

# The Land Sparing Complex: Environmental Governance, Agricultural Intensification, and State Building in the Brazilian Amazon

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Since 2004, annual deforestation in the Brazilian Amazon has fallen nearly 80 percent, even as agricultural production in the region has increased. Understanding this land use transition requires a theorization of the relationships among environmental governance, agricultural intensification, and state building. Drawing on key informant interviews, municipal-level case studies, and an organizational ethnography of an international environmental organization, I argue that declines in deforestation engineered by new governance arrangements are part of a project of economic development and state building through environmental regulation. This project is implemented by a complex of government, nongovernmental, and corporate actors. I describe the emergence of this complex and the land sparing logic that animates it. Land sparing policy inverts previous logics of state territorialization and environmental conservation with the aim of shifting the Amazonian economy from an extensive mode of extraction to an intensive mode of production. Two municipal case studies follow variation in land sparing policy implementation. The cases identify determinants of land sparing policy effectiveness and collateral effects, including tendencies toward agro-industrial consolidation at the expense of smallholders. *Key Words: agricultural intensification, deforestation, environmental governance, land sparing, territorialization.*

2004年后,巴西亚马逊的农业生产仍有所增加,但该区域的去森林化却减少了将近百分之八十。理解此一土地使用变迁,必须透过将环境治理、农业集约化以及国家打造之间的关系进行理论化。我运用关键报导人的访谈、市政层级的案例研究,以及国际环境组织的民族志组织研究,主张由崭新治理安排所驱动的去森林化的减少,是透过环境规范进行经济发展与国家打造计画的一部分。该计画是由政府、非政府与企业行动者的复杂组成所进行。我将描绘此一复杂组成的浮现,以及驱动该组成的土地分享逻辑。土地分享政策,反转过往的国家领域化和环境保育的逻辑,旨在将亚马逊的经济从大规模的榨取模式转化为集约生产模式。两个城市案例研究,跟随着土地分享政策执行的差异。这两个案例指认土地分享政策有效性的决定因素与附带效应,包括倾向农工联合,并以牺牲小农为代价。 *关键词: 农业集约化, 去森林化, 环境治理, 土地分享, 领域化。*

Desde el 2004, la deforestación anual de la Amazonia brasileña ha caído en cerca del 80 por ciento, aun considerando que la producción agrícola de la región se ha incrementado. Entender esta transición en el uso del suelo requiere una teorización de las relaciones entre la gobernanza ambiental, la intensificación agrícola y la construcción de estado. Basándome en entrevistas con informantes claves, estudios de caso a nivel municipal y en una etnografía organizacional de una entidad ambiental internacional, arguyo que las declinaciones de la deforestación diseñadas por nuevos esquemas de gobernanza hacen parte de un proyecto de desarrollo económico y construcción de estado a través de la regulación ambiental. Este proyecto está implementado por un complejo de actores gubernamentales, no gubernamentales y corporativos. Describo el surgimiento de este complejo y de la lógica de compasión por la tierra que lo anima. La política de protección de la tierra invierte lógicas anteriores de la territorialización del estado y de conservación ambiental con la intención de cambiar la economía amazónica de un modo extensivo de extracción a otro intensivo de producción. Dos estudios de caso municipales exploran la variación en la implementación de las políticas de protección de la tierra. Los casos identifican determinantes de la efectividad en las políticas de protección de la tierra y efectos colaterales, incluyendo las tendencias hacia la consolidación agro-industrial a expensas de los minifundistas. *Palabras clave: intensificación agrícola, deforestación, gobernanza ambiental, protección de la tierra, territorialización.*

Tropical deforestation is central to global trends of biodiversity loss, climate change, and agro-industrial expansion. In Brazil, vast areas of the

Amazon have been deforested since the 1980s for cattle ranching and industrial field crops (Rudel, DeFries, et al. 2009). Between 2004 and 2015, however, annual

deforestation in the Brazilian Amazon declined 79 percent,<sup>1</sup> even as agricultural production in the region increased.<sup>2</sup>

Brazilian success in reducing deforestation is promoted as a model for other countries (Boucher et al. 2014), yet the political-economic character of Brazil's Amazon transition has not been effectively theorized. Drawing on eleven months of fieldwork in the eastern Amazon, I argue that new governance arrangements reducing deforestation are part of a project of economic development and state building through environmental regulation. This project is driven by a complex of government, nongovernmental organizations (NGOs), and corporations united by a logic of *land sparing*. The land sparing complex has deployed environmental regulation to promote state territorialization and agricultural intensification in a way that inverts previous territorialization and conservation strategies. The complex's ultimate goal is a regional transition from an extractive economy that degrades local resources to a productivist economy that supports articulated socioeconomic development. This transition has been unevenly realized, and declining deforestation has been accompanied in some areas by economic stagnation and smallholder dispossession.

By identifying the land sparing complex and its socioeconomic and environmental consequences, this article moves toward a systemic understanding of the Amazonian governance model, while advancing new perspectives on modalities of environmental governance and the relationships among environmental policy, agricultural development, and state building.

## Background

Most forest land cleared in the tropics is converted to agriculture (Ramankutty and Foley 1999). Since the 1980s, scholars, policymakers, and activists have sought to reconcile agricultural development with environmental protection, arguing that agricultural intensification, by increasing production per unit of land, can meet a given demand on a smaller area, thus "sparing" land that would otherwise be converted for agriculture (Lee, Ferraro, and Barrett 2001). This land sparing hypothesis is controversial (Kremen 2015). Nonetheless, agricultural intensification is considered pivotal to observed land use transitions, where agricultural production and forest cover increase simultaneously (Lambin and Meyfroidt 2011).

Reductions in Amazonian deforestation concurrent with increasing agricultural production are

promoted as an example of land sparing (Macedo et al. 2012). Scholarly explanations for the transition focus primarily on enumeration of proximate causes. Although macroeconomic and climatic factors remain important deforestation drivers (Geist and Lambin 2002), deforestation reductions in Brazil are attributed especially to new governance arrangements, including supply-chain sustainability initiatives (Nepstad et al. 2014; Gibbs et al. 2016), expansion of conservation areas and indigenous territories (Nepstad et al. 2006; Soares-Filho et al. 2010), and measures supporting compliance with environmental regulations including enhanced enforcement, restricted agricultural credit, and funding for sustainable agriculture (Assunção, Gandour, and Rocha 2012; Arima et al. 2014). Nepstad et al. (2014) reviewed fifty-one different policies and programs that "may have influenced the decline in deforestation" (S18) in the Brazilian Amazon.

Existing explanations take a largely "technical" approach to policy (Li 2007b), either attempting to quantify effects of specific policy interventions on deforestation (Assunção, Gandour, and Rocha 2012; Arima et al. 2014; Gibbs et al. 2016) or listing policies and processes out of whose interactions deforestation reductions emerge (Hecht 2011; Lapola et al. 2013; Nepstad et al. 2014). Largely absent is a political account that looks beyond proximate factors to the actors and interests that generate the policy environment. One exception is Lapola et al. (2013), who linked deforestation reductions to agricultural intensification in a "pervasive transition of the Brazilian land-use system" (27) that consolidates agro-industry while reinforcing land concentration. Yet Lapola et al. focused on the national level and did not specifically analyze Amazonian governance. A second exception is Baletti's work describing how environmentalism and developmentalism "reterritorialize" the lower Amazon (Baletti 2012) and how environmental governance facilitates industrial soy "neoextractivism" (Baletti 2014). Baletti did not elucidate linkages between "territorialization" and agro-industrial development under a land sparing agenda, however.

This article develops a theorization of Amazonian environmental governance that moves beyond technical explanations of discrete interventions to a systemic understanding of actors, interests, and processes. I focus on the confluence of government, NGO, and corporate interests that links territorialization,

agricultural intensification, and forest conservation under a land sparing complex in the Brazilian Amazon. Although community associations, indigenous peoples, social movements, and others interact with the land sparing agenda, those groups' social visions differ from the land sparing vision shared by government, corporate, and NGO actors in the land sparing complex.

## Methods

The synthesis in this article is based on fieldwork in the Brazilian Amazon in September 2013 through August 2014 in the states of Mato Grosso and Pará. Research was structured around an organizational ethnography of The Nature Conservancy (TNC), an international environmental NGO and an important actor in Brazilian forest governance. TNC activities at the time of research were organized into two ecoregional programs, one more active in Mato Grosso and one more active in Pará. In addition to semistructured interviews with twenty-nine current and former TNC employees and participant observation at TNC offices and activities, I conducted two municipal-level case studies in each state. (TNC projects frequently target the municipal level.) For each ecoregional program, I selected the municipality where TNC staff reported their projects as most successful and the municipality where they reported the greatest difficulties. This article explicates the structure and function of the land sparing complex with support from the Pará case studies of São Félix do Xingu (São Félix) and Novo Progresso.

These two municipal cases capture diverse forest governance experiences in rapidly deforesting areas of the Amazon. Both municipalities are objects of intervention by TNC, yet these interventions have produced divergent results. TNC sees its Pará program as most successful in São Félix, whereas it has experienced its greatest difficulties in Novo Progresso. The case studies are based on participant observation and key informant interviews conducted during six weeks in São Félix in January and February 2014 and July 2014 and two weeks in Novo Progresso in March 2014. Municipal-level interviewees included current and former mayors, secretaries of environment and agriculture and their staff, employees of TNC and domestic NGOs, representatives of state and federal agencies, and representatives of ranchers', workers', and community associations. More than thirty semistructured interviews were conducted in São Félix,

sixteen interviews were conducted in Novo Progresso, and fifteen further interviews for these case studies were conducted elsewhere between September 2013 and August 2014. Participant observation included field visits with NGO staff and attendance at municipal environmental policy meetings. The case studies are also informed by documentary material, including NGO and government reports, municipal documents, news stories, and academic publications.

## Theoretical Framework

### Complexes and Coalitions

I analyze the sociology of Amazonian governance through an organizational hierarchy of complexes and coalitions. Since the 1980s, neoliberal deregulation, decentralization, and privatization have transformed the exercise of political authority, leading to the increasing salience of governance (exercise of authority by heterogeneous political actors) over government (exercise of authority by the state) (Jordan, Wurzel, and Zito 2003; Himley 2008). Neoliberal governance advances through sociological formations that Li (2007a, 264) called "assemblages": networks of heterogeneous elements united by the will to govern. I use the term *complex* to describe an assemblage of actors, institutions, practices, and discourses that seeks to advance a particular political-economic project; that is, to structure accumulation in a particular way. A complex is linked to a specific fraction of capital and includes epistemic and governmental formations that support that fraction. I use *complex*, as opposed to the more general term *assemblage*, to describe assemblages composed of powerful actors coalescing around fractions of capital. Nonetheless, there are contingencies and frictions in "assembling" a complex at multiple levels.

Within neoliberal capitalism, a multitude of complexes advance particular industrial sectors, commodities, and transformative projects; for example, the fossil fuels complex, the sustainable development complex, and the military-industrial complex. Complexes can overlap and actors might participate in multiple complexes. I define the *land sparing complex* as an assemblage of actors, institutions, practices, and discourses centered on a fraction of agro-industrial capital and seeking to advance land sparing as a political-economic project. In the empirical sections that follow, I identify the actors in the Brazilian land

sparing complex and the processes through which the complex has been assembled.

A complex describes relationships among actors with complementary interests and discourses anchored in a fraction of capital. Complexes do not act unitarily, however. A complex's program advances in different places and moments through political-economic *coalitions*. Coalitions are assemblages that emerge when members of a complex ally with each other (and possibly other actors) to advance particular projects supporting their common agenda; they are the bridge between a complex and the implementation of policy. The land sparing complex acts through land sparing coalitions. These coalitions are instances of developmental coalitions or growth coalitions; that is, social groupings dedicated to promoting particular processes of socioeconomic and environmental transformation (Evans 1995; Rudel 2009). The case studies describe land sparing coalitions in two municipalities, where they comprise the local materialization of the land sparing complex.

### The State

Complexes and coalitions anchored by government, NGOs, and corporations are symptomatic of the rise of governance as a neoliberal political form. These governance structures can be constituted through multi-stakeholder cooperation or public-private partnerships (McCarthy and Prudham 2004), yet they often remain closely articulated with government authority. In practice, the boundaries of the state are mutable. As Mitchell (1991) noted, the state-society distinction is "a line drawn internally within the network of institutional mechanisms through which a social and political order is maintained" (78). In this article, I adopt local understandings of the actors and institutions that constitute the state—that is, the Brazilian government—and I discuss state building as the realization of state interests in government, which centers on the control of spaces and populations (Foucault 1977; Scott 1998).

The construction of territory is a principal means through which states control populations and resources. Elden (2010) defined *territory* as a political technology that has both economic and strategic dimensions. *Territorialization*, in Vandergeest and Peluso's (1995) formulation, describes the state's actions to structure the spatial organization of people and their relations to natural resources. Building on these concepts, I use *territorialization* to describe the

construction of political spaces of economic and strategic control. Territorialization is a process of state building (government) that articulates with other forms of socioeconomic control (governance).

The following sections detail the evolution of forest conservation in Brazil from the twentieth-century protected areas model to the twenty-first-century land sparing complex.

### Protected Areas: From Remote Preserves to "Green Barriers"

Western conservation has traditionally focused on protected area creation under a "cult of the wilderness" ideology (Martinez-Alier 2002). Environmentalists interested in wilderness conservation found common cause with state efforts to control people and resources, developing a protected areas model that expanded rapidly with globalization of the environmentalist movement in the 1960s through the 1990s (Adams and Hutton 2007). TNC's entry into Brazil, for example, occurred primarily through the "Parks in Peril" program, an initiative to improve protected areas management.

Protected area creation in Brazil includes several processes driven by different assemblages. Strictly protected conservation areas such as national parks correspond to the cult-of-the-wilderness model. Sustainable use conservation areas and indigenous territories allow occupation by local populations, and their creation has generally resulted from advocacy by coalitions of local and indigenous people, indigenous rights and environmental NGOs, and government indigenous and environmental agencies (Hecht and Cockburn 1989). Prior to the 2000s, strictly protected areas in the Amazon were located mainly in remote regions far from the deforestation frontier, whereas indigenous territories and sustainable-use areas were often created in direct response to frontier expansion (Veríssimo et al. 2011).<sup>3</sup>

Globally, neoliberalization of environmental governance shifted mainstream environmentalism from the cult of the wilderness toward a focus on ecosystem services and multifunctional landscapes. TNC spearheaded this shift (e.g., Kareiva, Marvier, and Lalasz 2012), which entailed new articulations among environmentalists, state territorial interests, and capitalist interests. A neoliberal protected areas complex emerged that linked protected areas to capital accumulation for an assemblage centered on the natural resources and tourism sectors, financial capital, and environmental NGOs. In addition to conserving biodiversity and developing state capacity

through territorialization (Adams and Hutton 2007), protected areas have enabled primitive accumulation (or “accumulation by dispossession”; Harvey 2004) based on ecosystem services, ecotourism, and the labor of local populations (Kelly 2011; Fairhead, Leach, and Scoones 2012). The linkage of protected areas to this fraction of capital under the protected areas complex is evident in Brazil through initiatives such as payments for ecosystem services in Juma Sustainable Development Reserve, private forestry concessions in national forests, and a public–private agreement promoting tourism in federal conservation areas (Veríssimo et al. 2011).

By 2002, nearly 650,000 km<sup>2</sup> in the Amazon had been designated to state or federal conservation areas. In the ensuing four years, almost 500,000 km<sup>2</sup> of new state and federal conservation areas were designated (Veríssimo et al. 2011). This explosion in protected area creation was due not primarily to the protected areas complex but rather to the integration of protected areas into the land sparing complex, which reorganized the territorial and accumulative logics of protected area creation.

The protected areas complex links environmentalist interests in biodiversity conservation with state interests in territorialization and capitalist interests in primitive accumulation within forest reserves. Under the land sparing complex, the spatial logic is inverted. Forest conservation results from complementarity of biodiversity and ecosystem services conservation with state interests in territorialization and capitalist interests in accumulation outside forest reserves, through territorial constriction and agricultural intensification. This new spatial logic drove a geographic shift in protected area creation. Prior to 2003, strictly protected conservation areas were primarily located in remote regions, but after 2003 new conservation areas have been located principally in areas of high deforestation pressure, where they operate as “green barriers” to deforestation (Soares-Filho et al. 2010). Although enclosure and primitive accumulation persist as functions of protected areas, the dominant logic of protected area creation has become territorial constriction under the land sparing complex.

## The Land Sparing Hypothesis

The land sparing logic is simple: Agricultural intensification increases production per unit of land, such that a given demand can be met by cultivating a

smaller area. Land that would have been used for agriculture under more extensive production is thus spared (Phalan et al. 2011). In the case of forests, land sparing would avoid conversion of standing forests or free land for reforestation. Land sparing as a forest conservation strategy is connected to forest transition theory (Perfecto and Vandermeer 2010), which is based on the observation that in some places historical declines in forest area have been followed by reforestation. Forest transition theory emphasizes the centrality of agricultural intensification to forest recovery (Rudel et al. 2005).

The land sparing hypothesis has motivated Amazonian governance strategies, and reduction of Amazonian deforestation concurrent with increasing agricultural production is considered an example of land sparing and an incipient forest transition, yet global evidence for the land sparing hypothesis is mixed (Rudel, Schneider, et al. 2009; Stevenson et al. 2013). An alternative logic (the Jevons paradox) suggests that instead of land sparing, agricultural intensification might induce a “rebound effect” where increasing production efficiency lowers prices, stimulating demand and increasing profits, resulting in an expansion of agricultural area (Lambin and Meyfroidt 2011).

In the Brazilian Amazon, two forms of agricultural intensification predominate: intensification of cattle ranching through practices such as improved pasture management and intensification via transition in techno-managerial system from ranching to industrial field agriculture (cf. Laney 2002). Other forms of intensification exist also; for instance, through diversification of smallholder production with cacao agroforestry. Ranching intensification and pasture-to-cropland conversions are the most important forms of intensification for the Amazonian land use transition, however. Barretto et al. (2013) showed that before 2006, ranching intensification and crop yield increases in frontier areas coincided with agricultural expansion in the Brazilian Amazon, contradicting the land sparing hypothesis. They also found that in southern Brazil, crop and pasture intensification under conditions of land scarcity did result in land sparing. Land scarcity, or territorial constriction that produces land scarcity, is a key variable interacting with agricultural intensification to determine land cover change. Intensification does not automatically spare land for nature, but when intensification occurs in conjunction with territorial constriction through forest protection, it might deliver increasing agricultural production

concurrent with decreasing deforestation (Phalan et al. 2011).<sup>4</sup>

### The Land Sparing Complex in Brazil

Land sparing is attractive to a range of powerful actors. Agricultural intensification is favored by agro-industrial corporations because it improves supply-chain productivity and governability, integrates producers into markets for inputs and financial products like credit and insurance, and can bring environmentalist commendation for sustainable production as opposed to condemnation for deforestation. The state favors agricultural intensification because it is associated with higher incomes, better infrastructure, and increased public goods provision (VanWey et al. 2013), which are elements of increased state revenues and capacity (i.e., state building). Environmentalists favor intensification to reconcile forest conservation with economic development (Figure 1). The question is how to stimulate agricultural intensification and avoid the rebound effect to decouple agricultural development from deforestation. The strategy developed in the Brazilian Amazon relies primarily on territorial constriction to both stimulate intensification and avoid agricultural land expansion.

The territorial character of Brazilian forest governance has been discussed by other scholars. Nepstad et al. (2014) described post-2008 governance as a “territorial performance” approach, but their usage is limited to distinguishing municipal-level (“territorial”) interventions from policies targeting farmers individually. A more developed treatment

of the territorial character of Amazonian governance considers territorial ordering (*ordenamento territorial*), a discourse deployed by the federal government to orient landscape-level development and conservation planning. Baletti (2012) analyzed territorial ordering as a reterritorialization of the Amazon that reconciles environmentalism with developmentalism under “green capitalism.” Nonetheless, she failed to link territorial ordering to the creation of land scarcity through territorial constriction as a strategy for supporting agricultural intensification.

### Territorial Constriction and Agricultural Intensification

*Territorial constriction*, or land scarcity within a bounded terrain (cf. Elden 2010), is fundamental to interrelated processes of state building and agricultural intensification. Circumscribed agricultural land has historically been a condition for emergence of institutionalized hierarchies that are the foundation of the state (Carneiro 1970), and constriction is also a primary driver of intensification. In Boserup’s (1965) classic model, rising population on limited land impels farmers to increase output per unit area. Whereas in the classic model intensification occurred through increasing labor inputs, with decreasing output per unit of labor, industrial agriculture relies heavily on capital investments to increase both agricultural yield and labor productivity. Capitalist growth rests on twin foundations of primitive accumulation and productivity gains. Where primitive accumulation through frontier

	Interests in Land Sparing Policy			Selected Coalition Actors	
	territorial constriction	agricultural intensification	forest conservation	São Félix	Novo Progresso
<b>State</b>	Legibility and control	Revenue and infrastructure	Natural capital and ecosystem services	Municipality, MMA, IBAMA, Embrapa	MMA, IBAMA, Embrapa
<b>Agro-industrial capital</b>	Increasing land values	Productivity and supply chain integration	Ecosystem services	Frigol, Cargill, Walmart, Marfrig, Vale, SPR	Bunge, Vale
<b>Environmental NGOs</b>	Forest conservation	Green development	Biodiversity and ecosystem integrity	TNC, IEB	TNC

**Figure 1.** Actors and interests associated with core land sparing complex sectors. MMA = Ministry of Environment; IBAMA = Brazilian Institute of the Environment and Natural Resources; Embrapa = Brazilian Agricultural Research Corporation; SPR = Rural Producers’ Syndicate; NGO = nongovernmental organization; TNC = The Nature Conservancy; IEB = Brazilian International Institute of Education.

expansion is limited by territorial constriction, investments in intensification to support continued growth might follow.

Land scarcity is not the only stimulus for intensification, nor is intensification the only response to land scarcity (Stone and Downum 1999). Nonetheless, the “induced intensification thesis” that land constraints drive intensification is valid in many contexts (Turner and Ali 1996; Laney 2002). Intensification might exacerbate social stratification as those able to make larger investments in productivity improve their relative socioeconomic position (Turner and Ali 1996), whereas social stratification and state development feed back into intensification as dominant groups extract surplus from their subjects (Carneiro 1970).

Territorial constriction can therefore operate as a political–economic strategy for socioeconomic development and state building. In addition to state, environmentalist, and corporate interests in intensification resulting from territorial constriction, constriction per se is attractive to the state because it territorializes by fixing the population in space; to environmentalists because it conserves forest by halting agricultural expansion; and to some agricultural capitalists because scarcity might increase land values (Figure 1).<sup>5</sup> The land sparing complex thus inverts the logic of the protected areas complex, shifting focus to the agricultural zone “outside the box” of protected areas.

### The Amazonian Extractive Economy

The Brazilian Amazon has historically been characterized by minimal presence of the central state and “boom-and-bust” resource exploitation that fails to generate longer term productive circuits of accumulation. Bunker (1985) argued that the Amazonian economy operates through a mode of extraction, where resources are removed from the region to be transformed and consumed in core areas that operate through a mode of production. This extractive economy destroys value in energy and material, underdeveloping the Amazon as it builds the value and complexity of productive economies elsewhere.

Cattle ranching in the Amazon, the land use occupying an estimated 60 to 80 percent of deforested land (Margulis 2004; Embrapa 2011; Sy et al. 2015), has historically operated in an extractive mode reinforced by speculation. The productive value of the herd is often secondary to the ability to profit from future land sales and government tax breaks and subsidies

(Bowman et al. 2012). Where the exchange value of land far exceeds its productive value, land managers have few incentives to invest in sustainable practices (Hecht 1985). Ranchers consolidate large properties, frequently through coercive or illegal land grabbing; extract the fertility of deforested land through unmanaged or excessive grazing; and then as pastures become degraded they move on to grab and clear new areas (Rodrigues et al. 2009). Since the mid-1980s, cattle ranching has also become widespread among smallholders (Smeraldi and May 2008), intensifying cycles of land degradation and frontier expansion. Insecure land tenure, especially for smallholders, has been a further factor promoting deforestation (to establish ownership through “productive use”) and inhibiting agricultural intensification (by hindering credit access and discouraging capital investments; Alston, Libecap, and Mueller 1999; Jepson 2006).

The Amazonian extractive economy has enriched loggers, ranchers, and speculators at the cost of deforestation, land degradation, and dispossession, without supporting regional socioeconomic development, and state building has been limited to the territorializing function of ranchers in occupying the space (Oliveira and Hecht 2016). Opposition to the extractive economy from local populations, environmentalists, and productivist elements of the Brazilian government and transnational capital converged in the 2000s to assemble the land sparing complex.

### Emergence of the Land Sparing Complex

The expansion of extractive peripheries and productive centers is a fundamental dynamic of capitalism (Bunker 1985; Moore 2000). Although the Amazon remained largely an extractive periphery until the 2000s, the Brazilian state since World War II has been controlled by a developmentalist regime promoting productivist modernization. The environmental movement in Brazil grew following the democratic transition in the 1980s (Hochstetler and Keck 2007), and the Public Ministry, a body of independent prosecutors, was restructured to become a proponent for environmental law enforcement (McAllister 2005). Multiple structural and conjunctural factors then converged to forge the land sparing complex as a political–economic and environmental project in the mid-2000s.

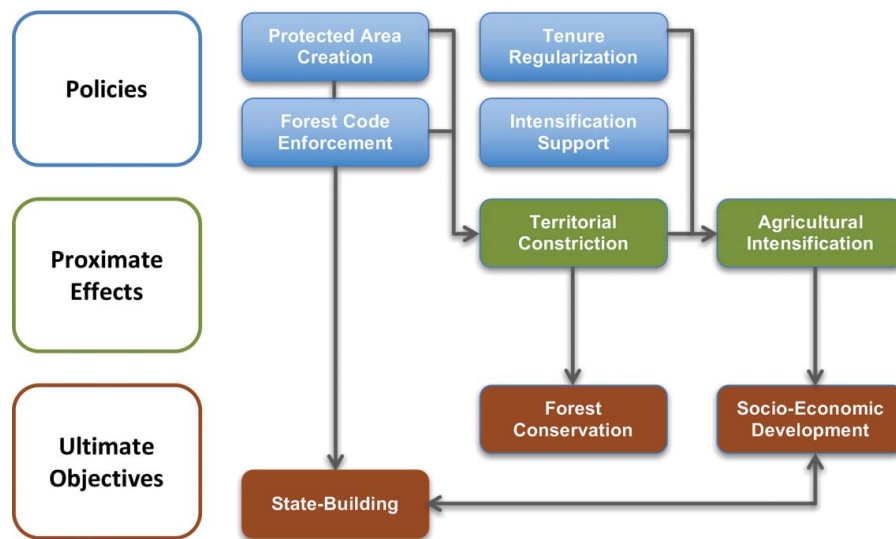
Structurally, infrastructure spending, agricultural research, and global commodity-chain development brought industrial soy and cattle production to the

southern and eastern Amazon. The increasing role of corporate agribusiness in Amazonian land change alarmed environmentalists and the Public Ministry, who began to exert pressure down global supply chains to control deforestation (Nepstad, Stickler, and Almeida 2006). Mainstream environmental NGOs had corporatized during the 1980s and 1990s, adopting neoliberal modalities of “partnership” with governments and corporations that facilitated a “politics of agreement” among powerful actors (Hecht 2011, 7). Critically, remote sensing and geographic information systems (GIS) technology for monitoring deforestation had advanced during the 1990s, and the National Institute for Space Research (INPE) emerged in Brazil as a center of technological capacity, enabling more active and targeted regulation.

Conjuncturally, land sparing arguments gained prominence in academic discourse in the 2000s. International attention to the role of forests in climate change also grew rapidly, leading to inclusion of reducing emissions from deforestation and forest degradation (REDD) in United Nations climate negotiations in 2005. Domestic concern over climate change heightened in Brazil following the El Niño of 1997 and 1998 and the Amazon drought of 2005.<sup>6</sup> The inauguration of President Lula in 2003 brought to power an administration with ties to socioenvironmental movements, installing rubber-tapper activist Marina Silva as Minister of Environment, but simultaneous alliances with

agribusiness demanded a conciliation of environmental protection with agricultural production.

Under these conditions, productivist elements in the Brazilian executive linked with environmental and enforcement agencies to articulate a new environment and development agenda for the Amazon. The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm) launched in 2004, bringing activities of thirteen federal ministries under coordination of the President’s office. Under PPCDAm, antideforestation efforts developed along three axes (Instituto de Pesquisa Econômica Aplicada (IPEA), Comissão Econômica para a América Latina e Caribe (CEPAL), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) 2011): (1) “territorial ordering,” including protected area creation and land tenure regularization; (2) monitoring and enforcement, including enforcement of the Federal Forest Code, which requires preservation of areas of natural vegetation on rural properties; and (3) support for sustainable production, including technical assistance and financing for agricultural intensification. Protected area creation and Forest Code enforcement anchored the land sparing complex with territorial constriction, whereas support for sustainable production and tenure regularization would facilitate land sparing intensification (Figure 2). As farmers and ranchers have begun to feel territorially constrained, an



**Figure 2.** The Brazilian land sparing model. This model depicts the simplified, ideal relationships motivating land sparing advocates. Protected area creation and Forest Code enforcement contribute to state building through territorialization and produce territorial constriction. Territorial constriction guarantees forest conservation while inducing agricultural intensification, which is also supported by tenure regularization and agricultural policy. Agricultural intensification catalyzes socioeconomic development, and development and state building are mutually reinforcing. (Color figure available online.)



extractive coalition represented by the “ruralist bench” of the Brazilian Congress has pushed back with a revision of the Forest Code in 2012 and efforts to weaken protected areas.

In a typical neoliberal modality, government policies of PPCDAm form the backbone of environmental governance, whereas mechanisms for implementing these policies frequently rely on nonstate actors. Implementation of PPCDAm has thus catalyzed and structured the assembling of the land sparing complex. I describe the regional-level development of PPCDAm strategies through the emergent land sparing complex before moving to municipal case studies illustrating implementation of these strategies on the ground by land sparing coalitions.

### Protected Area Creation

In 2004 through 2007 under PPCDAm, nearly 20 million hectares of new conservation areas were created, primarily in zones of high deforestation pressure in the eastern Amazon. Protected area creation in the Terra do Meio region of Pará, between São Félix and Novo Progresso, was driven especially by smallholder farmers, who sought to halt the expansion of large-scale ranches. The planning process for Terra do Meio was facilitated by domestic and international environmental NGOs, including Instituto Socioambiental, Greenpeace, and the Woods Hole Research Center (Campos and Nepstad 2006). During the same period, indigenous peoples and activists secured designation of 10 million hectares of indigenous territories. These new protected areas act as “green barriers” to agricultural expansion. Soares-Filho et al. (2010) estimated that protected area creation was responsible for 37 percent of the decrease in Amazonian deforestation between 2004 and 2006.

### Forest Code Enforcement

The Brazilian Forest Code was passed in 1965 and subsequently modified by presidential decrees. At the beginning of the 2000s, the Forest Code required rural landowners to maintain “permanent protection areas” along water courses and on steep slopes and to maintain an additional percentage of the property as a “legal reserve” of natural habitat, which in the Amazon biome was set to 80 percent of the property area. These requirements went largely unenforced, such that by 2012, achieving compliance would have required restoration of 50 million hectares nationally

(Soares-Filho et al. 2014). Under PPCDAm, the federal government intensified Forest Code enforcement, effecting territorial constriction on private properties through enhanced deforestation monitoring and enforcement and development of environmental registration systems to regulate property-level compliance.

The Rural Environmental Registry (CAR) exemplifies the close but contingent and sometimes conflictual interactions among Brazilian municipal, state, and federal governments; NGOs; and corporations in environmental governance. CAR developed out of the System for Environmental Licensing of Rural Properties (SLAPR) in Mato Grosso, a registry funded by international donors for managing environmental licensing with remote sensing and GIS (Rajão, Azevedo, and Stabile 2012). In 2006, spurred by a Greenpeace campaign, transnational soy traders agreed to a moratorium on purchasing soy from newly deforested areas in the Amazon. The soy moratorium and environmentalist pressures motivated the municipal government of Lucas do Rio Verde (Lucas) in Mato Grosso to partner with TNC to pursue environmental compliance, including SLAPR registration of all rural properties. The Lucas project began in 2006, but in 2008 the federal environmental enforcement agency (Brazilian Institute of the Environment and Natural Resources [IBAMA]) fined landowners in Lucas for violations. The fines damaged the project’s credibility with producers and led to lobbying by municipal leaders, TNC, and the state environmental agency, culminating in a state law creating CAR in Mato Grosso (Rausch 2013). CAR divided environmental licensing into parts: Producers first voluntarily register their properties with state environmental authorities through CAR and then are granted a period to achieve compliance without incurring fines for past illegal clearing.

CAR spread regionally and nationally. In 2008, the Ministry of Environment (MMA) published a “priority list” of Amazonian municipalities for combatting deforestation that subjected priority municipalities to strict monitoring and enforcement. A requirement for exiting the list became completion of CAR in 80 percent of a municipality’s private property area. TNC, other NGOs, and the federal government developed CAR registration programs across the Amazon, and in 2009, under pressure from environmentalists and public prosecutors, meat-packing corporations in the Amazon began requiring CAR from producers to purchase their cattle. Pará launched a Green Municipalities Program in 2011 to encourage CAR registration, and at the federal level, CAR

entered the 2012 Forest Code revision as a requirement for all rural properties in Brazil. Assunção, Gandour, and Rocha (2012) found overall that new conservation policies avoided more than 62,000 km<sup>2</sup> of deforestation in 2005 through 2009, and Arima et al. (2014) estimated that policies targeting priority municipalities avoided more than 10,000 km<sup>2</sup> of deforestation from 2009 to 2011.

### Tenure Regularization

Tenure regularization contributes to state building, but in relation to land sparing constriction and intensification, land titling functions to enable agricultural intensification. In 2009, the Brazilian government launched the *Terra Legal* (Legal Land) program to support titling for Amazonian settlers. This program was a late addition to PPCDAm, and its performance has been weak. Against a goal of titling nearly 150,000 properties, by November 2015 fewer than 20,000 titles had been issued (IPEA, CEPAL, and GIZ 2011; Ministério do Desenvolvimento Agrário 2015). Although many actors hoped that environmental registration through CAR might facilitate tenure regularization, the spread of CAR has not yet resulted in accelerated titling. Some NGOs have sought to support tenure regularization, but titling depends on the government and NGOs have made little headway.

Although tenure regularization is an enabling condition for agricultural investment (Jepson 2006), it is neither sufficient for intensification (Futemma and Brondízio 2003) nor absolutely necessary. Formal title is one indication of tenure security, but untitled producers, especially large landholders, could have fairly secure tenure even without possessing legal title (Campbell 2015) and therefore might still respond to constriction through investments in intensification. Agricultural credit is not necessarily dependent on definitive title, and smaller producers who lack title but have completed CAR might receive financing. Tenure regularization has thus far done little to encourage intensification, and insecure tenure remains a barrier to investment.

### Support for Sustainable Production

The final axis of PPCDAm is support for “sustainable production,” including agricultural intensification. In 2011 through 2014, the Brazilian government provided US\$2.7 billion in credit through its Low-Carbon

Agriculture Program (ABC) to support activities such as restoration of degraded pastures and integrated ranching–cropping–forestry systems (Observatório ABC 2014). The federal agricultural research corporation, Embrapa, promotes ranching intensification through improved pasture management and environmental compliance, and the executive’s Secretariat for Strategic Affairs (SAE) has sought to develop a ranching intensification credit line.

Meanwhile, environmental NGOs have expanded beyond their focus on natural areas to support ranching intensification and agricultural production on degraded lands. Brazilian NGO Instituto Centro de Vida supports ranching intensification in northern Mato Grosso, with funding from Fundo Vale, the foundation of Brazil’s Vale mining company. The São Félix case study describes TNC’s Sustainable Beef project, supported by meat processor Marfrig and retailer Walmart, and a Cargill-funded program promoting cacao agroforestry on degraded lands.

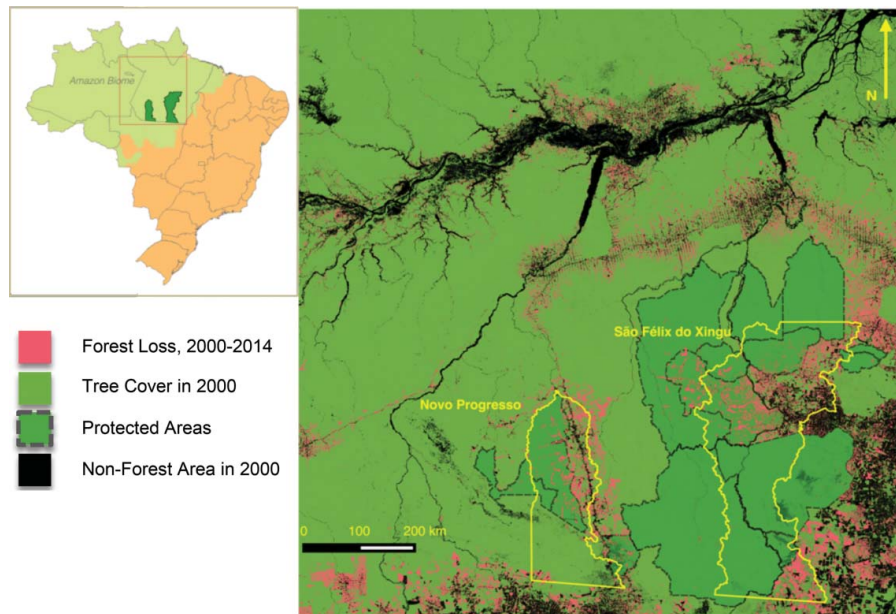
In general, however, support for sustainable production and tenure regularization, the two strategies facilitating agricultural intensification, have had weaker implementation than policies supporting territorial constriction. The case studies demonstrate how this weakness results in a partial land use transition that might incompletely realize land sparing goals.

### Municipal Case Studies

Case studies of two municipalities illustrate the action of land sparing coalitions and the partial and differential realization of the land sparing agenda on the ground.

#### São Félix: Effective Constriction and Stagnation

São Félix, covering 84,213 km<sup>2</sup> in southeastern Pará, experienced rapid population growth and land cover change beginning in the late 1970s, catalyzed by construction of a highway to the municipality (Schmink and Wood 1992). Ranching expansion in the 1990s and 2000s drove large-scale deforestation, and almost all occupation occurred without formal land title. The soy frontier remains distant, and the hilly and rocky terrain is considered difficult for industrial cropping, so land use change is dominated by ranching. Between 2000 and 2007, deforestation in São Félix averaged 1,200 km<sup>2</sup> per year, and the municipal population jumped from 35,000 to 60,000



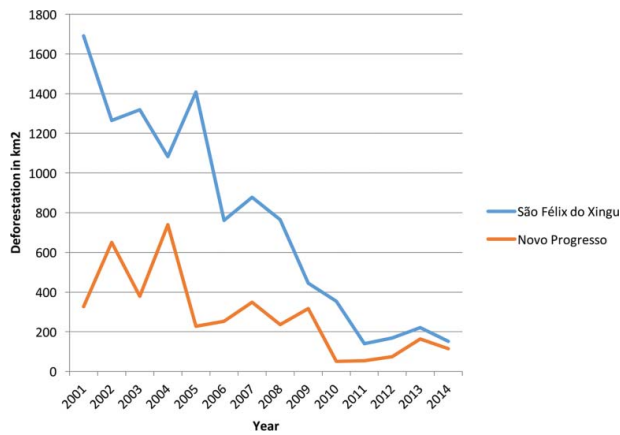
**Figure 3.** São Félix do Xingu and Novo Progresso. Military area in southern Novo Progresso not shown. Protected areas overlapping the municipalities are shown with 2015 boundaries. *Data source:* Ministry of Environment (MMA), Hansen/UMD/Google/USGS/NASA. (Color figure available online.)

(Instituto Brasileiro de Geografia e Estatística [IBGE] 2016a). During the same period, the municipal cattle herd increased from 682,000 to 1.6 million head (IBGE 2016b), becoming the second-largest municipal herd in Brazil. Deforestation advanced westward as small farmers and large ranchers moved into the Terra do Meio region west of the Xingu River (Castro, Monteiro, and Castro 2002), threatening to break through to the BR-163 highway running through Novo Progresso in western Pará.

To forestall this frontier expansion, small farmers along the Transamazon highway north of Terra do Meio found common ground with environmentalists in Brazilian and international NGOs to work with the Brazilian government to create a mosaic of protected areas (Campos and Nepstad 2006). In addition to existing indigenous territories, which today cover 53 percent of São Félix, the federal government in 2005 created two new strictly protected conservation areas. Large ranchers organized to oppose the protected areas. They succeeded in altering some conservation area boundaries and in ensuring that the Triunfo do Xingu protected area, created in 2006 by the State of Pará, was designated as an Environmental Protection Area (APA), allowing private occupation and “sustainable use” (Taravella and Arnaud de Sartre 2012). Nonetheless, properties in federally protected zones were expropriated and cattle grazing within the areas were seized. With the new protected areas, 19

percent of municipal territory fell under conservation areas, virtually all territory west of the Xingu had protected status, and just 28 percent of the municipality remained unprotected private property space (Figure 3).

Protected area creation and enhanced enforcement under PPCDAm drove significant deforestation reductions in São Félix after 2005. Deforestation declined 37 percent, from 1,268 km<sup>2</sup> per year in 2003 through 2005 to 800 km<sup>2</sup> per year in 2006 through 2008. In 2008, the priority list was created, accompanied by credit restrictions and robust enforcement. In 2009, TNC and Brazilian International Institute of Education (IEB), a Brazilian NGO, launched projects aimed at reducing deforestation with support from Frigol, a local slaughterhouse, and Fundo Vale. The large ranchers initially were hostile to the NGOs, but when public prosecutors began forcing slaughterhouses to receive cattle only from properties with CAR, the ranchers’ syndicate (SPR) began to work with the NGOs and government to achieve environmental compliance. Deforestation bottomed out in 2011 at 140 km<sup>2</sup>, a 90 percent reduction from 2005 (Figure 4). That year, CAR registration in the municipality exceeded 80 percent of private property space, and a Pact for the End of Illegal Deforestation was signed by stakeholders, including municipal, state, and federal government entities; local, national, and international NGOs; and ranchers’, farmers’, and community



**Figure 4.** Deforestation in São Félix and Novo Progresso. (Color figure available online.)

organizations. In signing the pact, rural producers committed not to deforest illegally and to adopt more sustainable practices, and government agencies and NGOs committed to provide technical assistance and credit for sustainable production, to maintain infrastructure, and to facilitate environmental licensing and tenure regularization.

As this history shows, territorial constriction has been central to environmental governance in São Félix. Protected areas closed the western frontier, limiting and encircling the available area for agricultural expansion. Heavy enforcement rendered constriction effective, as fear of punitive measures led many to reduce or cease forest clearing. Ranching intensification is almost universally considered the necessary response to this new land constraint.

Although government officials, NGO activists, ranchers, and small farmers all recognize the necessity of increasing productivity on already-deforested land, intensification has not occurred automatically with constriction. Almost all properties lack formal title, which might facilitate investment, and by November 2015, Terra Legal had issued just twenty-six titles in rural São Félix (Ministério do Desenvolvimento Agrário 2015). Some larger ranchers with access to credit or capital reserves have adopted more intensive practices, such as restoring degraded pastures and implementing pasture rotations, but many land managers lack access to the necessary capital, equipment, and knowledge to intensify. The collateral effect of deforestation reductions has therefore been a freeze in the agricultural sector in São Félix. Residents speak of economic stagnation, and real municipal gross domestic product (GDP)

per capita declined after 2006 (Figure 5). According to a small farmer living in the APA:

Until the new regulations, we worked normally. We received financing from the bank to buy cattle, and everything was going well until 2009. . . . Now we are isolated, and anything we do is repressed. We have been frozen in place.

Farmers cannot deforest new land to expand, nor do they receive assistance to intensify.

Realizing that intensification might not occur spontaneously, TNC has launched initiatives supporting new production practices. The organization's sustainable ranching project, established in 2013 in partnership with Walmart and Marfrig, has supported around twenty primarily medium and large ranchers to intensify and pursue tenure regularization. TNC's sustainable cacao project, begun in 2013 with financing from Cargill, works with nearly sixty smallholders to recover degraded lands with cacao agroforestry. These projects are intended to be replicable and scalable, TNC staff affirm, and have been complemented by support for sustainable production from IEB and MMA, but these initiatives presently reach a small proportion of the 10,000 rural properties in São Félix. Support promised by federal and state governments for infrastructure, technical assistance, credit, and land titling has mostly failed to materialize.

Without substantial investments supporting intensification, and with incomes stagnating, two trends have emerged. First, deforestation began to rebound, climbing to 223 km<sup>2</sup> in 2013 (Figure 4). As the Municipal Secretary of Environment explained, "People are afraid of enforcement actions, so they wait for public policies, but when public policies don't come, they decide to run a risk and deforest." Second, as small farmers struggle under the new enforcement regime, there has been an increasing tendency for smallholders to sell their properties and move to cities or other parts of the frontier, according to multiple informants, and this tendency further concentrates land in the hands of large ranchers.

The case of São Félix thus demonstrates the on-the-ground implementation of a project of constriction and intensification by a land sparing coalition of government, NGO, and corporate actors (Figure 1). Command-and-control measures, including protected area creation and Forest Code enforcement, have dramatically reduced deforestation. Credit restrictions, regional legal action against slaughterhouses, and

TNC and MMA projects also have succeeded in bringing over 80 percent of private property area into CAR. Pressure under territorial constriction for a transition from an extensive mode of extraction to an intensive mode of production is widely felt. Yet ranching intensification is still incipient, and without substantial financial support or technical assistance, territorial constriction through environmental regulation has resulted in state building in a coercive mode but not yet agricultural intensification and socioeconomic development. Environmental governance is favoring more productivist management among large ranchers, even as smallholders struggle—and in many cases fail—to adapt.

### **Novo Progresso: Incomplete Constriction, Extractive Expansion, and Soy**

Novo Progresso, in southwestern Pará, covers 38,162 km<sup>2</sup> along either side of the north–south BR-163 highway, which links soy-producing Mato Grosso with ports on the Amazon. Colonization of Novo Progresso began with the highway's opening in the 1970s and has occurred largely without formal land titling. A gold rush in the early 1980s drew settlers, followed by a shift toward logging and ranching. Soy expansion in Mato Grosso has driven growth along the BR-163 corridor, and industrial row-crop agriculture is entering southern areas of Novo Progresso. The municipality experienced large-scale deforestation during the early 2000s, averaging 465 km<sup>2</sup> per year between 2000 and 2005.

The implementation of PPCDAm has played out in Novo Progresso through conflicts between a thin land sparing coalition including primarily external actors and a strong coalition supporting frontier expansion. In 2006, the federal government created Jamanxim National Forest (FLONA) in western Novo Progresso at the same time as the Terra do Meio protected areas to the east. FLONA Jamanxim covered 13,000 km<sup>2</sup>, and when combined with a biological reserve created in 2005 and a restricted military area in the municipality's southern half, there remained just 9,898 km<sup>2</sup> of legally available private property space in Novo Progresso, 25.9 percent of the municipality's total area, located in a 50-km-wide corridor bisected by BR-163 (Figure 3). The FLONA's creation generated significant resistance. Demarcation occurred with little local input, FLONA boundaries were not made clear to the

population, and its creation expropriated people who had occupied the area for decades. Deforestation was not immediately reduced, rising from 254 km<sup>2</sup> in 2006 to 348 km<sup>2</sup> in 2007 (Figure 4). Novo Progresso entered the MMA priority list in 2008, bringing credit restrictions and enhanced enforcement. In 2009, as elsewhere, slaughterhouses began to purchase only from properties with CAR.

Novo Progresso residents chafe at the constriction of their potential agricultural area. Agamenon Menezes, president of the ranchers' syndicate, lamented that Novo Progresso is left with “just a tiny corridor to work in, and even then they want to prohibit activities” by enforcing the Forest Code on private properties. Ranchers and their ruralist advocates have sought reduction of the FLONA from the federal judiciary, executive, and legislature, and there have been periodic protests by municipal residents. On the other side, IBAMA has engaged in numerous enforcement actions, including confiscating cattle grazing illegally within the FLONA.

There has also been substantial resistance to CAR. Seeing CAR as a state enforcement tool, many landowners chose not to register to “stay hidden” and continue clearing, according to a state extension agent. Those who completed CAR have generally done so to access credit or sell to slaughterhouses, but according to one rancher, “Those who are well-prepared don't need CAR”: they have alternative financing sources and can launder cattle through someone else's CAR, or they register only part of their property and continue to deforest in the unregistered portion.

Political leaders in Novo Progresso have abetted resistance to environmental regulation. In 2011, when TNC prepared to enter the municipality to support CAR and Pará's Green Municipalities Program, Agamenon of the ranchers' syndicate spoke before the town council:

For years we have been fighting against these international interests in the region. . . . “Zero deforestation” does not exist, it is impossible to accept this imposition by the government. If this happens, we will burn their cars and expel them from the city. We don't want NGOs here. (“Presidente Do Sindicato” 2011)

Agamenon's conflation of government and NGOs speaks to the alliance of these actors in a land sparing coalition seeking to change the practices of ranchers like himself.

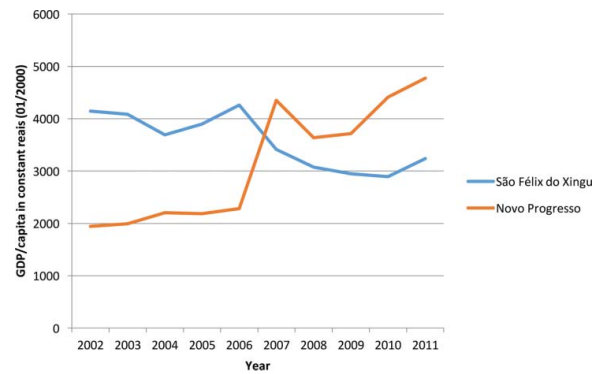
Oswaldo Romanholi, elected mayor in 2012, was president of the loggers' syndicate and during his

campaign pledged to expel IBAMA from the municipality. “Political power is in the hands of those who profit from illegality,” one rancher observed. In 2014, the town council removed Romanholi for fiscal impropriety, and in 2015 the federal government arrested members of a local criminal ring coordinating land grabbing and deforestation, but substantial deforestation continued.

Despite the hostile context, TNC attempted to support CAR registration through a project funded by Fundo Vale in 2011 and 2012. The project encountered difficulties, largely due to weak support from the municipal government and antagonism from the ranchers’ syndicate, according to a local TNC employee. At the beginning of 2014, 60 percent of private property area in Novo Progresso was registered in CAR, and TNC planned to return, initially within a project funded by multinational grain trader Bunge.

Deforestation declined substantially after creation of the priority list, from 316 km<sup>2</sup> in 2009 to 51 km<sup>2</sup> in 2010. There was a widespread perception, however, that federal enforcement primarily hurt smallholders, whereas some larger landowners continued to deforest with impunity, using wealth and political connections to evade fines and obstruct environmental policy. Deforestation rebounded in 2013 and 2014 to 139 km<sup>2</sup> per year, less than half of 2009 deforestation but far short of the reductions in São Félix (Figure 4). Decreased deforestation has been accompanied by reduction of the municipal cattle herd (IBGE 2016b), due partly to embargoes on illegally deforested areas and pasture degradation in extensive ranching operations. Large ranchers who no longer deforest have begun to intensify production using their own resources, but reforming degraded pastures and adopting intensive rotations are generally too costly for smallholders without external support. Tenure regularization that might facilitate agricultural investment has advanced little. Although Terra Legal arrived in Novo Progresso in 2009 and quickly titled 233 properties (Brito and Barreto 2011), the program titled just ninety-three properties during the ensuing six years (Ministério do Desenvolvimento Agrário 2015). Campbell (2015) reported that titling has been distorted by large ranchers to further consolidate land and power by laundering cattle from illegal ranches through titled smallholder properties.

The arrival of the soy frontier along BR-163 is deemed imminent by the local population. Even if soy expands only into pasture areas, it could indirectly drive deforestation by displacing ranching and



**Figure 5.** Real gross domestic product per capita in São Félix and Novo Progresso. Calculated from Governo do Estado do Pará (2014a, 2014b). (Color figure available online.)

increasing land values under conditions of ineffective territorial constriction. As an agricultural extension agent affirmed, “Soy brings more money, more ambition, and more pressure.”

Continued municipal economic growth between 2006 and 2010, when GDP per capita doubled (Figure 5), was likely driven partly by ranching expansion with illegal deforestation, as well as by infrastructure improvements, logging, and high metals prices encouraging mining. Large landowners maintain profitability through ranching intensification, illegal deforestation, and in some cases a transition to field agriculture. Small farmers struggle from enforcement and lack of support, and the hostility of large ranchers toward NGOs damages smallholders, who are least able to independently afford environmental registration and investments in intensification.

In Novo Progresso, the land sparing coalition of federal agencies and TNC (with corporate support) has struggled to implement its agenda of territorial constriction and agricultural intensification through environmental governance. Command-and-control actions have reduced deforestation since 2009, but resistance to CAR, the FLONA, and NGOs and domination of local politics by actors tied to illegal clearing and land speculation have stymied local land sparing coalition development. A shift from an extractive to a productive economy in the municipality might depend on an exogenous transition from ranching to field agriculture, although territorial constriction will be crucial to prevent intensification from driving indirect land use change in the FLONA and Terra do Meio. Recent events have continued to undermine constriction and reinforce extractive deforestation, however. In

December 2016, in a victory for the extractive coalition, the Temer government announced a 43 percent reduction of FLONA Jamanxim, decreasing the strictly protected area in Novo Progresso by 30 percent and legalizing extensive landgrabs.

### Comparative Analysis

The differential effectiveness of land sparing coalitions in the two municipalities, resulting in effective constriction and stagnation in São Félix and ineffective constriction and extractive expansion in Novo Progresso, is explained primarily by differential investment in governance by external actors, coupled with frontier geography and the indirect effects of pasture-to-cropland intensification.

As the Amazonian municipality with the highest annual deforestation rate in the mid-2000s, São Félix was specially targeted for interventions by government and NGO actors hoping to set an example for the region. NGOs were attracted to São Félix by what a TNC employee called the “symbolic challenge” of the municipality known as the “deforestation champion.” Government agencies targeted São Félix for enforcement, and the Environment Ministry took the unprecedented step of implementing a project to support Forest Code compliance in the municipality. These heavily invested external actors formed a strong land sparing coalition that attained cooperation from local actors to reduce deforestation. Novo Progresso, although still a priority municipality on the MMA list, received far less investment from external land sparing proponents.

At a proximate level, TNC staff attribute greater success in São Félix to stronger cooperation with the municipal government and ranchers’ syndicate and difficulties in Novo Progresso to antagonism from the ranchers’ syndicate and local political feuds, but these municipal political landscapes are structured by frontier geography and regional land use change dynamics. Territorial constriction in São Félix was facilitated by the regional geography of the frontier. The primary axis of economic development in eastern Pará is the north–south Belém–Brasília highway corridor, 250 km east of São Félix. Westward frontier expansion from São Félix advanced at ever-increasing distances from highways and economic poles (Garcia, Soares-Filho, and Sawyer 2007), although with the prospect of connecting to BR-163 in Novo Progresso and the Transamazon Highway to the north. This spatial configuration of latitudinal penetration made it easier to “close” the frontier with protected area “barriers.”

In Novo Progresso, the north–south BR-163 that runs the length of the municipality constitutes the main axis of development in western Pará. The highway’s bisection of the municipality increases access to remaining forest land in Novo Progresso, heightening the likelihood of deforestation (Laurance et al. 2001). As the artery connecting soy production in Mato Grosso with Amazonian ports, the BR-163 corridor has strong growth prospects driven by industrial agribusiness expansion and regional economic poles (Garcia, Soares-Filho, and Sawyer 2007). This frontier geography hinders efforts at territorial constriction, encouraging speculative land grabbing and leading to strong contestation of FLONA Jamanxim and local politics hostile to environmental governance interventions.

Distinct expansionary pressures and intensification dynamics in the two municipalities are also determined by the indirect effects of pasture-to-cropland conversions. First, expansion of soy on pastureland might displace ranchers to the forest frontier; second, intensification through cropland conversion raises land values, which drives land appreciation and speculation on forest margins. Although there is limited evidence for the displacement effect, land appreciation effects of cropland expansion could explain as much as one third of Amazonian deforestation (Richards, Walker, and Arima 2014). These indirect effects operate more strongly in Novo Progresso than in São Félix due to Novo Progresso’s integration with land markets in soy expansion zones in Mato Grosso and Santarém. Land market effects and the advancing soy frontier might also be driving intensification by some large ranchers in Novo Progresso, whereas intensification in São Félix is induced by territorial constriction and positive investments from NGOs. This contrast is reflected in economic growth in Novo Progresso tied to extractive expansion and regional agricultural development versus economic stagnation in São Félix tied to insufficient support for a productivist transition.

### Discussion

Comparing São Félix and Novo Progresso illuminates conditions for implementation of the Amazonian land sparing agenda. Territorial constriction is necessary but not sufficient for land sparing intensification. The effectiveness of constriction depends on how

it is imposed and existing pressures in an area. Without constriction, deforestation might continue even as intensification occurs. With constriction, intensification should allow for increasing agricultural production over a constant area, but intensification is not the inevitable outcome of land scarcity. Intensification through individual investment is occurring on some large properties, but more widespread intensification requires either arrival of the row-crop frontier, as in Novo Progresso, or additional investments by land sparing coalitions. A key question for the future is thus whether the land sparing complex can effectively catalyze ranching intensification through constriction and positive incentives absent land pressure from industrial row-cropping.

Even if intensification does not occur, command-and-control measures can substantially reduce extractive expansion. Punitive measures without corresponding incentives disadvantage smallholders, who have fewer resources to deal with fines or invest in intensification. As smallholders struggle, large landowners consolidate their holdings. In areas like São Félix, where it has been most successful, the land sparing project reduces deforestation and develops internal territorialization through territorial constriction, and it provides weak direct support for a transition to more intensive, productivist agriculture, but the social effects of these policies are highly uneven, favoring agro-industry above smallholder livelihoods. The success of land sparing coalitions varies on the ground according to levels of investment by external actors, frontier geography, and regional dynamics of pasture-to-cropland conversion. In areas like Novo Progresso, where land sparing coalitions are weak, an extractive economy still predominates.

These findings advance several strands of geographical literature on land use and governance. First, regarding Amazonian deforestation, this article responds to studies that identify policy drivers of deforestation reductions but lack a systemic theorization of how drivers interrelate (e.g., Assunção, Gandour, and Rocha 2012; Nepstad et al. 2014). These studies elide the interests motivating policy and how policies interact to advance a political-economic agenda. Specifically, I identify the linkage between territorial constriction and agricultural intensification in the Amazon as the nexus on which policies and outcomes turn and through which interests are coordinated. Variation in the constriction-intensification relationship explains variation in municipal outcomes parsimoniously and dynamically.

Second, regarding the land sparing hypothesis, this article expands on discussions of territorial governance, land sparing, and the Amazonian land use transition with an analytical framework that identifies the interests and processes driving a regional transition from extraction to productivism and that exposes the collateral effects of this transition, including smallholder dispossession. This analysis contributes more broadly to our understanding of when and how land sparing occurs, pointing to multilevel investment, frontier geography, and regional agricultural dynamics as determinants of constriction and intensification.

Third, this article demonstrates the utility of a conceptual hierarchy of complexes and coalitions for studying the sociology of neoliberal governance. This conceptual structure is more specific and systematic than concepts of “assemblages” and “development coalitions,” as it situates actors and policies in relation to multilevel dynamics of systemic political-economic transformation. Moreover, this analysis of the land sparing complex sheds light on the role of government by the state within neoliberal governance. As the boundaries of the state are a mutable “effect” of the sociopolitical order, the governance configurations of the land sparing complex could be interpreted as a diffusion of state authority or an integration of nonstate actors into an expanded state apparatus. From either perspective, Amazonian transformations exemplify the growth and operation of a dense, multilevel complex of government, NGOs, and corporations that typifies contemporary global environmental governance.

## Conclusion

In addition to providing a theorization of environmental governance and land use dynamics in the Brazilian Amazon, this article advances new understandings of the relationships between environmental policy, agricultural development, and state building and of the interactions among government, NGOs, and corporations in an era of neoliberal governance. The core of environmental governance to combat deforestation includes a project of territorialization and intensification aimed at shifting the Amazonian economy from an extractive to a productive mode. This project inverts the territorializing and accumulative functions of environmental conservation under the protected areas model, instead employing a land sparing logic to engineer socioeconomic development and state building in the private property space outside protected areas.



The land sparing project is implemented by coalitions deriving from a multilevel complex of political-economic actors including government, NGOs, and corporations. Deforestation has declined almost 80 percent since 2004, but extractive interests continue to resist constriction, especially in the absence of sufficient support for intensification. Moreover, a successful productive transition might lead the state to relax constriction, jeopardizing forest conservation. If deforestation pressures come from productive industrial agriculture that increases state revenues, as opposed to predatory extraction that degrades natural capital, the state might open new areas for conversion. This scenario seems likely given trends in reduction and reclassification of Brazilian protected areas (Bernard, Penna, and Araújo 2014) and would negate the land sparing effects of intensification. Capture of Amazonian policy by extractive interests under the Temer administration could also critically weaken the land sparing complex.

The land sparing hypothesis is influential in global conservation and development discourse, and Brazil's reduction of deforestation under the land sparing complex is promoted as a model for other countries. This article reveals the actors and interests invested in the Brazilian model, as well as the model's collateral effects, including economic stagnation where intensification lags and the consolidation of large-scale landholdings at the expense of family agriculture. This analysis should assist actors in Brazil in understanding and (re)politicizing the land sparing governance model and actors elsewhere in assessing the feasibility and desirability of its replication.

## Acknowledgments

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## Notes

1. Deforestation figures in this article are from INPE (2015). Since 1988, INPE has used Landsat imagery to annually report clear-cutting of areas over 6.25 ha in Amazonian primary forest.
2. Agriculture refers to both producing crops and raising livestock.
3. I use the term *protected areas* to refer generically to strictly protected and sustainable-use conservation areas and indigenous territories.
4. Nonetheless, displacement of deforestation to other areas might cancel out regional deforestation reductions (Oliveira and Hecht 2016). This article focuses on transformations in the Amazon, but those wishing to replicate the Brazilian model or assess its global implications must factor in displacement.
5. I owe the point regarding land values to Gustavo Oliveira.
6. Although from a narrower perspective extreme weather events are conjunctural, the frequency of extreme events is predicted to increase with climate change, which is exacerbated by deforestation. These events are thus also linked to long-term structural changes.

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