclusivity and productive integration of smallholders or rural development in producing countries (Astari and Lovett, 2019).

Yet, considering the identified economic outcomes, states should prioritize aligning socio-environmental concerns with issues of production costs and competitiveness in global markets. While Brazil shows that an overall lack of competitiveness is not necessarily linked to environmental governance frameworks, that is clearly a point that might undermine the existing environmental merits in the long run. By not succeeding in global competitive markets, companies may see little advantage in attaining environmental standards. Moreover, as labor costs constitute the main disadvantage vis-à-vis major palm oil producers, companies may find tempting to downgrade labor rights, the so-called race to the bottom.

Considering this risks, states should more actively embrace strategies to improve competitiveness. While the socio-environmental race to the bottom is certainly not a reasonable strategy to improve sector competitiveness, the focus should be on finding other alternatives. This could be done domestically by, for example, reducing transportation costs, investing in mechanization or improved varieties, or reducing vertical integration by outsourcing supply and expanding smallholder schemes. The last-mentioned could be a viable solution for countries with higher labor standards, particularly once the sector achieves a certain level of maturity.

However, countries like Brazil may need to start embracing transnational governance initiatives in order to become competitive and to differentiate themselves in international markets, since domestic market opportunities are limited. Being a frontrunner with RSPO jurisdictional certification could open new doors to premium markets. Since the sector cannot forever look inward, opportunities provided by transnational governance may need to be exploited in order for the sector to mature. Yet, this engagement in transnational processes is significantly different from the case of other palm oil producing countries. In Indonesia, for example, there has been a constant conflict between domestic and transnational efforts, conceptualized as rival governance (Hospes, 2014). Given that Brazil has the right fundamentals, it is better placed to engage those processes in a constructive and collaborative manner. This suggests that there is no governance silver bullet to fix the socio-environmental risks of commodity production, and that both domestic and transnational strategies need to be aligned at certain point. Any country wanting to succeed in commodity governance and compete in global markets should consider both domestic and transnational governance mechanisms.

In terms of an overall conclusion, the following can be said: Governance strategies to enhance the sustainability of commodity supply should be as domestic and bottom-up as possible and sufficiently aligned to transnational efforts. The former is important to the extent that it generates engagement and ownership, ensures the understanding of local issues and dynamics, and guarantees the strategy's effectiveness in the medium/long run. The latter is key to the extent that vertical coordination with global markets is required in order for sectors to be competitive, particularly in premium markets.

8.2.2. Understanding and adjusting to dynamic contexts through adaptive governance

But does governance in fact define the socio-environmental outcomes of agricultural production? To a certain extent: yes. Governance—as defined by its policy (instruments), polity (institutional context), and politics (actors) dimensions—plays a substantial role in shaping outcomes. However, considering that polity and politics dimensions in each context have several specificities, applying the same instruments everywhere is not likely to work. Any governance attempt, whether domestic or transnationally driven, should consider a correct analysis of the context. For example, policy integration between specific instruments designed to target commodity production and overall regulatory frameworks must be considered.

Moreover, it is also key to understanding the diversity of actors in each landscape. For example, including indigenous groups, riverside dwellers, and other traditional groups in high-value agricultural commodity markets, particularly with exotic crops, is probably not the most appropriate option. These groups not only inhabit areas closer to, or actually inside, old-growth forests, but in many cases they also have different cultural backgrounds and world views. These generally collide with the market-oriented mentality that planting a crop like oil palm normally

requires. This is also a major limitation of inclusive business models debates, at least as they are conceived in Brazil: They are biased toward commercial and productivist approaches, which often conflict with the mindset of traditional groups.

In addition to the three governance dimensions, the geographical context where the crop is expanding or intended to expand is obviously a key element. For example, the recent expansion of oil palm in the Brazilian Amazon did not contribute to deforestation or cause major land conflicts. But those results certainly cannot be dissociated from the distance to frontier areas and the territories of traditional populations. In fact, in the few cases where oil palm expanded near the areas of traditional groups, several problems emerged. It is likely that intense conflicts would have erupted had oil palm expanded near large indigenous territories, for example. Moreover, unlike in, for example, Indonesia, oil palm in Brazil has mostly expanded into areas of extensive agriculture, which are normally far from old-growth forests. This is because oil palm is a more suitable land-use activity for areas of extensive agriculture considering its high implementation costs (also increasing the economic risks of illegality), labor and logistical requirements, and long maturity periods (normally 25 years). In this context, oil palm is a less "logical" activity for frontier areas in the Amazon.

As contexts change over time and policy design or policy implementation may face problems, there is a need to invest in monitoring mechanisms and effective participation. In other words: Adaptive governance through flexible and collaborative decision-making frameworks is key to adjusting to changing contexts (Wyborn, 2015). At the time of writing (November 2019), the governance context in Brazil and in the field of palm oil supply is completely different from the context when the present research was started. This shows that the world is changing fast and that outcomes are momentary and fragile. In this unstable situation, actors with direct roles in defining production practices such as processing firms, farmers, and buyers, and those with indirect influence such as unions, governments, NGOs, and consumer groups, will always need to adjust to contextual changes, and those changes need to be regulated by improved participation and adaptive governance strategies. Constant and robust monitoring is key, in addition to flexibility and capacity to improve existing frameworks. Building appropriate governance mechanisms to guarantee effective participation should be a priority. Investing in transparent and inclusive participatory bodies I which virtually all stakeholders are represented should be an important element of any domestic or transnational strategy. This is also important to deal with negative externalities, a problem that Brazil has not managed to solve.

8.3. FINAL THOUGHTS

In recent decades, the world has witnessed the emergence of many transnational strategies and initiatives to improve the current state of affairs of commodity production. This is clearly related to ongoing trends, such as globalization, decentralization, and privatization, that offered

unprecedented centrality to non-state actors, challenging the traditional role of the state and pressuring for innovative ways to address common problems. This has unquestionably had many advantages. In many consuming countries, for example, consumer groups are acting and pressing governments to reduce waste generation and food waste, or to promote new forms of recycling or reutilizing certain materials as options for a more efficient use of natural resources; while other groups are supporting more radical change, for example, through certain commodity bans or changing consumption patterns toward vegetarian diets. The idea of infinite growth is also being academically and politically challenged by, for instance, the de-growth movement (Kallis et al., 2012). From the supply side, responses have mostly focused on green growth strategies, such as improving productivity and developing new technologies to reduce negative externalities. In some cases, these actions are adopted through mandatory mechanisms, while in others change is related to profitability or green marketing concerns.

The merits and increased reach of these options is indubitable, as many aspects of global production have improved. There are, however, several limitations and question marks. Two of the question marks seem critical. The first is that many of these options focus in consumption-side aspects and do not often prioritize the interests of producing regions and their rural poor populations. In some cases, they could be seen as naïve, which seriously undermines their effective capacity to deliver change in the long term. It has become clear throughout several years of research activities in Brazil that persistently favoring environmental aspects over social and economic development in producing countries may result in unintended consequences, such as the strengthening of anti-environment populist discourses. Between 2013 and 2019, Brazil has made an impressive and maybe dramatic change from being led by a government global leader in terms of sustainability and climate change, strongly supported by a socio-environmental grassroots coalition, to a conservative populist inward-looking government elected through an anti-environment rhetoric and supported by most of the agricultural sector, with the particular visibility of its most retrograde groups. At the time of writing, the government is discussing the dismantling of many of the most symbolic socio-environmental rights, including indigenous territories in the Amazon. The recent hype about Amazonian fires makes it evident that the current Brazilian government will try to force this position.

While there are many reasons for the rise of this populist movement, which exists not only in Brazil, it is clear that it is strongly rooted in people's often erroneous belief that in producing regions, environmental- and consumer-driven aspects are given more importance than the socioeconomic aspects. To what extent consuming countries and final consumers are willing and able to pay more to incentivize sustainable production is a major question. Until now, premium markets have shown limited capacity to effectively provide a viable alternative, beyond certain niches, for sustainable production in the tropics. This can be even more important given the lack of economic and livelihood alternatives rural people and remote areas normally face. Finding the right balance between the Ür nature, the neo-nature, and the socio-nature (Hecht, 2012) is also for this reason a fundamental target to achieve long-term sustainable outcomes in tropical landscapes.

The second question mark is that most of the current strategies focus on growth. Whether "inclusive," "green," "endogenous" or something else, growth is always an underlying leitmotiv of current strategies to promote sustainable development, in particular related to agricultural production. Of course up to now, although unequally distributed, growth has been able to produce unprecedented wealth and to lift innumerous people out of poverty. However, infinite growth within the current planetary boundaries does not exist, and has it has been said many times that the limit is now not far away. To what extent green growth strategies will be able to effectively promote the reconciliation of economics, ecology, and society is for this reason very tricky. Until now, examples like the Brazilian Amazon show that producing more, in particular intensifying production, is still desirable, but given that infinite growth does not exist, the major question is for how much longer these triple-win strategies will be able to produce the desired outcome of a prosperous and just society on a safe and balanced planet.

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EXECUTIVE SUMMARY

Chapter 1

Chapter 1 frames this dissertation in the context of debates on the governance of agricultural commodities—more precisely, on strategies to reconcile conservation and development. It introduces the main debates around the notion of governance, refers to the main authors, and provides the most important definitions. It also explains why the oil palm value chain and the Brazilian Amazon were selected as a case study. Aspects such as the research design, approach, methods, and data collection are presented here, along with a brief discussion on epistemologies and intellectual foundations. The chapter concludes by presenting the structure and outline of the book.

Chapter 2

This chapter describes in broad terms Brazil's unique governance system, which shapes agricultural commodity production in the Amazon. It presents a number of policies and other aspects related to, for example, deforestation, socioeconomic development, tenure, and biofuels. In order to characterize these policies, it discusses the Amazon's historical context, geographies, social and cultural diversity, land-use trends, and political economy. In doing so, it explains why Brazil has developed a progressive governance system that has managed to significantly reduce deforestation in the Amazon and lift millions of people out of poverty. The chapter also provides the background required to understand why and how oil palm expanded in the Amazon and the antecedents shaping the emergence of the Sustainable Palm Oil Production Program (SPOPP). Based on an extensive literature review, this chapter expands and updates a CIFOR Working Paper published in 2015.

Chapter 3

This chapter focuses on the evolution and dynamics of the Brazilian oil palm value chain, based on research conducted in Pará—Brazil's leading palm oil producing state. It introduces the history of the oil palm expansion process in the Amazon, the main governmental programs, and the current state of affairs, including the geographies, investors' backgrounds, business models, model for smallholder inclusion, and processing and marketing. The chapter provides the necessary background for the remaining chapters.

Chapter 4

This chapter looks beyond a normative analysis of oil palm expansion to offer a nuanced analysis of landscape transformations in the Brazilian Amazonian region of Tomé-Açu. Based on quantitative and qualitative data derived from interviews with key stakeholders, focus groups, and surveys among smallholders and migrant workers, contextualized and cross-checked with observations between 2011 and 2017 and secondary sources, the chapter discusses the processes and outcomes of the 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 an absent state, reduced participation, and disinvestment, local agency has been able to reorganize the sector on the ground and a transformed landscape has emerged. However, in the current situation, if expansion recommences there is no guarantee that the sector will be able to avoid creating many of the socio-environmental problems experienced in the past.

Chapter 5

This chapter evaluates how well the oil palm contract farming scheme promoted under the remit of the SPOPP has delivered on its inclusive development objectives and ameliorated the social concerns expressed by civil society. The SPOPP was established in 2010 within the framework of Brazil's 2005 Biodiesel Law. As the country's biodiesel sector is primarily reliant on large-scale mechanized soy production, this program sought to enhance the sustainability and inclusiveness of the industry through the promotion of oil palm cultivation in the Amazon biome. Drawing on cross-sectional data collected from 420 households in northeast Pará, this chapter employs a number of econometric techniques to analyze three key topics of debate with respect to the SPOPP, namely the determinants of participation, the determinants of labor allocation to oil palm, and changes in livelihood portfolios and food production. In doing so, this chapter offers new insights into processes of inclusion and exclusion in contract farming, the erroneous assumptions that underlie SPOPP eligibility criteria, and the dilemmas associated with inclusive business and value chain development.

Chapter 6

Contract farming is arguably a pro-poor strategy to promote rural development and minimize the social impacts of large-scale agricultural expansion. Yet, little attention has been paid to its environmental impacts, particularly in tropical landscapes. This chapter fills this gap by linking social and environmental analysis of oil palm contract farming in the Brazilian Amazon. The analysis presented used a mix of quantitative and qualitative methods, including household surveys, remote sensing techniques, and in-depth interviews, to assess whether the scheme managed to avoid deforestation and to contribute to livelihood improvements. The results show that the Brazilian model managed to prevent the deforestation of primary forests, but achieved limited and differentiated livelihood results. The analysis suggests that the Brazilian model is more likely to work for households with an agricultural vocation and a commercial spirit in areas with an abundant availability of degraded lands, but can hardly be a solution in frontier areas or for subsistence or more dependent households. The chapter concludes with some reflections on how contract farming schemes should be designed in order to maximize livelihood gains and minimize negative environmental impacts.

Chapter 7

Oil palm, due to its controversies, has been targeted by several regulatory innovations aimed at enhancing the sector's sustainability. Among these, transnational efforts—such as the Roundtable on Sustainable Palm Oil (RSPO) and corporate commitments to zero deforestation—and consumer country initiatives have been highly influential. Nonetheless, there has been little focus on the domestic efforts of producing countries. This chapter presents an analysis of the extent to which the governance models of palm oil producing countries can be better equipped to reconcile conservation and development goals, more precisely domestic demands such as economic development and poverty alleviation, and transnational concerns about forest conservation. In the Brazilian case, the government intended to drive oil palm expansion in the Amazon through a program that simultaneously only allowed expansion into already degraded areas and offered companies incentives to engage smallholder farmers in their supply chains. The findings suggest that domestic governance strategies can be a valuable way to minimize the socio-environmental footprint of commodity production, and are not necessarily strategies to greenwash or circumvent transnational regulations. In Brazil, however, the sector's overall economic viability is beset with constraints and dilemmas. This suggests that any attempt to enhance the socio-environmental standards of commodity production should be grounded in economic viability.

Chapter 8

Finally, Chapter 8 summarizes the main findings of the research presented in this book in relation to three main issues. It concludes that although oil palm expansion is not synonymous with socio-environmental destruction in the Amazon, it is far from being a silver bullet for local development. It also discusses the viability of Brazil's governance model and presents implications for academic debates, notably on the transnational versus domestic oriented governance models and on the need for adaptive governance. It ends with some final reflections on the secondarization of producing regions and the interests of their poor rural populations, the rise of populism in the global arena, and the questionable notion of infinite growth.

SAMENVATTING

Hoofdstuk 1

Hoofdstuk 1 schetst het kader van dit proefschrift, namelijk de debatten over bestuur als het gaat om landbouwgrondstoffen – preciezer gezegd, over strategieën om natuurbehoud en ontwikkeling op elkaar af te stemmen. De belangrijkste debatten rond het begrip 'bestuur' worden geïntroduceerd, er wordt verwezen naar de belangrijkste auteurs en de belangrijkste termen worden gedefinieerd. In dit hoofdstuk wordt ook uitgelegd waarom de waardeketen van de oliepalmteelt en het Braziliaanse Amazonegebied als casestudy werden geselecteerd. Aspecten zoals de onderzoeksopzet, aanpak, methoden en dataverzameling worden hier gepresenteerd, samen met een korte bespreking van de epistemologieën en intellectuele grondslagen. Het hoofdstuk sluit af met een overzicht van de opzet en inhoud van het boek.

Hoofdstuk 2

Dit hoofdstuk beschrijft in grote lijnen het unieke Braziliaanse bestuurssysteem, dat bepalend is voor de productie van landbouwgrondstoffen in het Amazonegebied. Hierin worden verschillende beleidslijnen en andere aspecten gepresenteerd die verband houden met zaken als ontbossing, sociaaleconomische ontwikkeling, pacht en biobrandstoffen. Om dit beleid te karakteriseren wordt ingegaan op de historische context van het Amazonegebied, de geografie, de sociale en culturele diversiteit, de trends in landgebruik en de politieke economie. Op deze manier wordt verklaard hoe het komt dat Brazilië een progressief bestuurssysteem heeft ontwikkeld dat erin is geslaagd om de ontbossing in het Amazonegebied aanzienlijk te verminderen en miljoenen mensen uit de armoede te halen. Het hoofdstuk schetst ook de achtergrond die duidelijk maakt waarom en hoe de oliepalmteelt zich in het Amazonegebied heeft uitgebreid en de omstandigheden die bepalend waren voor de ontwikkeling van het Sustainable Palm Oil Production Program (SPOPP). Op basis van een uitgebreid literatuuronderzoek wordt in dit hoofdstuk een CIFOR-werkdocument uit 2015 uitgebreid en geactualiseerd.

Hoofdstuk 3

Dit hoofdstuk richt zich op de evolutie en dynamiek van de Braziliaanse oliepalmwaardeketen, op basis van onderzoek dat is uitgevoerd Pará, de deelstaat van Brazilië die de meeste palmolie produceert. Het introduceert de geschiedenis van het uitbreidingsproces van de oliepalm in het Amazonegebied, de belangrijkste overheidsprogramma's en de huidige stand van zaken, inclusief de geografische situatie, de achtergronden van investeerders, bedrijfsmodellen, het model voor de inclusie van kleine boeren, en de verwerking en marketing van de oliepalm. Het hoofdstuk geeft de nodige achtergrond voor de resterende hoofdstukken.

Hoofdstuk 4

Dit hoofdstuk overstijgt een normatieve analyse van de uitbreiding van de oliepalmteelt en biedt een genuanceerde analyse van de landschapsveranderingen in de regio Tomé-Açu in

het Braziliaanse Amazonegebied. Op basis van kwantitatieve en kwalitatieve gegevens uit interviews met de belangrijkste stakeholders, focusgroepen en enquêtes onder kleine boeren en arbeidsmigranten, die in een context zijn geplaatst en getoetst aan observaties uit de periode 2011-2017 en secundaire bronnen, worden in dit hoofdstuk de processen en resultaten van het SPOPP besproken. Ondanks de participatieve component en de innovatieve opzet van het programma, dat de ecologische, economische én sociale dimensie aanpakte, werden er al snel structurele aanpassingen doorgevoerd in het programma en waren er problemen met de continuïteit. Er ontstond een nieuwe groei- en krimpcyclus in de regio, maar zowel de groei- als de krimpperiode werden gekenmerkt door gemengde resultaten. Ondanks de huidige verschuiving in het bestuur, die wordt gekenmerkt door afwezigheid van staatsbemoeienis, verminderde participatie en desinvestering, zijn lokale actoren erin geslaagd om de sector ter plaatse te reorganiseren en is er een getransformeerd landschap ontstaan. In de huidige situatie is er echter geen garantie dat, als de uitbreiding wordt hervat, de sector in staat zal zijn om te voorkomen dat veel van de maatschappelijke en milieugerelateerde problemen die zich in het verleden hebben voorgedaan weer zullen optreden.

Hoofdstuk 5

In dit hoofdstuk wordt geëvalueerd hoe goed de door het SPOPP gestimuleerde regeling voor contractlandbouw van oliepalmen heeft gefunctioneerd als het gaat om de verwezenlijking van de doelstellingen voor inclusieve ontwikkeling en heeft bijgedragen tot vermindering van de maatschappelijke problemen zoals deze waren benoemd door het maatschappelijke middenveld. Het SPOPP werd in 2010 opgezet in het kader van de Braziliaanse biodieselwet van 2005. Aangezien de biodieselsector van het land voornamelijk afhankelijk is van grootschalige gemechaniseerde sojaproductie, was dit programma erop gericht om de duurzaamheid en inclusiviteit van de industrie te vergroten door de oliepalmteelt in het Amazone-bioom te bevorderen. Op basis van crosssectionele data van 420 huishoudens in het noordoosten van Pará wordt in dit hoofdstuk een aantal econometrische technieken gebruikt om drie hoofdthema's van het debat over het SPOPP te analyseren, namelijk de beslissende factoren voor participatie, de beslissende factoren voor tewerkstelling van arbeiders in de oliepalmindustrie, en veranderingen in manieren van levensonderhoud en de voedselproductie. Dit hoofdstuk biedt nieuwe inzichten in de processen van inclusie en uitsluiting in de contractlandbouw, de verkeerde aannames die ten grondslag liggen aan de criteria om in aanmerking te komen voor het SPOPP, en de dilemma's die samenhangen met inclusieve bedrijfs- en waardeketenontwikkeling.

Hoofdstuk 6

Contractlandbouw is aantoonbaar een strategie ten gunste van de armen om plattelandsontwikkeling te bevorderen en de maatschappelijke gevolgen van grootschalige landbouwuitbreiding tot een minimum te beperken. Toch is er weinig aandacht besteed aan de gevolgen voor het milieu hiervan, met name in tropische gebieden. Dit hoofdstuk vult deze leemte op door middel van een gecombineerde maatschappelijke en ecologische analyse

van de contractlandbouw van oliepalmen in het Braziliaanse Amazonegebied. Voor deze analyse is gebruikgemaakt van zowel kwantitatieve als kwalitatieve methoden, waaronder enquêtes onder huishoudens, teledetectietechnieken en diepte-interviews, om na te gaan of het programma erin is geslaagd ontbossing te voorkomen en bij te dragen aan een verbetering van het levensonderhoud. De resultaten tonen aan dat het Braziliaanse model erin is geslaagd de ontbossing van oerbossen te voorkomen, maar slechts beperkte en gedifferentieerde resultaten op het gebied van levensonderhoud heeft opgeleverd. De analyse suggereert dat het Braziliaanse model eerder zal werken voor huishoudens met een agrarische roeping en handelsgeest in gebieden waar aangetaste percelen in overvloed beschikbaar zijn, maar dat het nauwelijks een oplossing kan zijn in grensgebieden of voor het levensonderhoud van meer afhankelijke huishoudens. Het hoofdstuk eindigt met een aantal overwegingen over hoe contractlandbouwregelingen moeten worden opgezet om een zo groot mogelijke vooruitgang te boeken als het gaat om het voorzien in het levensonderhoud en tegelijkertijd de negatieve milieueffecten tot een minimum te beperken.

Hoofdstuk 7

Vanwege de controverses rondom de oliepalmteelt zijn er verschillende innovaties geweest op het gebied van regelgeving gericht op het verbeteren van de duurzaamheid van de sector. Internationale initiatieven – zoals de Ronde Tafel voor Duurzame Palmolie (*Roundtable on Sustainable Palm Oil*, RSPO) en de toezeggingen van bedrijven om geen land meer te ontbossen – en initiatieven van consumerende landen zijn hierbij van grote invloed geweest. Toch is er weinig aandacht besteed aan de binnenlandse inspanningen van de producerende landen. In dit hoofdstuk wordt een analyse gepresenteerd van de mate waarin de bestuursmodellen van palmolieproducerende landen beter kunnen worden uitgerust om de doelstellingen van behoud en ontwikkeling – of preciezer gezegd, de binnenlandse vereisten zoals economische ontwikkeling en armoedebestrijding – en de zorgen in de internationale gemeenschap over het behoud van bossen met elkaar in overeenstemming te brengen. In het geval van Brazilië was de regering van plan om de uitbreiding van de oliepalmteelt in het Amazonegebied te stimuleren door middel van een programma dat tegelijkertijd alleen uitbreiding naar reeds aangetaste percelen toestond en bedrijven stimuleringsmaatregelen bood om kleine boeren in hun toeleveringsketens te betrekken. De bevindingen suggereren dat binnenlandse bestuursstrategieën een waardevolle manier kunnen zijn om de sociale en ecologische voetafdruk van de grondstoffenproductie te minimaliseren en niet noodzakelijkerwijs strategieën voor groenwassen of om internationale regelgeving te omzeilen zijn. In Brazilië wordt de algehele economische levensvatbaarheid van de sector echter met beperkingen en dilemma's geconfronteerd. Dit lijkt erop te duiden dat elke poging om de sociale normen en milieunormen voor de productie van grondstoffen te verbeteren gebaseerd moet zijn op economische levensvatbaarheid.

Hoofdstuk 8

Tot slot worden in hoofdstuk 8 de belangrijkste bevindingen van het in dit boek gepresenteerde onderzoek samengevat in relatie tot drie hoofdpunten. De conclusie is dat, hoewel de

uitbreiding van de oliepalmteelt niet synoniem is met sociale en ecologische vernietiging in het Amazonegebied, het verre van een wondermiddel is voor de lokale ontwikkeling. Verder wordt de levensvatbaarheid van het Braziliaanse bestuursmodel besproken en worden er implicaties gepresenteerd voor academische debatten, met name over transnationaal versus nationaal georiënteerde bestuursmodellen en over de noodzaak van adaptief bestuur. Het eindigt met een aantal overwegingen over de secundarisering van de producerende regio's en de belangen van de arme plattelandsbevolking in die regio's, de wereldwijde opkomst van het populisme en de aanvechtbaarheid van het idee van 'oneindige groei'.

SUMÁRIO EXECUTIVO

Capítulo 1

O Capítulo 1 se inicia apresentando o contexto dos debates sobre a governança de commodities agrícolas, mais precisamente, sobre as estratégias para conciliar conservação e desenvolvimento em países tropicais. Este capítulo expõe os principais debates sobre a noção de governança, faz referência aos principais autores e fornece as teorias e conceitos mais importantes para a leitura da dissertação. Também explica o motivo da cadeia de valor da palma de óleo na Amazônia brasileira ser o tema selecionado como estudo de caso. Aspectos como o desenho da pesquisa, a abordagem metodológica e a coleta de dados são apresentados neste capítulo, juntamente com uma breve discussão sobre epistemologias e fundamentos intelectuais. O capítulo termina apresentando a estrutura e o esboço do livro.

Capítulo 2

Este capítulo descreve, em termos gerais, a estrutura de governança do Brasil referente à produção de commodities agrícolas na Amazônia. São apresentas políticas e outros aspectos relacionados, como por exemplo, desmatamento, desenvolvimento socioeconômico, agricultura familiar, posse da terra e produção de biocombustíveis. Para caracterizar essas políticas, o capítulo discute o contexto histórico da Amazônia, características geográficas, diversidade social e cultural, dinâmicas de uso da terra e economia política. Este capítulo explica o porquê do Brasil ter desenvolvido uma estrutura de governança única, conseguindo reduzir significativamente o desmatamento na Amazônia e tirando milhões de pessoas da pobreza. O capítulo também fornece a base necessária para entender por que e como a palma de óleo se expandiu na Amazônia e o histórico de surgimento do Programa de Produção Sustentável da Palma de Óleo (Programa da Palma). Baseado em uma extensa revisão da literatura, este capítulo expande e atualiza um Working Paper do CIFOR publicado em 2015.

Capítulo 3

A análise central do Capítulo 3 é a evolução e dinâmica da cadeia de valor da palma de óleo brasileira, com base em pesquisas realizadas no Pará, principal estado produtor de óleo de palma do Brasil. Apresenta o processo histórico de expansão da palma de óleo na Amazônia, os principais programas governamentais bem como o status atual, incluindo características geográficas, histórico de investidores, modelos de negócios incluindo o regime de integração de pequenos produtores, processamento e comercialização. O capítulo fornece as informações necessárias para a compreensão dos demais capítulos.

Capítulo 4

Este capítulo vai além de uma análise normativa da expansão da palma de óleo para oferecer uma análise diferenciada das transformações da paisagem na região de Tomé-Açu. Com base em dados quantitativos e qualitativos, derivados de entrevistas com as principais partes

interessadas, grupos focais, pesquisas com pequenos produtores e trabalhadores migrantes, contextualizados e cruzados com observações entre 2011 e 2017, e fontes secundárias, o capítulo discute os processos e os resultados do Programa da Palma. Apesar da sua componente participativa e do seu design inovador, abordando simultaneamente as dimensões ambientais, econômica e social, o programa passou por rápidas mudanças estruturais e resultando em diversas descontinuidades. Com o surgimento de um novo ciclo de expansão e contração na região, os dois períodos ("expansão" e "contração") ainda foram marcados por resultados mistos. Mesmo com mudança na estrutura de governança caracterizada por um Estado ausente, participação social reduzida e falta de investimento, os atores locais foram capazes de reorganizar o setor na região, resultando no surgimento de uma nova paisagem. No entanto, se o cultivo da palma voltar a expandir, não há garantia de que o setor seja capaz de evitar o reaparecimento de problemas socioambientais já vivenciados no passado.

Capítulo 5

Este capítulo avalia até que ponto o regime de integração de pequenos produtores no cultivo da palma de óleo, promovido sob a competência do Programa da Palma, alcançou os seus objetivos de desenvolvimento inclusivo e respondeu às preocupações da sociedade civil em relação à segurança alimentar (por exemplo, pela conversão de áreas com culturas alimentares como a mandioca para palma de óleo). O Programa da Palma foi criado em 2010, no seguimento da Lei do Biodiesel de 2005. Como o setor de biodiesel do país depende, principalmente, da produção mecanizada de soja em larga escala, este programa procurou aumentar a sustentabilidade e a inclusão social através da promoção do cultivo da palma de óleo no bioma amazônico com a participação de pequenos produtores. Com base em dados coletados através de questionários a 420 famílias no nordeste do Pará, este capítulo utiliza uma série de técnicas econométricas para analisar três tópicos-chave de debate em relação ao SPOPP, especificamente, os determinantes da participação, os determinantes da alocação de mão de obra e as mudanças no uso da terra e na produção de alimentos. Ao fazê-lo, este capítulo oferece novas perspectivas sobre os processos de inclusão e exclusão nos regimes de integração de pequenos produtores em cadeias de valor, discute as suposições errôneas subjacentes aos critérios de elegibilidade do Programa da Palma e analisa os dilemas associados ao desenvolvimento de modelos de negócios mais inclusivos.

Capítulo 6

A integração de pequenos agricultores em cadeias produtivas é indiscutivelmente uma estratégia mais inclusiva para promover o desenvolvimento rural e minimizar os impactos sociais da expansão agrícola em larga escala. No entanto, pouca atenção tem sido dada aos seus impactos ambientais, particularmente em paisagens tropicais. Este capítulo preenche essa lacuna conectando a análise social e ambiental dos regimes de integração da palma de óleo na Amazônia brasileira. A análise apresentada utilizou uma combinação de métodos quantitativos e qualitativos, incluindo pesquisas domiciliares, técnicas de sensoriamento remoto e entrevistas em profundidade, para avaliar se o modelo proposto pelo Programa da Palma conseguiu evitar

o desmatamento e contribuir para a melhoria dos meios de vida dos agricultores participantes. Os resultados mostram que, o modelo brasileiro conseguiu evitar o desmatamento de florestas primárias, mas alcançou resultados de meios de vida limitados. A análise sugere que o modelo brasileiro é mais provável que funcione para famílias com vocação agrícola e comercial, e que possuam áreas com abundante disponibilidade de terras degradadas, entretanto, dificilmente pode ser uma solução em áreas de fronteira, para famílias que praticam agricultura de subsistência ou famílias com elevado grau de dependência. O capítulo finaliza com algumas reflexões sobre como os regimes de integração devem ser desenhados, de forma a maximizar o impacto positivo nos meios de vida e minimizar os impactos ambientais negativos.

Capítulo 7

A palma de óleo, devido às suas controvérsias, tem sido alvo de várias inovações regulatórias que visam melhorar a sustentabilidade do setor. Entre elas, esforços transnacionais, como a Mesa Redonda de Óleo de Palma Sustentável (RSPO) e compromissos corporativos de desmatamento zero, além das iniciativas de países consumidores, que têm sido altamente influentes para melhoria da sustentabilidade. No entanto, tem ocorrido pouco foco nos esforços internos dos países produtores. Este capítulo analisa em que medida as estruturas de governança dos países produtores de óleo de palma podem ser mais bem equipadas para conciliar as metas de conservação e desenvolvimento. Mais precisamente, conciliar as demandas internas como o desenvolvimento econômico, a redução da pobreza, e as preocupações internacionais sobre a conservação florestal. No caso do Brasil, o governo buscava impulsionar a expansão da palma de óleo na Amazônia por meio de um programa que, simultaneamente, permitisse apenas a expansão em áreas já degradadas e oferecesse às empresas incentivos para incorporar pequenos agricultores em suas cadeias produtivas. Os resultados sugerem que, as estratégias de governança doméstica podem ser uma forma valiosa de minimizar a pegada socioambiental da produção de commodities, e não são necessariamente estratégias de *greenwashing* ou de contornar regulamentações internacionais. No Brasil, no entanto, a viabilidade econômica geral do setor está repleta de restrições e dilemas. Isso sugere que qualquer tentativa de melhorar os padrões socioambientais da produção de commodities agrícolas deve ser fundamentada na viabilidade econômica.

Capítulo 8

Por fim, o Capítulo 8 resume os principais resultados da pesquisa apresentada neste livro em relação a três principais questões. Conclui que, embora a expansão da palma de óleo não seja sinônimo de destruição socioambiental na Amazônia, está longe de ser a grande solução para o desenvolvimento local. Também discute a viabilidade do modelo de governança do Brasil e apresenta implicações para debates acadêmicos, notadamente sobre os modelos de governança transnacionais *versus* domésticos e sobre a necessidade de governança adaptativa. Finalizando com algumas reflexões sobre a pouca importância dada às regiões produtoras e aos interesses de suas populações rurais pobres nos debates globais sobre produção de commodities, a ascensão do populismo na arena global e a questionável noção de crescimento infinito.

BIOGRAPHY

Frederico was born in 1985 in the Portuguese city of Porto. He has been passionate about global politics, travel, literature, culture, history, and—as a decent Portuguese—football since a very young age. While he loves (and does not negotiate) his Portuguese cultural background, it is in global fields that he feels most at home. He holds a BA in International Relations awarded by Coimbra University, an MSc in International Development Studies and a PhD in Geography, both awarded by Utrecht University. Before his PhD, he worked in several organizations, such as the European Parliament, the United Nations Development Program, and the Ministry of Foreign Affairs of Cape Verde as an intern. Since 2013 he has been performing various roles and carrying out various assignments for the Center for International Forestry Research (CIFOR), and more recently for the World Agroforestry Centre (ICRAF), for The Nature Conservancy (TNC) and for the Government of Pará, as an expert in the Brazilian Amazon. His research interests include the fields of value chains, rural development, tropical deforestation, smallholder agriculture, and climate change. Frederico has lived in Brazil, Portugal, the Netherlands, Belgium, Indonesia, and Cape Verde. In times gone by, he lived in a República in the mythical student city of Coimbra, Portugal, where one of his favorite pastimes was discussing idealisms and utopias. In recent years, however, his experience in some of the world's least developed regions has triggered a fairly pragmatic sense of being. Yet, his favorite literary character is still Pepe Carvalho (Spain's most famous fictional detective). Frederico speaks Portuguese, English, French, and Spanish.

The recent Amazon fire crises and the emerging anti-environmental governmental rhetoric across some important countries have brought to the fore the need to develop viable models that both protect forests and stimulate socioeconomic development as intertwined goals in tropical landscapes. This dissertation focuses on one of the proposals to address that aim: sustainable agricultural production. More precisely, it discusses the extent to which sustainable oil palm expansion can be a viable option to reconcile conservation and development in the Brazilian Amazon.

The book's eight chapters analyze in great detail an expansion process shaped by a unique governance context characterized by robust measures to prevent the deforestation of primary forests and to use degraded lands, and to support the inclusion of smallholder farmers in the business through contract farming schemes. It does so grounded in extensive fieldwork activities carried out between 2014 and 2015 in the Amazonian state of Pará, where the bulk of Brazil's agricultural investments are located.

Brazil has achieved remarkable outcomes in terms of preventing deforestation and stimulating a fairer and more equitable distribution of benefits. This shows that oil palm expansion is not necessarily associated with devastating consequences, such as those observed in Southeast Asia. Yet, the Brazilian model does have some important limitations in terms of inclusivity and viability, which questions its socio-environmental orientation in the long run. By discussing the observed merits and failures, the case study presented here provides an interesting example of the existing challenges and dilemmas encountered when attempting to align agricultural development, poverty alleviation, and forest conservation.