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Maldevelopment revisited: Inclusiveness and social impacts of soy expansion over Brazil's Cerrado in Matopiba

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ABSTRACT

Cash crops such as soy, cocoa and oil palm have expanded at great speed in developing countries, often at the expense of customary landowners, traditional livelihoods, and biodiversity. These landscape transformations have global drivers, but they are often justified by a dominant rationale that they bring development to otherwise underprivileged regions. Such development claims, however, are either taken at face value or conflated with simplistic macroeconomic indicators that gloss over most social issues. Those claims may, therefore, hide severe inequities. To better analyze these phenomena, we revisit and conceptualize the notion of maldevelopment, here defined as inequitable and exclusive processes of change that deprive most local stakeholders of their social and material capabilities. Using an inclusiveness framework, we then conduct an in-depth analysis of soy expansion in the Matopiba region of Brazil's Cerrado. This rich biome with a mosaic of land uses forms an agriculture-savanna landscape that is rapidly giving way to soy monoculture – under the guise of development. Through fieldwork and primary data collection in 18 Matopiba municipalities, we have interviewed 62 stakeholders in that landscape transformation from different social groups. We assess how soy expansion has altered access and allocation patterns of key resources such as land and water, as well as participation in the local food systems and governance initiatives. When looking beyond general economic indicators, our findings expose a brutally exclusive process of environmental degradation and resource dispossession. Yet the stakeholders we interviewed do not want to simply be left undisturbed but to experience inclusive development instead, with participation in governance and support for bottom-up initiatives. We conclude that the frequently cited claim that industrial monocultures bring development to underserved regions deserves far greater scrutiny, and that inclusiveness in the design and execution of interventions is crucial for avoiding maldevelopment.

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"Mal nommer un objet, c'est ajouter au malheur du monde" (Calling something by the wrong name adds to the misery of the world) Albert Camus (2006, p.908)

1. Introduction

The increasing global appetite for a few agricultural commodities such as cocoa, palm oil and soy has shaped the fates of people and places around the developing world. Monocultures have continually replaced landscapes formerly made of native vegetation or traditional agricultural systems (Meyfroidt et al., 2013). Often, such landscape transformations are relatively fast processes. In Brazil, soy cropland grew as much as 328 percent between 1988 and 2018, mostly over the Cerrado savanna, a biodiversity hotspot and home to various local communities (Myers et al., 2000; IBGE-PAM, 2019). Although half of the biome has already disappeared, soy continues to expand under the guise of promoting "development" (Barbier, 2004; Strassburg et al., 2017; Rausch et al., 2019).

Development has long been a controversial endeavor. Beneficiaries often use the concept to legitimize and then justify public or private interventions, wrapping them in the notion of bringing progress to otherwise underdeveloped areas (Sachs, 2010; Ziai, 2017). From the recognition that the consequences are not always positive, adjectives such as *sustainable* or *inclusive* have emerged for qualifying development. Alongside debates on sustainability, inclusive development has come to the fore as a critical concept

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demanding the meaningful inclusion of different actors under equal terms in development processes and governance (Hickey et al., 2015; Gupta & Pouw, 2017). When the negative impacts of purported development are particularly notable, authors characterize it as *maldevelopment*, but this term remains inconsistently used and only loosely defined (see Sachs, 1979; Gupta & Pouw, 2017).

To provide for greater analytical rigor, this article revisits the notion of maldevelopment to conceptualize it and then uses it to examine the case of soy expansion over Brazil's Cerrado. We elaborate on maldevelopment anchored principally on the notion of inclusiveness, as "maldistribution" has long been established as a key issue (Sachs, 1979, p. 637). We argue that defining maldevelopment more clearly is important because, although development is frequently critiqued, it continues to carry a mostly positive connotation. In policy circles, it is often taken at face value, with nearly unquestionable legitimacy. In scientific assessments, development is sometimes invoked to balance adverse social or ecological impacts (see Martinelli et al., 2017). Development – even if neither sustainable nor inclusive – still possesses an aura of legitimacy that implicitly or explicitly seeks to justify itself, as if eventual ecological impacts or social disruption were but acceptable by-products of a greater good, justified sacrifices of an ultimately positive endeavor. We aim not only to question this presumption but to go a step further and conceptualize maldevelopment. As Cortina (2017, p.9) argues, problematic social realities need to have a name that allows us to recognize their existence and analyze them; otherwise, they benefit from remaining shrouded in anonymity.

After developing a conceptual framework to contrast maldevelopment to inclusive development, we characterize the Cerrado landscape, particularly its Matopiba region. We then present our research methods, which have included key-informant interviews with 62 stakeholders in 18 Matopiba municipalities, to assess the consequences of soy expansion through an inclusiveness lens. We have particularly sought the perspectives of the region's most marginalized stakeholders, such as smallholder farmers and indigenous peoples. Using Matopiba as an in-depth case, we then discuss how exclusion and inequity are crucial proxies to characterize maldevelopment and the value of defining it as such.

2. From maldevelopment to inclusiveness: A conceptual framework

2.1. Development as an evolving agenda

The debut of development as a concept on the world stage is usually attributed to US President Harry Truman, who in his 1949 inaugural address sought to justify American engagement abroad by framing poorer parts of the globe as "underdeveloped areas" in need of "industrial progress," to "raise the standards of living" and "lighten the burden of the poor" (Illich, 2010, p. 99). More than seven decades later, development continues to be widely – and often uncritically – promoted by international actors and many so-called "development organizations."

Critics of "development" do highlight its simplistic conflation with economic growth, as well as with modernistic and Eurocentric notions of progress (Sachs, 1979; Hickey et al., 2015; Gupta & Vegelin, 2016). Some ask why all societies should automatically aspire to emulate the affluent West irrespective of their different cultural backgrounds (Rahnema, 1997; Ziai, 2017). Others point to the Earth's planetary boundaries and limited ecological capacity to accommodate a growing global population aspiring to those lifestyle and consumption patterns (Steffen et al., 2015). Thus, various contestations have turned development into a "battleground," where different actors compete for the agenda (Sachs, 2010, p. xix).

One common approach to address development's controversies has been to qualify it, i.e., to clarify that the objective should not be just any development, but one that abides by some norms. Environmental norms, in particular, have gained substantive currency in recent decades. At the 1972 UN Conference on the Human Environment in Stockholm, its chairman Maurice Strong put forth the notion of *eco-development*, whereby the world would address poverty while accounting also for pressing ecological concerns (Mellos, 1988). *Sustainable development* would later rise as the prime example of such qualifications to become the world's dominant policy paradigm – in the parlance, if not in practice. Some argue that such terms become "floating signifiers," up for grabs, and ready to be defined and appropriated in different ways by different actors (Mert, 2015, pp. 150–159). Nevertheless, such development concepts remain central to policy debates, as seen in the 2030 Agenda and its Sustainable Development Goals (SDGs) that emphasize inclusiveness (Caballero, 2019; Siegel & Bastos Lima, 2020).

Some authors have articulated the concept of *inclusive development* partly due to the frequent neglecting of social equity dimensions in sustainability debates (see Cook et al., 2012). Hickey et al. (2015, p.5) define inclusive development as "a process that occurs when social and material benefits are equitably distributed across divides within societies." In turn, equity requires avoiding discrimination, except when to benefit weaker actors and prioritize the most vulnerable (Rawls, 1972). This understanding is in line with the 2030 Agenda's focus on "reaching the furthest behind first" (UNGA, 2015, p.3). Inclusiveness targets structural issues and seeks "changes to the power relations that underpin poverty and exclusion" (Hickey et al., 2015, p.6). It is arguably implicit in the idea of "development as freedom" as gaining capacities to overcome deprivation (Sen, 2000). Therefore, inclusiveness can help assess the social soundness of development endeavors – and when they could perhaps be more accurately described as instances of maldevelopment.

2.2. Inclusiveness, Maldevelopment, and the Anna Karenina principle

"All happy families resemble one another, but each unhappy family is unhappy in its own way," wrote Leo Tolstoy in the famous opening of his novel *Anna Karenina* (Tolstoy, 2014 [1877]). This reasoning implies that a deficiency in any single factor amongst many can lead to failure, while success requires satisfying all of them. This idea has become known in science as the "Anna Karenina principle" and been applied, for instance, to ecological risk assessments by defining a set of criteria that should be met (Moore, 2001). It builds on an older ethical notion, dating as far back as Aristotle's Nicomachean Ethics (Book 2), that "it is possible to fail in many ways." Conversely, instances of success tend to resemble one another for satisfying common requirements (Polansky, 2014). The same reasoning underscores Sen's (2000) argument that poverty exists whenever there is at least one form of deprivation (or, as he puts it, "unfreedom"), even if all other needs are met.

Such failures in the field of development would arguably be *maldevelopment*, a long-used but seldom defined concept. Sachs (1979, p. 635) hints at its meaning when suggesting that,

"While concentrating wealth and well-being in the hands of a privileged elite, rapid maldevelopment often results in the worsening of the social and material conditions of large strata of the population whose traditional activities are ruined by the competition of the modern sector unable to absorb the labor thus displaced."

Gupta and Pouw (2017, p. 97) similarly identify marginalization, poverty and inequality as typical maldevelopment features. Akin to malnutrition or the very concept of maldevelopment in biology, it thus refers to development that fails in one or many respects deemed necessary. In development studies, maldevelop-

ment betrays the core goal of improving human lives, to instead make weaker social groups worse off (Amin, 1990). Like unhappiness in the original Tolstoy statement, maldevelopment can therefore take multiple forms due to various reasons.

We contend that inclusive development offers critical people-centered criteria where deficiency will be indicative of maldevelopment. Gupta and Pouw (2017) identify three main dimensions of inclusiveness: (a) *social inclusiveness*, relating to the equitable sharing of socio-economic and cultural resources; (b) *ecological inclusiveness*, about the fair distribution of natural resources and ecological risks; and (c) *relational inclusiveness*, referring to participation in governance forums. Processes that fail in one or more of these dimensions could be called "exclusive development," but that would beg the question of whether it deserves to be called development at all, given the mostly positive connotation of this word. If development is, as Sen (2000, p. 26) suggested, "a process of expanding the real freedoms that people enjoy," inclusive development means doing so for all stakeholders, particularly the most vulnerable, while processes that instead curtail or constrict such freedoms necessarily are forms of maldevelopment.

In line with Sen's (2000, p. 181) shorthand for poverty as "capability deprivation," we define maldevelopment as an inequitable process of change that excludes and impoverishes local actors, undermining their economic or political capabilities and thus their social freedoms. Therefore, an indicator of maldevelopment is whether any major dimension of inclusiveness (social, ecological, or relational) is found wanting. The Anna Karenina principle is here useful for clarifying that deficiency in any key respect is problematic even if the other needs are met (e.g., compromised water access creates a problem even if all other essential resources are accessible). Next, we identify some critical development issues related to landscape transformations and exclusion before examining our case study.

2.3. Inclusiveness in agriculture-savanna landscapes

Landscapes are, by definition, multifunctional socio-ecological spaces with various biophysical, cultural, and institutional features (Arts et al., 2017). They often combine different land uses whose boundaries may be fuzzy and not always clear-cut. For instance, there can be mosaics with complex combinations of agricultural uses and native vegetation, such as in agriculture-forest landscapes (Agrawal et al., 2014). Similar hybrid mosaics can alternatively involve other native vegetation types such as grasslands or savannas.

We advance the notion of *agriculture-savanna landscapes* to characterize such mosaic areas where various savanna vegetation types coexist interspersed with farming areas. That arguably is the Cerrado's case, where local communities often use grasslands as grazing areas and create temporary croplands in field rotation systems (Eloy et al., 2016). They also collect natural resources that, in a forest context, would typically be described as non-timber forest products (e.g., fruits, nuts, medicinal herbs). These are vital savanna resources for local livelihoods and food security (Shackleton & Shackleton, 2004). However, because of a "high forest bias" in the international policy arena that privileges humid tropical rainforests at the expense of semi-deciduous or savanna woodlands, these regions' environmental importance is frequently underplayed (Hecht, 2005). Despite their social and ecological values, they commonly become "sacrifice zones" for monoculture expansion, replacing both the native vegetation and traditional farming (Oliveira & Hecht, 2016).

Assessing how such agricultural development endeavors shift access and allocation patterns is critical (see Gupta & Lebel, 2020). Many studies have examined, for instance, how large-scale land acquisitions or land grabbing have compromised customary land rights and dispossessed local actors (Borras et al., 2012; Hall, 2013). A restructuring of the corporate food regime towards "available" and cheap farmland in the Global South, fueled by financial speculation on agricultural commodities and land prices, currently drives expansion (Cotula, 2012; McMichael, 2012). This process has mainly targeted farmland suitable for expanding industrial crops like soy and corn. Those investments have typically sought flat, easily mechanizable, and climatically suitable regions such as Southern Africa or Brazil's Cerrado (Gasparri et al., 2016; Sauer & Borras, 2016; Spadotto et al., 2020). Despite a focus on large-scale deals, many reallocations of land from local to outside actors happen not in one or a few major events but cumulatively at expansion frontiers (Cons & Eilenberg, 2019). Farmland acquisition is sometimes accompanied by its twin, "green grabbing", when the state or private actors avail themselves of natural vegetation areas for conservation at the expense of local people's access (Fairhead et al., 2012). Both types of land grabbing – for agriculture or conservation – raise the issue of "territorial exclusion" as such landscapes are institutionally or materially transformed (Anaya & Espírito-Santo, 2018).

Water grabbing, too, has come to the fore as a significant issue in agriculture-savanna landscapes (see van Eeden et al., 2016). It refers to instances when powerful actors take control of water resources customarily used by local communities for their livelihoods (Franco et al., 2013). Similar to the prevalent narrative of "marginal" or "waste" lands used to justify appropriation, there has been an accompanying one of "available" or "underutilized" water (Mehta et al., 2012). Water grabbing, however, relates not only to the diversion of water resources but also to changes in use that can impact the water cycle and others' access (e.g., pesticide contamination and cost externalization compromising access to clean and safe water) (Franco et al., 2013). Reallocation changes "hydro-social dynamics" and can give rise to multiple forms of water exclusion (Shrestha et al., 2020). Therefore, it is vital to understand how water resources change hands and how interventions broadly impact local water access.

Similarly, the impacts of purported agricultural development on food go beyond land issues; they also include how resource reallocation affects local actors' placement in food systems, food security, and food sovereignty. Food security relates to physical and economic access to nutritious and culturally appropriate food (FAO, 2006). Food sovereignty, in turn, refers to notions of food democracy and refers to peoples' control over their food system, from production to consumption (Grey & Patel, 2015; Dekeyser, Korsten, & Fioramonti, 2018). Land-use changes frequently impact diets in multiple ways, not only by changing local communities' ability to produce food but also affecting their access to wild foods, for example (Ickowitz et al., 2016). Likewise, studies on Canada's First Nations have shown how they may no longer have their land grabbed but continue to experience undermined sovereignty and various forms of food system exclusion (Desmarais & Wittman, 2014). Local communities may retain their land and still be excluded from food markets, as can their knowledge and traditions be from influencing the dominant food culture (Coté, 2016). Such actors may become impoverished net food consumers even on their land – a fate all too common to many indigenous peoples (Turner & Turner, 2007).

Finally, a fundamental domain for inclusiveness is in overall landscape governance, which determines how different actors may secure, gain, or lose access to resources (Ros-Tonen et al., 2015). Non-governance, understood as an absence of agreed norms and rules to steer behavior (Bastos Lima & Gupta, 2013), may exist and possibly lead to a classic tragedy of the commons, where resources are exhausted due to the lack of collective management (Hardin, 1968). However, most landscapes count on an overlapping mix of formal and informal institutions stemming from different

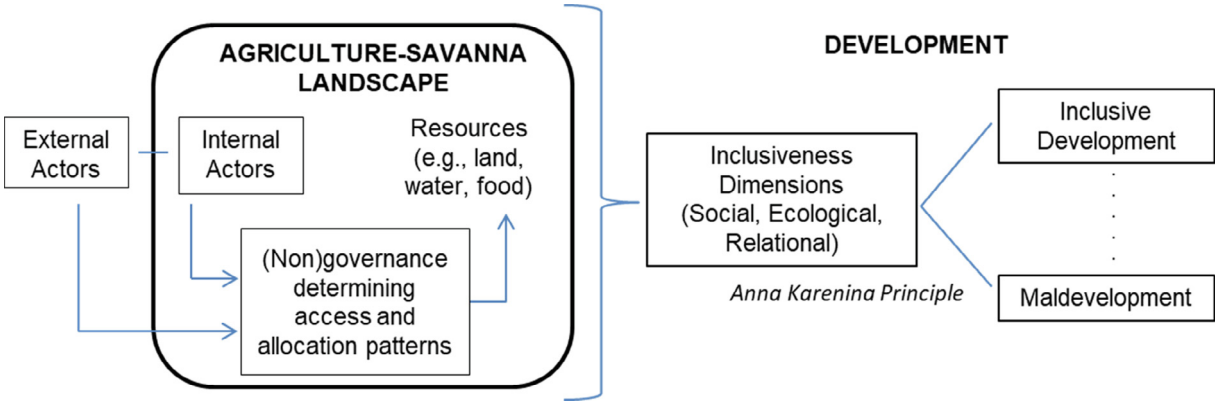

Fig. 1. Development dynamics in agriculture-savanna landscapes (own elaboration).

levels (De Castro et al., 2016). Yet, as landscapes are increasingly subject to the pressures and demands of globalization, commodity financiers and consumers have gained increased leverage over their fates, and it becomes essential to discuss who gets included in landscape governance (Hecht, 2010; Bastos Lima & Persson, 2020). Fig. 1 schematically synthesizes our conceptual framework.

3. When soy conquered the crooked trees: Soy-driven changes in the Cerrado

3.1. The Cerrado and Matopiba

The Cerrado is South America's second-largest biome, with native vegetation that ranges from dense canopy formations to natural open fields (De Miranda et al., 2014). It includes seven types of savanna formations, three kinds of grasslands, as well as dry forests and tall woodlands (Ribeiro & Walter, 2008; Ministry of the Environment, 2017). Hosting five percent of all the world's species (Green et al., 2019), the Cerrado is a biodiversity hotspot with a high rate of endemism that includes approximately 4800 unique plant or vertebrate species (Myers et al., 2000; Françoso et al., 2015; Strassburg et al., 2017). Its ecosystem services include food, fiber, and other bioproducts (e.g., oils, resins) (Lahsen et al., 2016). Similarly, water cycling services from the Cerrado are crucial for rain formation, livelihoods and agriculture throughout the country (Oliveira et al., 2014, 2015; Hunke et al., 2015; Spera et al., 2016; Leite-Filho et al., 2019; Pousa et al., 2019). The ecosystem is popularly called Brazil's "birthplace of the waters" for holding 43 percent of the country's surface water outside of the Amazon, the headwaters of three of South America's major basins, and several aquifers (Strassburg et al., 2017; Rekow, 2019). These aquifers, too, rely on the Cerrado's vegetation extensive root systems for recharging (Oliveira et al., 2017). In terms of carbon sequestration, the Cerrado's remaining native vegetation holds about 3.5 billion tons of aboveground carbon and nearly three times more underground (Freitas et al., 2018). This total of 12.8 billion tons of CO_{2eq} (after converting C to CO_{2eq}) is equivalent to almost seven years of Brazil's total greenhouse gas emissions (Russo et al., 2018; SEEG, 2020).

The Cerrado's bushes, shrubs and emblematic crooked trees are interspersed with traditional farming areas in a complex agriculture-savanna landscape. Half of the biome's original cover of 200 million hectares (Mha) has, however, already been converted for large-scale uses such as cattle ranching or soy cultivation (Mapbiomas, 2020). Between 2003 and 2017, as much as 13 Mha of Cerrado clearing was caused by soy expansion (Zu Ermgassen et al., 2020), incurring more than 1.6 billion tons of CO_2 from land-use change (Noojipady et al., 2017). Meanwhile, increasing habitat fragmentation has particularly threatened fauna, including iconic endemic species such as the giant anteater and the maned wolf (Green et al., 2019). Beyond their symbolic value, those animals may also be ecologically important for ecosystem regeneration through seed dispersal (Paolucci et al., 2019).

Most of the remaining half of the Cerrado is in its northernmost segment, a region recently nicknamed Matopiba (see Fig. 2). It is an expanse of 73 Mha involving 337 municipalities across four Brazilian states: Maranhão, Tocantins, Piauí, and Bahia, whose initials form the acronym. Indigenous peoples, *quilombolas* (people of Afro-Brazilian settlements created by escaped slaves in the past), and other smallholder communities of mixed ancestry have historically lived in the region. Local agri-food systems usually combine mixed-crop agriculture, extensive livestock grazing, and the gathering of native products such as fruits, oils, and resins (Eloy et al., 2016).

As the Cerrado's topography has a combination of high and low altitude areas, there is traditionally a geographical separation of land uses. Grazing typically takes place on plateaus or high flat areas (*chapadas*). Meanwhile, small-scale cultivation mostly occupies the valleys (*baixões*) near springs and water bodies, where most communities are also settled. To those people, the Cerrado has been a home, a place rich in social and symbolic meaning that increasingly gives way to a "disenchanted hinterland" (*sertão desencantado*) as soy arrives (Moraes, 2000).

3.2. The dynamics of soy expansion in Brazil

Soy (*Glycine max*) has, over the past decades, become the world's primary source of animal feed protein, especially for poultry and pigs (Garrett & Rausch, 2016). Between 1960 and 2016, global soy production grew ten-fold, with 85 percent of the current output coming from the Americas (FAO, 2018). In Brazil, responsible for 28 percent of the global production, soy has become the number one crop both in area (occupying 36 Mha) and foreign exchange earnings (MAPA, 2019). About 80 percent of Brazil's soy production is exported, primarily to China and Europe (Trase, 2018).

Soy has expanded in Brazil through a combination of technological breakthroughs, public policies, and market incentives. Cultivation started for local consumption by Japanese immigrants in the early 20th century (Shurtleff & Aoyagi, 2009). What began as a subsistence crop in smallholder communities would, however, expand from the 1940s as a useful nitrogen-fixing legume to compensate for the soil deterioration wrought by wheat and corn monocultures in the country's temperate South Region (Hasse & Bueno, 1996). Expansion into Brazil's Cerrado, starting from the country's vast Center-West Region, would emerge mainly as a political project.

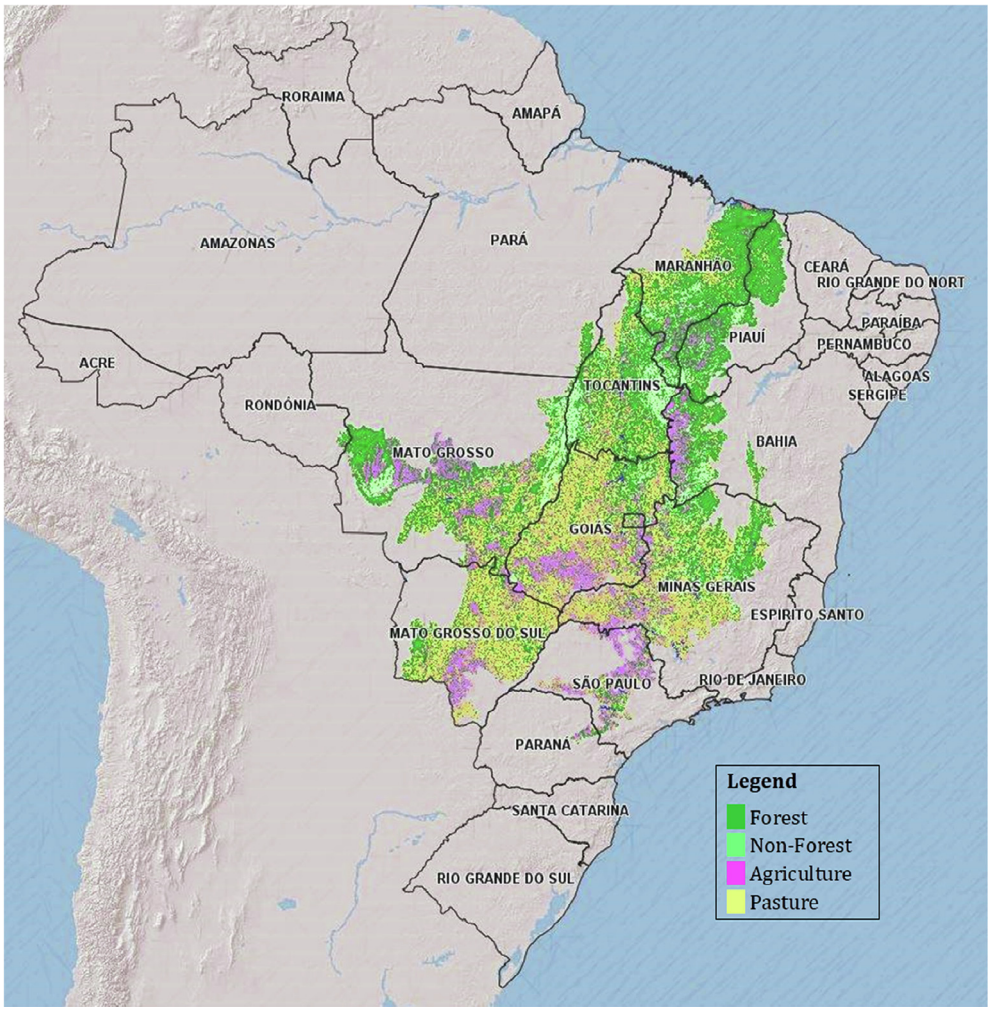

Fig. 2. Key land-uses in Brazil's Cerrado (Mapbiomas, 2020).

Soy would follow the steps of President Getúlio Vargas's (1930–1945, 1951–1954) "March towards the West," a policy of occupying "empty" Brazilian hinterlands as a way to secure national sovereignty and produce more food. During Brazil's military dictatorship (1964–1985), that would persist with the new intent of routing communist peasant insurgence (Oliveira, 2016). Building on public universities' agronomic research, the state-owned Brazilian Company for Agricultural Research (Embrapa) would be established in 1973 partly to develop improved seeds and soil preparation procedures. Those public investments crucially allowed soy to be cultivated not only in the temperate southern areas but also in the country's tropical regions and, particularly, in the Cerrado's acid soils (Weinhold et al., 2013; Hosono & Hongo, 2016).

From the 1970s, international market demand would become increasingly meaningful. When the US embargoed its soy exports to secure domestic supplies in the wake of the 1973 oil crisis, Japan responded by establishing a collaboration with Brazil as a potential alternative supplier (Conlon, 2009). The Japan International Cooperation Agency (JICA) from 1974 to 1977 funded the seminal Japanese-Brazilian Cooperation Program for the Development of the Cerrados (*Programa de Cooperação Nipo-Brasileiro para o Desenvolvimento dos Cerrados* – Prodecer). That would plant the seed of Brazil's soy-exporting orientation, integration in global grain markets, and eventually also prefigure its upcoming role as a major food supplier to Asia.

Southern Brazilian migrants – mostly families of Japanese, German or Italian descent, with strong agricultural cooperative traditions and already familiar with soy – would spearhead the crop's expansion through the Cerrado in the 1970s and 1980s (Vennet et al., 2016). Federal/state assistance with land titling, governmental technical assistance for soy cultivation, subsidized credit, and publicly funded R&D underscored much of that push. Such family migrants created numerous farmer towns that later became major cities in Brazil's Center-West. Some would go further and also form the first soy-farmer settlements in what would later be called Matopiba, then still considered a remote hinterland. In time, those migrants would come to form powerful agrarian elites in control of much of those regions' economies and politics.[1]

In little more than a decade, soy cropping in Brazil's Center-West Region would grow more than ten-fold, from a nearly negligible area of 378 thousand hectares in 1976 to 4 Mha in 1989 (CONAB, 2020). As soy expanded, Cerrado clearing became rampant, as did the expulsion of – mostly untitled – local communities (Fearnside, 2001; Eloy et al., 2016; Pitta & Vega, 2017). However, recognition of such social or environmental issues was scant. The

[1] The best illustration probably is the Maggi family. In 1977, these Southern migrants founded Amaggi, which would grow to become Brazil's largest soy-trading company. Blairo Maggi, son of the company's founder and at times called "the king of soy", would grow to become not only a Forbes billionaire but also governor of Mato Grosso state (2003–2010), before rising to be Brazil's Minister of Agriculture (2016–2019).

Cerrado was widely seen as available land waiting for development – a persisting view recently seen in *The Economist*'s now-notorious article where such a landscape transformation is dubbed as a "miracle" to be replicated elsewhere (see The Economist, 2010). At the time, the best evidence of such a view is that Brazil's 1988 Constitution recognized various ecosystems as "national patrimony" to undergird environmental protections, but not the Cerrado (Hecht, 2005). For instance, only 7.5 percent of the biome is under some form of protected area status, in contrast to 46 percent of the Brazilian Amazon (Rausch et al., 2019).

Although state support continued from the 1990s onwards, Brazil's soy sector would experience growing internationalization and significant structural transformations (Araujo et al., 2019). In line with the dominant neoliberal paradigm, this agroindustry became increasingly transnational, while public policies focused on tax breaks and financing. In 1996, the emblematic Kandir Law started exempting unprocessed agricultural commodity exports from taxation (Brazil, 1996). From 2003, annual Harvest Plans (*Plano Safra*) would provide billions in credit to agribusiness at low-interest rates (MAPA, 2019). Multinational grain traders such as ADM, Bunge, Cargill, and Louis Dreyfus – the so-called ABCD companies – grew increasingly influential. Through mergers and acquisitions, these firms' installed capacity in Brazil increased ten-fold between 1995 and 2002, as they came to control half of all soy-crushing operations in the entire Southern Cone (Wesz, 2016). Brazil's soy cropland grew modestly from 11 Mha in 1990 to 13 Mha in 2000, but then experienced a boom once more internationalized, expanding to 23 Mha in 2010 and 36 Mha in 2020 (CONAB, 2020). Soy cultivation has therefore experienced growing integration in a corporate agri-food regime, initially through multinational traders, then also agricultural input companies (Sauer & Leite, 2012). From the 2000s, genetically modified seed packages with fertilizers and pesticides would dominate Brazil's soy sector (Oliveira & Hecht, 2016).

Matopiba, which has borne the brunt of soy's expansion since 2003, therefore no longer experiences so much migration of farmer families from Brazil's south, but the growth of a corporate soy sector financed overwhelmingly by the global North (Vennet et al., 2016; Oliveira, 2016). Soy is a relatively expensive crop to grow, and it benefits tremendously from economies of scale. Therefore, smallholders are virtually non-existent in its expansion areas. While soy farms retain some heterogeneity, consolidation has meant increasingly larger and fewer units. Most such farms in the Cerrado today consist of vast machine-harvested fields sometimes exceeding 10,000 ha (Mier & Giménez, 2016). That has meant a total transformation of social realities on the ground as farming communities give way to large estates frequently controlled either by absentee owners or under diffuse corporate ownership (Ofstehage, 2018).

Once seen as remote, the region has received massive public and private investments in grain storage, cargo transport, and port infrastructure. Meanwhile, agronomic developments have enabled soy cultivation despite the water stress that characterizes much of this northern Cerrado segment. The state plays significant roles in providing R&D through Embrapa and regularizing (sometimes illegal) land acquisitions (Wolford et al., 2013; Oliveira, 2016). Indeed, "Matopiba" is a Federal Government creation (see Bezerra & Gonzaga, 2019). In an Agricultural Development Plan (*PDA-Matopiba*), it assembled 337 municipalities in those four states' hinterlands into a single zone for investment under the guise of bringing development (Brazil, 2015). Farmland price speculation has thus boomed with the presence of land-dealing companies (e.g., Radar, SLC Agrícola) and increasing "land assetization" (i.e., its utilization as a financial asset) by foreign pension funds and other international finance actors (Frederico, 2019; Spadotto et al., 2020).

Finally, China's rise as a major soy buyer and investor has further globalized Matopiba's "development" drive (Torres et al., 2017). China alone purchases as much as 60 percent of Brazil's soy production (Trase, 2018). Besides, Chinese soy traders, such as COFCO, have gained increasing presence amid complex assemblages of Asian capital with Brazilian agribusiness (Oliveira, 2019). What all this has meant for local actors and the understanding of "development" is what our research has sought to examine.

4. Research approach and methods: Local perspectives

While the broad political-economic (re)configurations from soy expansion in Matopiba have been extensively studied (e.g., Oliveira, 2016; Frederico, 2019; Spadotto et al., 2020) alongside the environmental impacts of Cerrado conversion (e.g., Rekow, 2019; Green et al., 2019; Escobar et al., 2020), local experiences often remain underappreciated. We argue that the microfoundations of landscape change merit a much more detailed examination to understand how local communities feel its impacts, through a more granular analysis of inclusiveness. Besides political-economic changes, those landscape transformations also carry various immaterial social meanings whose adequate understanding requires collecting and appraising local views.

Without falling into the trap of idealizing traditional small-scale agriculture (see Agrawal & Gibson, 1999; Brown & Purcell, 2015), we focus mainly on local communities as those with the highest stakes – and yet the most marginalized actors – in the profound transformation caused by soy expansion in Matopiba. We have combined different qualitative data-collection methods to triangulate multiple sources of evidence and draw inferences. Our sources include scientific and grey literature (in English and Portuguese), participant observations during three field visits (in 2016, 2017 and 2018) to a total of 18 Matopiba municipalities, focus groups, and semi-structured interviews (Patton, 2002; Silverman, 2010) with 62 stakeholders overall (see Figure 3 and Table 1). Key-informants have included smallholder farmers, government officials at municipal or state levels, labor unions, agribusiness representatives, soy growers, civil society organizations (CSOs), and members of indigenous or other traditional communities. We made a deliberate effort to include and give voice to vulnerable actors (e.g., Afro-Brazilian *quilombola* communities) as well as women, including the women-only babassu nutcrackers.

We first identified key soy-producing municipalities across the four Matopiba states, approached relevant stakeholders in each of those as "gatekeepers," and then used a snowball sampling technique for additional contacts (Patton, 2002; Silverman, 2010). We prompted them to talk about how they have experienced the arrival and advance of soy in Matopiba. All interviews were conducted in Portuguese by at least one of the authors. Due to the political sensitivity of agrarian issues in Brazil, we have ensured all interviewees' full anonymity. However, we make extensive use of quotations (without attribution) to foreground the participants' voices and, as often as possible, portray local issues in the stakeholders' own words.

5. Domains of exclusion: The maldistribution in Brazil's recent soy expansion

5.1. Territorial exclusion

Increasingly insecure rights or outright loss of land by local actors has underscored much of soy's recent expansion in Matopiba. Historically, communities in the Cerrado mostly settled in undesignated public areas without clear legal status. Brazilian law differentiates between land ownership from formal property

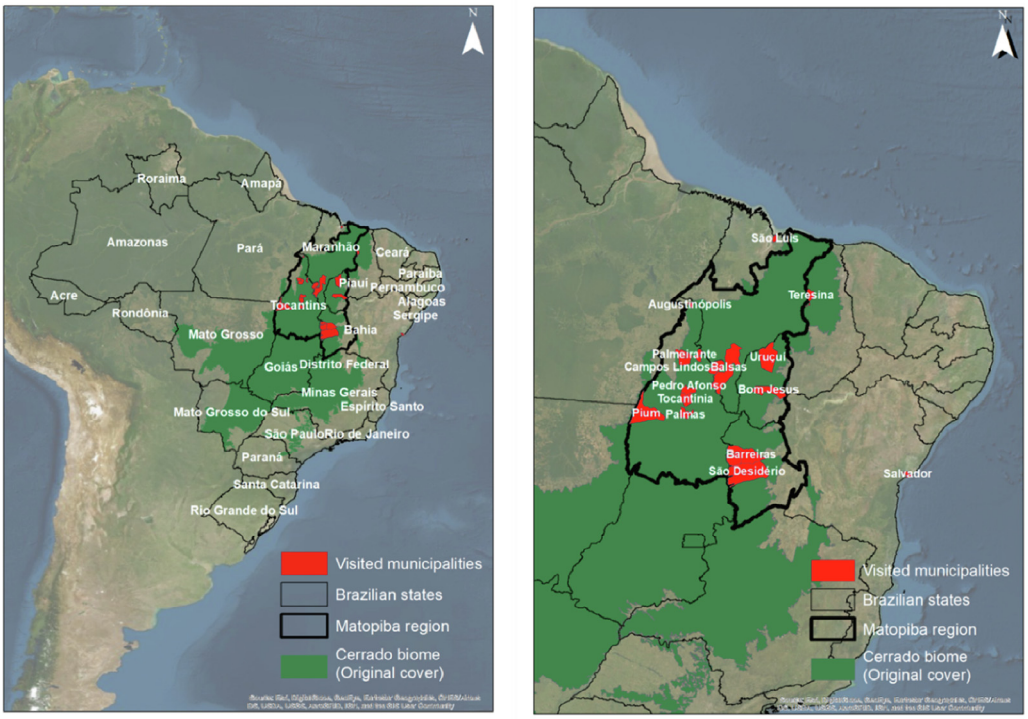

Fig. 3. Visited municipalities in the Matopiba region of Brazil's Cerrado (own elaboration).

Table 1
List of stakeholders interviewed in Matopiba (62 stakeholders in 18 municipalities).

States	Municipalities	Interviewed stakeholders
MARANHÃO	*Balsas*	NGO | Research institute linked to soy | Large-scale farmers' union | Public bank | Researcher | State environment department
	São Luís (state capital)	Researchers (3) | NGO | State environment department | State forestry agency | Grassroots organization | State human rights and popular participation department | State social development department | State agriculture department
TOCANTINS	*Augustinópolis*	Smallholders cooperative | NGO | Grassroots organization| Civil society organizations network
	Barra do Ouro	Rural community
	Campos Lindos	Rural communities (2) | Rural workers' union | NGO
	Nova Olinda	Rural workers' union
	Palmas (state capital)	Researcher | State environment department | State revenue department | NGO | Technical assistance cooperative
	Palmeirante	Soy farmers (2) | Municipal government
	Pedro Afonso	Large-scale farmers' union
	Pium	Large-scale farmers' union
	Tocantínia	Indigenous community
PIAUÍ	*Bom Jesus*	Rural communities (3) | Researcher | NGO | Rural workers' union | Large-scale farmers' union
	Teresina (state capital)	State rural development department | State land agency | State irrigation agency | Researcher
	Uruçuí	Soy farmers (2)
BAHIA	*Barreiras*	Researcher | Large-scale farmers' association | Large-scale farmers' union | NGO
	Luís Eduardo Magalhães	Soy farming consultancy | Research institute linked to soy
	Salvador (state capital)	Grassroots organization | State environment department | State institute of natural resources | State rural development agency | Association of lawyers for rural workers
	São Desidério	Municipal government

titles (*propriedade*) and informal tenure (*posse*) (Favareto, 2019). Land rights can, therefore, stem either from a formalized registry or from *de facto* occupation, as Brazil's Constitution recognizes customary rights (Brazil, 1988, art. 68 & 191). However, in practice, traditional ownership is mostly disregarded unless it goes through a lengthy – and mostly inoperative – procedure of formal recognition and titling by the government. As nearly all local communities in Matopiba lack land titles (and thus real tenure security), they have been subject to increasing pressure from soy expansion.

Matopiba's increasing attractiveness for soy has led to growing market speculation and rapidly soaring land prices (RSJDH, 2018). Soy expansion has sent a strong market signal that those once-remote lands can be made increasingly profitable, particularly plots on the flat and mechanization-friendly *chapadas* – the Cerrado's high plateaus (FIAN et al., 2018). Land assetization by international financial players, including North American and European banks or pension funds after the 2008/2009 crisis, in turn, has capitalized land-dealing companies and speculators (GRAIN & RSJDH,

2018; Frederico, 2019; Spadotto et al., 2020). Local communities have experienced a sudden wave of land price increases, harassment and eventually, evictions (Vega, 2017; CPT, 2020). Soy farmers generally claim they only buy fully legalized lands, but they often fail to verify how the land was cleared and how the titles were obtained (Girardi, 2018). Moreover, this sudden economic valorization has made it increasingly difficult for traditional communities to have their customary land ownership legally recognized (Lima, 2019).

Often, when locals refuse to be bought out, some claimants forge and then register false land titles, frequently with corrupt officials (see Campbell, 2015). Once registered, such documents are then used to "legally" evict untitled communities with a judicial order and police force. Matopiba communities colloquially call such forged land deeds "flying titles" (*títulos voadores*), as they materialize out of thin air in an abstract bureaucracy, without any real-life connection to the land. Title forgery as well as bribes to recognize private ownership have reportedly increased alongside land prices in Matopiba (Interviews; see also Favareto, 2019). In late 2019, Brazil's Federal Police uncovered a major land-grabbing scheme involving corrupt judges, agribusinessmen, and over 300,000 hectares in the region (AB, 2019). Communities occasionally succeed in appealing to decisions and disputing the validity of illegal land titles in higher courts, but this is a costly and lengthy process most locals cannot afford.

Eventual restitution of communal land properties may come years after the damage has been done (Favareto, 2019). Generally, we found that the few communities that had obtained either individual land titles or full-fledged legal recognition of collective ownership *before* the arrival of soy were better able to safeguard their rights. Table 2 contains some local views on these issues in the stakeholders' own words.

Even when smallholders or local communities do have land titles, they still report being subject to what they call *silent evictions*. It refers to when external actors deliberately undermine the community's ability to remain, thus gradually forcing them out in a way that makes it seem voluntary. That often takes place in collusion with state actors (see Lima, 2019). Interviewed communities have mentioned, for instance, the closing down of rural schools or hospitals, as well as road blockades by large landowners to prevent locals from coming and going. At times, however, silent evictions go beyond neglect and turn to various forms of coercion. What begins as land purchase offers can quickly escalate into more direct harassment and violence towards those who resist leaving. Some criminal groups reportedly specialize in intimidating locals, while hired gunmen commonly issue death threats to community leaders. Between 1985 and 2019, nearly two thousand people were murdered in Brazil's rural conflicts, many of them in Matopiba (CPT, 2020). There is a general sense of impunity as few of those rural murders are investigated or prosecuted in court – on average, only eight in each hundred ever get settled (Sobrinho, 2019).[2] In the face of such coercion, only the most resilient remain in an otherwise depopulated countryside to make way for soy.

As land and soy businesses initially only sought farmland, local communities were displaced to the valleys (*baixões*). However, the emergence of so-called "environmental soy" that complies with Brazil's land-use regulations has recently led to evictions also in areas of native vegetation (Anaya & Espírito-Santo, 2018; see also Steward, 2007). Brazil's new Forest Code requires private farms in the Cerrado to conserve at least 20–35 percent of their areas as native vegetation (Brazil, 2012). However, the law allows such reserve areas to be either on-farm or in another property of the same owner. Therefore, soy farmers have increasingly bought – or simply claimed – areas with native vegetation in the non-mechanizable valleys (*baixões*) to offset reserve deficits accrued through clearing the mechanization-friendly plateaus for planting. Communities living in such valleys, close to water sources, now suffer from evictions and territorial exclusion also through "green grabbing" in Matopiba (Anaya & Espírito-Santo, 2018).

To the dismay of many local smallholders, Matopiba's rural areas seem no longer to have any place for them: they are increasingly forced to emigrate to the cities, often to slums (Favareto, 2019). Interviewed farmers displayed clear awareness of the fate that awaits them and are hardpressed by their lack of options (see Table 3). As a very consolidated sector and highly mechanized crop, soy employs very few of the people it displaces. In Brazil, soy monocultures create on average only one full-time job per 200 ha, 5–10 times less than oil palm, and 25 times less than smallholder farms (IBGE, 2019; Brandão and Schonefeld, 2018, p. 27). Matopiba's rural population thus has been steadily decreasing while its economy grows. The region's gross domestic product (GDP) increased by 542 percent between 2000 and 2013 (Pereira et al., 2018). Yet, of about 250 thousand farms in the region, 80 percent together generate only five percent of the total rural income (Bolfe et al., 2016). The large and mostly worker-less soy farms concentrate the bulk of it. In 2015, over 10 million tons of soy were traded from Matopiba, exports that accounted for 2.7 billion US dollars (Colussi, 2017). The few jobs they create generally go to specialized migrant workers from more affluent parts of Brazil, with locals employed mostly in seasonal low-skill occupations (Favareto, 2019).

These various forms of territorial exclusion have pushed locals out of the land. Increasingly, Matopiba's lands become exclusively

Table 2
Local interviews on land issues resulting from soy expansion in Matopiba.

Smallholder farmer 01	"Land here? No way it had any value. My brothers themselves sold their lands, and they did it for 'peanuts'. Nowadays, they have nothing with which to buy one of these plots."
Smallholder farmer 02	"A gentleman from nearby once came asking for my signature on a paper, to prove my customary right. God didn't let me do it, otherwise I don't even know where I would be today. I figured they wanted to take my land. [...] I have seen these evictions happen, grabbers coming in a caravan to expropriate people who live on this land for 100 years. To be dragged, tossed onto a truck, someone who worked to tame the land, without the right even to take their things."
Smallholder farmer 03	"My grandfather, my father and I lived there on the plateaus, and then a few years ago they brought this soy project and pushed us to the valleys. Nobody cared whether that was our land. They came with documents and sent us out."
Local NGO representative 01	"Many families end up preferring to negotiate the land for an amount they find good. But going away to live in the city outskirts, that money soon is over, and they find themselves without a job or land. It is an eviction that may be neither from direct violence nor a coercive legal decision – although those things happen – but most emigration of traditional communities is in this silent way. In a certain manner, this is forced. It is seen as a voluntary decision, but behind that is a situation that somehow obliges them to leave. There are emotive testimonials of people whose roots were here, but if they remained, they would be putting their families at risk. It would be a suicide, in their words. Agrochemical contamination was too serious. There are countless cases."

[2] A smallholder informed us his house had been set on fire while he was away, a crime allegedly ordered by someone who had previously come to claim the land with a "flying title". The smallholder also claimed gunmen had prevented him from bringing new straw to rebuild his house. As a sign of resistance, he showed to us that he managed to rebuild his home despite those threats. He rebuilt the walls with twigs and disposed agrochemical plastic bottles from neighboring soy farms.

Table 3
Local interviews on territorial exclusion resulting from soy expansion in Matopiba.

Smallholder farmer 04	"They came here in the small hours and poisoned all our hens. The other day they shot our goats. Then they came again and offered us money to leave, but we didn't take it because we have nowhere to go, and we don't want to leave."
Smallholder farmer 05	"They keep coming here and saying that we should leave. But where should I go? To the slums? Many generations of my family were born and raised here, and now, just because I don't have a piece of paper saying it's mine and my family's, then I should leave?"
Smallholder farmer 06	"Why harass those that are living quietly? My husband and I have no schooling, but all my daughters do. None of them are rural workers, they all are public servants, but he and I, what are we going to do if we have to leave this place?"
Smallholder farmer 07	"Farmers here know little about how to do much else. I'm able to sell a kilo of rice or fruit pulp, but I don't know how to go around as an ice-cream vendor on the streets. We're not used to that kind of thing. Moving to the big city doesn't help us."
Large-scale soy farmer 01	"I have been a farmer here for 21 years, I am the owner. On arrival, it was very hard, because this was an unexplored land. The farmer profile here in our region is much smaller, if you compare for instance to Mato Grosso. Here we have about 500 ha each, only a few farms exceed 1000 ha. I have about five employees for a 500 ha property. If you put together the sowing and harvesting, then that's about 10 people in total."

farmed (or conserved) by Southern Brazilian migrants, foreign farmers such as from the US, or faceless enterprises (Mondardo, 2010; Ofstehage, 2016; Perdigão de Castro et al., 2018). Those who leave their livelihoods to become part of the formal economy do so "at its lowest rungs," as Scott (2009, p. 216) observes. In Matopiba, that means emigrating to the city, without adequate skills or training, while being excluded from agriculture and environmental conservation in the land.

5.2. Water exclusion

The conversion of the Cerrado's diverse agriculture-savanna landscapes into soy monocultures has had significant hydrological impacts in Matopiba. For one, vegetation clearing has impacted local rainfall patterns as well as reduced water flows in local rivers and streams, sometimes causing their complete disappearance (Pousa et al., 2019). That is because large-scale soy expansion affects two vital ecological processes in the Cerrado, with implications in both short and long terms: atmospheric water cycling and groundwater recharging. The relationship between agricultural land-use changes and water cycling is well established (e.g., Oliveira et al., 2014; Hunke et al., 2015; Spera et al., 2016). Native Cerrado vegetation, characterized by its deep root systems, is vital both for rainwater infiltration to feed groundwater and for pumping that water back to the atmosphere through evapotranspiration to form rain (Oliveira et al., 2015; Spera et al., 2016). Soy monocultures, instead, expose the soil during fallow periods. Although this can be partially mitigated by no-tillage practices that leave the organic matter on the ground, water infiltration still decreases without the original vegetation cover (Oliveira et al., 2014). Water infiltration is also impacted by the mechanization of the Cerrado's high plateaus for cultivation (Carvalho et al., 2009). Finally, soy cropping itself has increasingly utilized the ecosystem's green water, meaning it reduces the amount of water that would normally be available in the soil (Flach et al., 2020). These environmental impacts have not gone unnoticed by local actors, as access to drinking water and farming in Matopiba are increasingly affected (see Table 4).

Several studies have confirmed the widespread local perception that Matopiba's mean temperature has risen, its rains become more erratic, and droughts more common, partly from global climate change but also due to the clearing of Cerrado vegetation (Silvério et al., 2015; Pires et al., 2016; Abrahão & Costa, 2018; Salvador & Brito, 2018; Leite-Filho et al., 2019; Pousa et al., 2019). Local climatic change has impacted large-scale farming itself, as the already short season for planting and harvesting soy in Matopiba is shrinking (Abrahão & Costa, 2018).

Soy farmers have, however, far more capacity to adapt to a changing climate than smallholder communities, and their coping strategies themselves have aggravated local water impacts. Although most soy cultivation in Matopiba remains rain-fed, these highly capitalized farmers have invested in increasingly powerful water pumps and set up – largely unregulated – irrigation systems. Irrigation has been expanding to cope with erratic rainfall but also to increase soy yields and to enable its cultivation in drier areas. Done mostly without adequate government oversight – and without paying for water use – this practice has added considerable pressures to the hydrological basin (Interviews; Pousa et al., 2019). Communities accuse soy farmers of freely retrieving massive amounts of water from local rivers and ground sources, disregarding the limits authorized by public licenses. Public environmental authority representatives who we interviewed in Matopiba admitted that both monitoring and enforcement of water quotas for monoculture farms are scant. Sometimes, soy fields continue being irrigated even during droughts. For instance, major demonstrations took place in Correntina when the whole city ran out of water due to diversion for soy irrigation (see G1-BA, 2017). As a local social movement leader sardonically puts it: "*Soy fields are very thirsty, more so than us*" (Interview). Even so, Brazil's agricultural policy-makers plan to expand irrigated monocultures over the next years, especially in Matopiba (Borghetti et al., 2017).

Table 4
Local interviews on water issues resulting from soy expansion in Matopiba.

Smallholder farmer 08	"First, they moved us out of the plateaus, where we had our cattle grazing freely. Then we came to the valleys close to the water. But now some small rivers are even disappearing during the dry season. This is not normal."
Large-scale soy farmer 02	"It is normal to have one crop failure at least every five years, but this frequency is increasing to every four or three years."
Smallholder farmer 09	"After soy cultivation started on that side, water here finished. I have to go for a well on the other side of the hills now. Here, it was full of water, there were fish we caught to mix with beans, and now there is nothing left. [This stream] never dried, and now it's been three months that it's been dry. Soy arrived about three years ago and about two years ago the water started dwindling. Each day that passes, they deforest more. Nobody here has water anymore."
Smallholder farmer 10	"We have to go deeper and deeper to retrieve some water. The day our pump breaks down, and the mayor does not give us another one, we'll go thirsty."

Besides such broad impacts on water availability, soy farms often have physically restricted local community access to water sources. Overall, water conflicts in Brazil increased five-fold between 2010 and 2019 (CPT, 2020). Large landowners in Matopiba routinely place private guards to enforce control over the territory and sometimes intimidate customary users away. Such dispossession not only hampers local communities' basic water access, but it also affects them on a psychological and cultural level, as they lose what they traditionally perceive as a shared resource. Some local communities also reported being prevented from performing religious practices that sometimes require medic-

Table 5
Local interviews on water exclusion resulting from soy expansion in Matopiba.

Smallholder farmer 11	"They put some guards here and there, closing our access to the spring. They say it is a permanent protection area now, protected by law, and we cannot get water from there anymore."
Smallholder farmer 12	"Now we have to go to town to buy big water gallons to drink. We cannot drink the water from the stream anymore as we used to do. Sometimes, there is a white foam over it. We still have the wells, but I don't trust them to drink; we only use it for washing."
Smallholder farmer 13	"I went for three months without using this water, not even for washing clothes, due to the poison they put, washed down by the rains. Fish died; they even floated. Hens died, ducks died, drinking from that contaminated water."
Local NGO representative 02	"There is pressure to renounce these areas, but [local communities] also suffer from water shortages, the poisoning of rivers... They have to look for water farther and farther away."

inal plants located in uncultivated areas or near water bodies (Interviews; see Dalla Nora et al., 2019). Often, water grabbing happens alongside the green grabbing of customary community areas to meet environmental regulations.

Finally, water grabbing or exclusion occurs through the externalization of environmental impacts on local communities (see Franco et al., 2013). Rampant fertilizer and pesticide pollution have accompanied Matopiba's expansion of soy, a crop that accounts for as much as 63 percent of all pesticide utilization in Brazil (Pignati et al., 2017). Hundreds of cities in Matopiba already suffer from contaminated water supplies (Lyrio & Vigné, 2019). Pesticides (mostly glyphosate) are frequently air-sprayed, which facilitates dispersal. Runoffs also have become common and widely contaminated rivers, creeks, and even aquifers (Hunke et al., 2015; Lima, 2017; Santos, 2018; Nogueira et al., 2012; Albuquerque et al., 2016). Local communities routinely report health symptoms such as nausea, diarrhea, headaches, and coughing after agrochemical applications on neighboring soy fields (Soares & Porto, 2007; Rigotto et al., 2014). Infant deaths and fetus malformation have also been attributed to glyphosate contamination in the region (Felizardo, 2018). Toxicological studies remain needed to assess human contamination; however, local communities say the connections between agrochemicals and health issues are evident to them. Environmental contamination has already affected both their access to water and livelihoods. Indeed, compromised water access has been one of the critical factors compelling local communities to abandon Matopiba's countryside (see Table 5).

5.3. Food system exclusion

Traditionally, here as elsewhere, smallholder households have played a dual role as food producers and consumers – or "prosumers" (see Molitor et al., 2017). Matopiba's rural communities have historically relied on subsistence mixed-farming systems whose surpluses are traded in local markets. They traditionally combine livestock grazing in the high plateaus (*chapadas)* and cultivation in the valleys (*baixões*) near water sources, mixing crops such as corn, cassava, beans, rice, and vegetables. Indigenous and other local communities also rely extensively on native fruit cultivation or collection, including souari nut or pequi (*Caryocar brasiliense*), turu palm fruit or bacaba (*Oenocarpus bacaba*), moriche palm fruit or buriti (*Mauritia flexuosa*), baru nut (*Dypterix alata*), bacupari (*Garcinia gardneriana*), mangaba (*Hancornia speciosa*), murici (*Byrsonima crassifolia*), among many others. Wild food collection also includes honey in the Cerrado savannas as well as fishing and hunting. Finally, some smallholder communities have established fledgling value-chain development initiatives based on local produce (e.g., small-scale fruit pulp factories) to earn extra income and purchase additional food items.

The ongoing landscape changes in Matopiba have, however, undermined the local food system in important ways. Much attention goes to the supplying of soy to international markets under the guise of providing for global food security. Yet, locally, its expansion has disrupted traditional farming, contributed to the dying out of native edible species, and undermined some of the communities' income-generating activities, thus further impairing their economic access to food. Soy growers generally justify their undertaking by highlighting the need to feed a growing global population (for a critique of this "neo-Malthusian discourse," see De Schutter, 2017). As a Southern Brazilian migrant growing soy in Matopiba puts it, "*Unfortunately, to produce food, I need to deforest. I am here producing food, food for the world.*"

Communal grazing sites were the first to be lost by local communities due to land enclosure for soy. As this crop expands, the area dedicated to smallholder cultivation of staple foods in the local and broader regional diets – rice, beans, and cassava – has also been shrinking accordingly (Almeida & Junior, 2019; see also Alentejano, 2011). Generally, the soy sector either refutes any critique or aligns with a problematization of soy expansion only in terms of vegetation loss – not the replacement of local agriculture, regarded as primitive (see Bastos Lima & Persson, 2020). That conventional framing not only betrays the invisibility of local food system impacts, but it also exposes an unacknowledged contradiction in the food security rationale that often underscores soy expansion, as the production of "food for the world" comes at the cost of impairing local access to it.

Widespread pesticide contamination, too, has had significant impacts on local food access and the ability of local communities to engage with commercial farming or value-chain development activities. Not only smallholder crops but also wild foods have been severely affected. Collected food resources are important for direct consumption, for supplying local markets, as well as for value-added through local production of frozen fruit pulp, natural fiber handicrafts and other goods that provide rural or indigenous communities with an income. In our field visits, we encountered smallholder cooperatives on the verge of bankruptcy due to the increasing scarcity of native Cerrado resources that once were abundant. Alternatively, it is the violence used for land evictions that also sabotages the little economic capacity local communities have (see Table 6)

With such disruption of their traditional food systems and the undermining of their attempts at autonomous bottom-up development, rural communities have increasingly become net food consumers dependent on occasional wage labor or governmental cash transfers. After decades of neglect, some are pleased to finally find economic opportunities – though not without concern. As locals are employed mostly in casual or seasonal low-skill occupations that are poorly remunerated (Favareto, 2019), others are less sympathetic about the trade-offs (see Table 7).

Besides the evident livelihood erosion and the local perception of increasing food insecurity, there may also be less apparent implications of Matopiba's ongoing transformation. For one, some interviewed experts suspect the shift from farming to grocery shopping may be having important but still understudied nutritional impacts (see also Bastos Lima, 2008). Gender impacts are apparent, too, and deserve further study. Local women engage in many traditional livelihoods and often lead the fledgling value-chain development initiatives; meanwhile, the wage work that soy creates reportedly goes mostly to men (Interviews). With their food sovereignty thus dismantled, most local farmers leave the land. Indigenous communities with fully titled territories, which under Brazilian law cannot be rented out or sold, may remain. Yet their fate becomes all too similar to many of their North Amer-

Table 6
Local interviews on impaired food access resulting from soy expansion in Matopiba.

Smallholder farmer 14	"My corns are not growing sufficiently. Some years they dry out still small. The rains are diminishing. If the rain fails to come for several days when it should come, our beans, corn and vegetables die, and then we are only left with Bolsa Família [governmental cash transfer] to buy food".
Smallholder farmer 15	"Previously we could go out to the bushes and collect fruits like bacaba, souari nut, cashew, extract honey from wild bees... There were plenty of native foods. Now, this is like a green desert."
Indigenous leader	"We indigenous peoples do not know how to solve this situation. The water springs have been contaminated; honey production has decreased because the bees are disappearing; the passion fruit plants no longer manage to produce fruits..."
Smallholder cooperative leader 01	"We are considering terminating the cooperative because it is becoming harder every day to find the native fruits we use as raw materials. Many areas where we used to collect them are now totally cleared for soy fields. That is disappointing because we have just been through all the licensing bureaucracy."
Smallholder cooperative leader 02	"We bought refrigerators, crushing machines for the pulps, gadgets to remove the pits; we organized the women to work with us in management and processing activities; we negotiated prices and transportation with nearby supermarkets and other small food processors; but now everything is failing because we simply can no longer find our inputs, the native fruits."
Municipal public official	"No-till soy farming, with genetically modified soy, uses glyphosate, which directly impacts the ones who want to work with fruit pulp. Passion fruit, papaya, vegetables and herbs – within a 1Km-radius, all these more sensitive plants are impacted by those herbicides. Some smallholder harvests, of beans, also suffer from the use of the herbicide nearby."
Smallholder farmer 16	"Three times they burnt out our cassava mills. Other times, when it was the season to harvest our vegetable gardens, they would come and smash it all with tractors."

Table 7
Local interviews on the impacts of soy expansion in Matopiba on food systems.

Smallholder farmer 17	"Deforestation has increased a lot with soy, but our income has improved a bit, something that previously we didn't have. Sometimes they take people here from the valley to do some work. At the end of the month, everybody has their money to go and do groceries in the city. It's what there is. But our freshwater is disappearing. We think that, if there is no care, we will soon be without drinking water."
Smallholder farmer 18	"I don't see any advantage for myself with the arrival of soy. In addition to removing our native fruits like souari nut, all the good jobs go to qualified people who come from outside."
Rural workers' union member	"Soy employs too little, pays too little, and large landowners profit a lot. [...]. In our region, they leave only holes, diseases and dust – and a meager salary."
Smallholder farmer 19	"Soy for them is important. They deal in dollars, but they do not put anything on Brazilians' tables. Milk, [cassava] flour... it all comes from smallholders. Their thing is earning dollars and pushing people to the streets. If they are God's children, so are we. Deforestation, water problems...their children will also suffer from this, it won't be only ours."

ican counterparts who retained the land but lost their livelihoods and food sovereignty (see Desmarais & Wittman, 2014; Coté, 2016).

As Matopiba's local communities are converted from prosumers into net food consumers, being effectively excluded from playing other roles in the food system, broader implications for regional and national food security remain poorly understood. Most staple foods in Brazilian and local diets (e.g., rice, beans, cassava, milk) come from smallholder agriculture (IBGE, 2019). As a local villager complains, *"Now these [foods] cost more, and we don't eat soy"* (Interview). In fact, soy has recently started to be imposed on schoolchildren in parts of Matopiba states (as elsewhere in Brazil), despite student resistance to it and reported increases in food waste as a consequence (Pitombo, 2019). Beyond local issues, the increasing dominance of a single crop may not bode well for Brazil's broader food system.

5.4. Exclusion from governance

Environmental destruction in the Cerrado has triggered numerous calls for landscape sustainability. Scientists have called for urgent action to conserve what remains of the ecosystem (e.g., Castro & Kauffmann, 1998; Klink & Machado, 2005; Sawyer et al., 2017; Strassburg et al., 2017; Cava et al., 2018; Vieira et al., 2018). Some have gone as far as asking for a moratorium on all soy expansion over native vegetation, akin to what already exists in the Amazon (see Soterroni et al., 2019). In 2017, over 300 Brazilian CSOs published a Cerrado Manifesto highlighting its socio-ecological values and vanishing cover.[3] Multiple international actors endorsed the document through a Statement of Support (Cerrado SoS) to step up sustainability in the region.[4]

However, vulnerable Cerrado stakeholders are neither adequately accounted for in public consultations by the government, nor are they being included in the emerging multi-stakeholder processes for landscape governance. Brazilian law requires prior stakeholder consultation for all major interventions in land-use planning, and formally there are grievance mechanisms that affected parties can resort to (Brazil, 2006). Nevertheless, most such processes in Matopiba do not go beyond forms of "tokenism," i.e., formal but politically innocuous participation that fails to meaningfully incorporate participants' views into public processes while giving it a façade of democracy (see Arnstein, 1969; Brooks, 2014). A Public Prosecutor's Office (*Ministério Público*) is also available to address social grievances, such as criminal harassment and land rights violations. However, few locals have either the knowledge or the means to take legal action. Even when such efforts are consequential, such *ex-post* measures often fail to repair human or ecological damages. They do not compensate for the lack of *ex-ante* public participation in policy processes.

Several multi-stakeholder forums such as roundtables have emerged to address a perceived governance deficit for Cerrado sustainability. The most prominent one has been the Cerrado Working Group (*Grupo de Trabalho do Cerrado*), composed of soy growers' associations, commodity traders, government actors, and environmental NGOs. It has added to various soy-certification schemes such as the Round Table on Responsible Soy (RTRS)[5], a global standard strongly present in Matopiba (Schouten et al., 2012). However, all these forums have been rather exclusive of local actors. They generally work under a limited agenda that balances soy expansion "needs" only against deforestation concerns and labor rights – for those few employed in soy farms (Bastos Lima & Persson, 2020). Most such forums reproduce the soy industry's discourse of development brought through modern agricultural expansion. They support

[3] See: https://d3nehc6yl9qzo4.cloudfront.net/downloads/cerradomanifesto_september2017_atualizadooutubro.pdf.
[4] See: https://www.theconsumergoodsforum.com/wp-content/uploads/2017/10/2017-Letter-of-business-support-for-Cerrado-Manifesto-CGF.pdf.
[5] See: http://www.responsiblesoy.org/wp-content/uploads/2018/09/RTRS-Products-Intro-ENGLISH.pdf.

legal compliance and the adoption of "best practices," but without examining social inequalities or other structural issues.

The soy agribusiness argues it promotes economic growth and regional development, and the voices who could counter-argue or add nuance to such a rationale are excluded. As a local CSO representative puts it, "*We would like to go there and say what is happening here in reality. But we have never been invited*." NGO participants claim that private companies fear being "unproductively" blamed by local communities. In turn, soy agribusiness representatives suggest that it is only worth partnering with "constructive" NGOs (Interviews). As a result, despite allegedly focusing on sustainable development, most such multi-stakeholder processes in the Cerrado have failed to be inclusive of – let alone responsive to – local actors and their demands.

Local stakeholders have primarily played a resistance role. Many traditional communities have developed a renewed sense of activated local identities in the face of mounting external pressure (Santos, 2019; Sampaio, 2019). Various grassroots rural social movements have also coalesced around broader efforts such as the Cerrado Network (*Rede Cerrado*)[6] or the National Campaign in Defense of the Cerrado (*Campanha Nacional em Defesa do Cerrado*).[7] They often are inserted in a broader peasant movement towards agroecological farming and food sovereignty in Latin America (see Altieri & Toledo, 2011). However, such alternative views remain marginal in most landscape governance for Matopiba. For practical purposes, mainstream forums implicitly subscribe to an approach of "there is no alternative" to soy for regional development (see Bastos Lima & Persson, 2020). Alternative development visions do exist and have been occasionally pursued, such as the initial attempts at value-chain development based on native Cerrado plants, yet soy-driven (mal)development and its impacts suggest Matopiba may not be big enough for both.

Table 8 synthesizes the key issues that expose the exclusiveness of this landscape transformation and (mal)development at play.

Table 8
Exclusion in Matopiba's soy expansion.

Domains of exclusion	*Key impacts from soy expansion*
Territorial exclusion	• Mounting agribusiness interest and financial assetization of land leading to dramatic price increases, speculation, and frequent forgery of titles to drive local communities off the land; • Smallholders harassed and forcibly evicted or bought out in the face of even more difficult recognition of their customary land rights; • Communities left with reduced infrastructure while facing increasing environmental impacts ("silent evictions"); • Grabbing of arable land and rising green grabbing of vegetated community lands by agribusiness seeking compliance with Brazil's Forest Code's conservation requirements.
Water exclusion	• Decreased water availability as native Cerrado vegetation is cleared for soy, hampering evapotranspiration, groundwater recharge, and negatively impacting the local climate (e.g., lower rainfall); • Lower riverbeds, drying creeks, and local water access further reduced in cities and villages as capitalized soy farmers pump rivers and groundwater to increase yields or adapt to climate change; • Enclosing of water sources, sometimes as part of green grabbing, restricting the physical access of local communities and threatening their water security; • Increasing agrochemical contamination of water supplies due to air-spray pesticide applications or runoffs from neighboring soy fields.
Food system exclusion	• Disruption of traditional farming and of local food systems due to the reduction of grazing or crop lands, vegetation clearing and the dying out native wild foods, and increased pesticide contamination; • Local value-chain development initiatives (e.g., small-scale fruit pulp factories) undermined by soy-driven environmental degradation, notably deforestation and agrochemical pollution; • Dismantled local food sovereignty as the communities who remain cease from being "prosumers" to become net food consumers and witness the erosion of their traditional livelihoods and food cultures.
Exclusion from governance	• Tokenism during formal public consultations by governments about Matopiba; • Frequent absence of local stakeholders and their perspectives in the multi-stakeholder forums discussing sustainable development for the Cerrado, leaving the structural issues and most impacts of soy unchecked; • Little attention to alternative, bottom-up pathways due to a soy-centric development agenda – implicitly as if "there is no alternative".

6. Discussion: Maldevelopment in Matopiba

This analysis of inclusiveness reveals that, while allegedly bringing "development" to Matopiba, the distribution of benefits and burdens from soy expansion has been highly skewed. If the literature had already exposed the region's growing economic inequality (e.g., Oliveira & Hecht, 2016; Garrett & Rausch, 2016; Martinelli et al., 2017), our findings detail how soy expansion has dispossessed, excluded, and further impoverished some of Matopiba's most vulnerable local actors. All three dimensions of inclusiveness (social, ecological, and relational) have fallen short. Legally or illegally, soy farming has wrestled natural resources away from their customary users on a vast scale. In a stark ecological exclusion process, agribusiness has steadily captured access to land and water in the Cerrado, engendering a large-scale reallocation of these resources to soy farming. With their basic access to natural resources often compromised, many locals have had no option but to migrate, usually to city slums (Pitta et al., 2017; Favareto, 2019). Rural emigrants form much of Brazil's notorious and swollen city slums (*favelas*). Soon without capital and likely unemployed, they routinely become exposed to multiple forms of economic, food, and physical insecurity (Penglase, 2014).

A key piece of the debate is Matopiba's previous "underdevelopment," frequently used to justify its recent and ongoing maldevelopment. Brazil's largest soy-growers association regularly refutes environmental critiques on such grounds (Aprosoja, 2019). Indeed, as of 1991, every single Matopiba municipality scored "very low" on the Human Development Index (HDI), which measures GDP, literacy rate, and life expectancy (Bolfe et al., 2016). As of 2010, nearly all municipalities had improved, particularly those that serve as hubs to the soy agribusiness – some even scoring a "high" HDI, although living conditions changed relatively little (Favareto, 2019).[8] Local communities often – though not always – share the perception that the region lacked (and lack) in development. Rather than a classic – and perhaps stereotypical – rejection of "development" as such, Matopiba's rural dwellers critique *how* it takes place. Some smallholders are simply nostalgic about the lost peacefulness, but most (even indigenous peoples) argue something has long been amiss. Instead of being "left alone,"

[6] See: http://redecerrado.org.br/.

[7] See: https://www.cptnacional.org.br/publicacoes/noticias/articulacao-cpt-s-do-cerrado/3557-voce-ja-conhece-a-campanha-em-defesa-do-cerrado.

[8] The most significant change has been sometimes ten-times larger urban populations than before, which interviewed municipal authorities occasionally regard as evidence the city has "evolved" (Interviews).

Table 9
Contrasting perspectives over development in Matopiba.

Large-scale farmers' association (Aprosoja, 2019)	"Twenty years ago, without soy production, the municipalities in the region called Matopiba found themselves in a situation of extreme poverty. There was no access to infrastructure, few houses were made of brick and mortar, and there was no offer of basic goods and services to the population. [...] Were it not for the [soy] farmers who are there, there would be no development model being adopted for the municipalities of the region."
Indigenous leader	"The development we see is for a group of people. The indigenous communities remain there, not developing one bit. What you see there is more a regression, loss of knowledge, changes of habit... While a small group develops, the vast majority does not follow. [We see] major deforestation, and we do not develop. Our view of quality of life is well-being in nature and in the family. It is to live 100 years. It's not money. For others, it's to have great wealth and, if you have to dry up a river, so be it. [...] Development must be according to the local people, not something imposed from above."
Multinational soy trader representative in Brazil	"We are engaged with ending deforestation, but we can't take such a decision [for a moratorium on Cerrado conversion] without hearing those people who currently depend on soy or those who are looking forward to it finally arriving there bringing wealth."
Smallholder farmer 20	"I am 60 years old, and I am the third generation on this land. Now our areas have diminished. We no longer have access to raise what we raised. The Cerrado fruits, used in our diets and natural medicine, now there is very little left. [...] I am trying to raise my seven children in the tradition in which I was raised, but it's very difficult today because everything has been reduced."
Smallholders' association leader	"I am against this Matopiba thing. We don't have the health we should have here in the countryside. We just want peace. Now, 40–44 [Celsius] degrees of temperature – it's too much, also from deforestation. In the afternoon, you're no longer able to work."

many would rather see bottom-up inclusive development based on their values and preferred ways of living. That reasserts the core importance of inclusiveness to development. Notwithstanding the undeniable political and financial thrust behind soy expansion, a state of legal and economic neglect may indeed have made Matopiba vulnerable in the first place. Not only legally and materially vulnerable to forms of "grabbing" and dispossession, but also to the argument that the soy sector brings to the region what it never had – and that critiques or environmental demands, therefore, are unwarranted or even unthoughtful (see Table 9).

Using development as justification for self-serving intervention could not be more classic, as Matopiba is framed as an underdeveloped region calling for the arrival of progress. Its previous land uses, livelihoods, or access regimes are all made invisible or irrelevant. Yet rather than alleviating poverty – or "lightening the burden of the poor," as Truman's 1949 speech would have it – soy expansion has burdened locals further with intensified land grabbing and environmental deterioration. Far from "a process of expanding the real freedoms that people enjoy" (Sen, 2000, p. 26), Matopiba has been a story of taking freedoms away. It has robbed local communities of what they had while offering little in return, given the exclusiveness of both the soy sector and the mainstream conversation about Cerrado sustainability. Such lack of local participation aggravates community disempowerment and disenfranchisement even further, as their ecological and socioeconomic exclusion is not even acknowledged as an issue.

Moreover, as alternative development projects perhaps more suited to local needs are not discussed, a false dichotomy between conservationists and those who favor development becomes established. This dichotomy also allows the soy agribusiness to manipulate and undermine the communities, as it frames itself as legitimately pursuing regional development needs – indeed as the only way forward conceived. Stolen freedoms are synthesized in the locals' disabled capacity to reproduce their very social identities and ways of living, meaning that, to some, the transformations in Matopiba have resembled not so much development but more of a dystopia.

7. Conclusion

This article defines maldevelopment as an inequitable process of change that worsens local people's material and social capabilities. Its analytical framework combines the Anna Karenina principle (stating that deficiency in any core aspect means overall failure) with three key dimensions of inclusiveness: relational, ecological and social. Relational inclusiveness secures broad stakeholder participation in governance, enabling previously marginalized voices to be heard. Ecological inclusiveness can safeguard equitable access to natural resources and allocation of risks. Finally, social inclusiveness supports the fair distribution of economic activities' outcomes. We argue that, although development may remain a disputed concept, inclusiveness is critical for achieving all the goals commonly associated with it, such as overcoming deprivations, meeting basic human needs, expanding freedoms for the majority, or promoting the fair distribution of benefits and burdens across different social groups. The absence of inclusiveness, in contrast, leads to systematic resource dispossession and the disenfranchising of local actors.

In this regard, the mainstream claim that industrial monocultures may be unsustainable but promote development deserves far greater scrutiny. Our analysis exposes the fallacy of public and private actors' lip service to the narrative of "development" often used to legitimize agricultural frontier expansion. The application of our framework to analyze soy expansion in Brazil's Matopiba reveals how it fails in its pursuit not only to bring about sustainable development, but development altogether. In a pattern that resonates with other agricultural commodity frontiers (e.g., oil palm in Indonesia, cocoa in West Africa), narrow market demands dictated by external actors drive the transformation of diversified landscapes into monocultures (see Bastos Lima & Persson, 2020). While some may benefit, most rural dwellers in Matopiba become deprived of access to vital resources, such as food and water. They further have their rights and livelihoods hampered and are excluded from decision-making instances, such as landscape governance forums.

We argue that such processes can be characterized as maldevelopment because, instead of resulting in the betterment of living conditions for the majority, they lead to concentrated power, income, land and other natural resources in the hands of a few. Matopiba might be even worse than some of its counterparts because, unlike those other crops such as cocoa or oil palm, the soy supply chain neither offers significant rural labor nor room for smallholder inclusion. Instead, soy expansion is a violent process of smallholder dispossession coupled with the "deagrarianization" of those who remain, i.e., diminishing agriculture-based livelihoods and lowering food self-sufficiency (Bryceson, 1996). To a large extent, communities are socially and physically erased from the landscape together with the native Cerrado vegetation.

Therefore, maldevelopment arguably is worse than unsustainable development, which would suggest at least some short-term improvements to be balanced against longer-term considerations. As a critical concept, it helps to question development claims directly, without necessarily referring to sustainability. Thus, it prevents critiques from being dismissed in the name of supposedly meeting people's immediate needs. Our critique does not disavow the pursuit of development in Matopiba. It instead helps diagnose

what needs to change and may pave the way for more inclusive and beneficial alternatives to local populations. Breaking away from the false dichotomy between either soy plantations or a pristinely preserved Cerrado without human presence is fundamental. Matopiba's communities themselves give examples of development paths that address local needs while supporting ecosystem conservation, such as value-chain development based on native Cerrado fruits and other sustainably harvested products. A singular focus on soy expansion currently hampers these efforts.

Greater practical recognition of land and water rights and smallholders' roles in the food system is key to bringing about change. Similarly, having grassroots organizations and other local stakeholders in Cerrado landscape governance is vital. Such approaches can help prevent maldevelopment as much as support novel strategies that combine sustainability and inclusiveness imperatives. Only with alternative development pathways and a seat at the table can local communities effectively transcend from being passive subjects vulnerable to the effects of any intervention to becoming main agents of initiatives in their landscape. Further research may explore how such bottom-up alternatives could more effectively prosper in Matopiba. Specifically, analysis into the potential of external pressures, such as those from soy consumer regions and governmental regulations, to transform development pathways in Matopiba from one of driving exclusion to supporting inclusive development is timely.

CRediT authorship contribution statement

Gabriela Russo Lopes: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing. **Mairon G. Bastos Lima:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing. **Tiago N.P. dos Reis:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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