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# Brazil's Beef and Soy Moratoria on Deforestation: Lessons from Supply Chain Governance in the Amazon

Lisa Rausch

Holly Gibbs



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### **CONTACT**

Food System Economics Commission  
contact@fsec.org



# Brazil's beef and soy moratoria on deforestation: Lessons from supply chain governance in the Amazon

## **Abstract**

Brazil's Amazon Soy Moratorium (ASM) and Zero-deforestation Cattle Agreements (CA) have helped increase supply chain transparency and monitoring across the Amazon though the impacts on forest conservation have been mixed. Because the ASM and the CA have been in place for more than a decade, they offer an unparalleled opportunity to understand the conditions in which supply chain governance can emerge and persist. Here we interrogate the development of these agreements as well as their actual and perceived outcomes and offer lessons for the governance of commodity production in Brazil and elsewhere. Our assessment indicates that several factors aligned to support the ASM including simultaneous and cooperative commitment and implementation by a highly consolidated market, straightforward monitoring of suppliers, and relatively low demands for producers. Brazil's cattle sector, on the other hand, must contend with a less consolidated market, more complex supply chains that require company-specific monitoring efforts that go beyond easily accessible data, and a higher bar for farmers to be compliant. Regardless of current challenges, both policies have led to durable and significant changes in Brazil's, and indeed the world's, forest conservation policy landscape.



## Introduction

Soybeans and beef “forest risk” commodities due to their links to deforestation around the world. In Brazil’s Amazon biome, their production is subject to supply chain policies implemented by traders, which aim to reduce the role of soy and cattle in perpetuating deforestation. These policies include the Amazon Soy Moratorium (ASM) which was implemented in 2006 and places limits on the purchase of soybeans from land in the Amazon biome that has been cleared since July 2008, and the Zero-Deforestation Cattle Agreements (CA), which require cattle supplying properties to be free of deforestation after 2008. Since 2006, deforestation linked to soy production has plummeted in the Amazon, leading to the perception that the ASM has been successful, while deforestation linked to cattle production continues to be widespread, suggesting the CA have been less successful (Jusys 2016, Tabuchi 2017). Examining the development of these deforestation moratoria can offer important lessons for the governance of commodity production in Brazil and elsewhere.

A growing body of scholarly work has endeavored to assess the moratoria outcomes and to document overall shifts in the governance of commodity production, but few efforts documented the relational dynamics of policy development in this context. For example, many accounts of environmental policies in the Brazilian Amazon, including the ASM and the CA, have sought to quantify their efficacy on reducing deforestation (Silva Junior & Lima 2018; Assunção et al 2015; Heilmayr et al 2021; Gibbs et al 2015, 2016; Rudorff et al 2011; Gollnow et al 2018; Amaral et al 2021; Azevedo et al 2016). Others described the evolution of the policy landscape to include those operating along supply chains in the Amazon or more broadly (Nepstad et al 2014; Boucher et al 2013; Lambin et al 2018) or have documented the emergence of key political and social relations that supported the development of a more inclusive environmental governance (Keck & Sikkink 1998; Barbosa 2015). Rarer are studies that document the complex of actors involved in specific environmental governance arrangements. An exception is Thaler (2017), who drew from scholarship on coalition theory and governance studies to examine the emergence of various overlapping policies and projects aiming to control deforestation in parts of the Brazilian Amazon, differentiating them from efforts in other parts of the Amazon and other time periods, which focused on enclosure of pristine areas and did not feature engagement with the agricultural actors that are most directly responsible for the clearing in this region. While claiming to describe the interactions among an “assemblage of actors, institutions,



practices, and discourses centered on a fraction of agro-industrial capital”, ultimately, Thaler focused on Brazilian government agencies and institutions and one aspect of the work of a single civil society organization without fully exploring the larger context of interest groups, institutions, ideas, and material realities. A few studies have more directly engaged with the growing role of non-governmental organizations (NGOs) in broader policymaking and governance processes in the Amazon and beyond (Brannstrom et al 2012; Hospes et al 2012), including with regard to the ASM, though the CAs have been absent from most of these accounts.

This paper explores how the ASM and the CA emerged and have been maintained for over a decade in the Brazilian Amazon by considering the assemblage of political economic and material dynamics that led to their emergence, guided their evolution, and contributed to their persistence. We first describe their evolution and outcomes based on a review of both academic and informal literature. We then compare the ASM and the CA to draw lessons for the potential for similar environmental governance of other commodities and in other geographies based on factors highlighted by our political economy framework. We explore the importance of both socio-political and material realities reflected in institutions, motivating interest groups, and shaping ideas about the governance of commodity production in the Brazilian Amazon to reveal key political-social arrangements and materialities that have contributed to the similarities and differences between the two agreements.

## **Background**

### *Agricultural Production in Brazil*

Brazil is one of the world’s great agricultural powerhouses. Prior to the 1960s, agricultural development in Brazil was centered on family-run farms mainly in the country’s south and northeast but beginning in the 1960s, migrants from these regions began to move into the western parts of the Cerrado as well as into the Amazon in search of more lands to use for farming and ranching (**Figure 1**). Since the 1980s, agriculture in the Amazon has expanded rapidly. Today, most agricultural area is used for cattle ranching (64%; 49 Mha) or soybeans (7%; 5 Mha), and takes place on farms that average 165 ha, though the distribution of farm



sizes has a long tail and both ranches and soybean farms may be thousands or even tens of thousands of hectares in size (Mapbiomas 2022; IBGE 2017; **Figure 2**). Production of other crops like cotton or corn occurs primarily in a double cropping regime on farms that are also used for soybean production, due to the high returns offered by soybean relative to other crops.

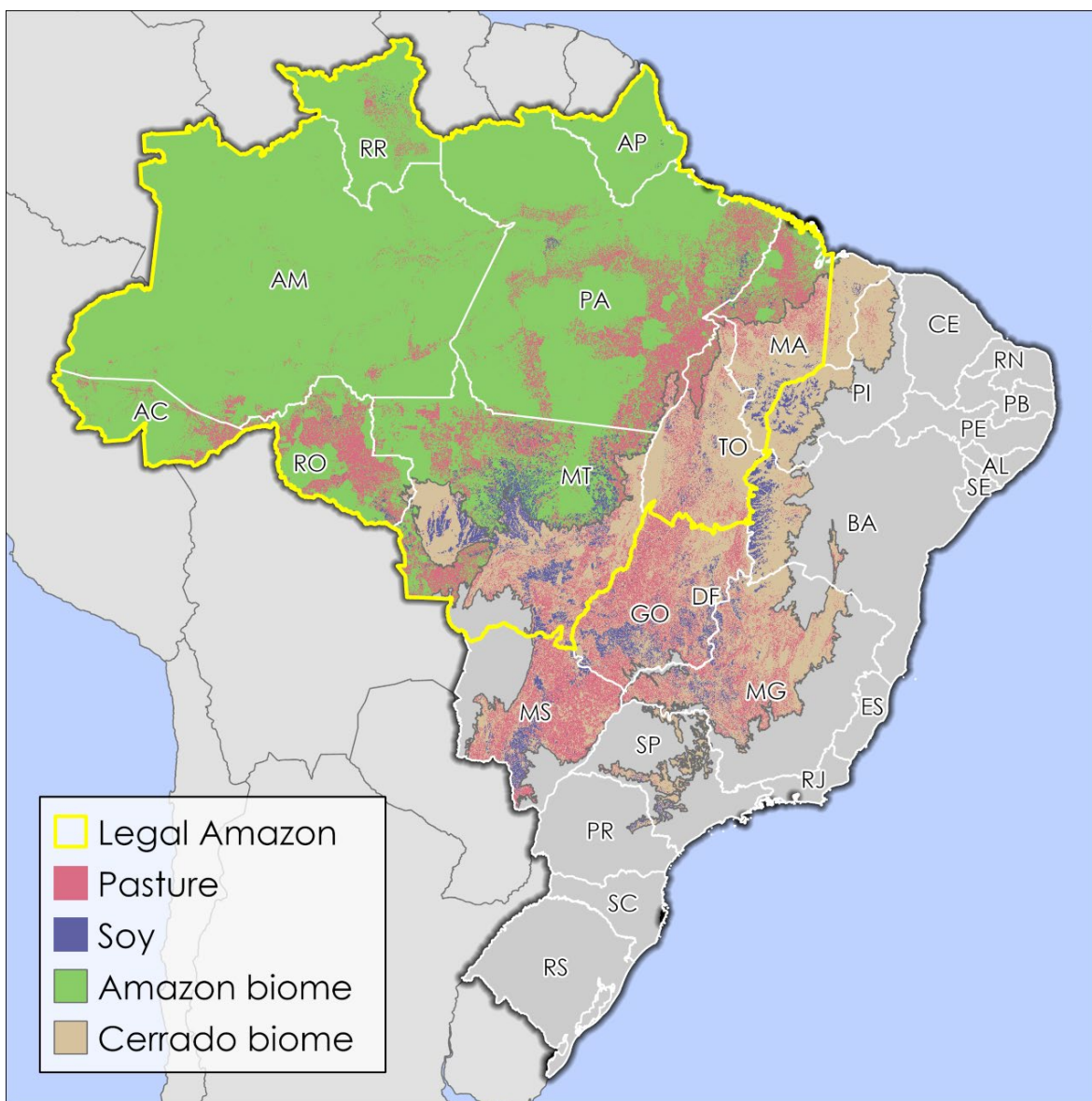


Figure 1: Brazil's Amazon and Cerrado biomes, where most recent agricultural expansion has occurred.

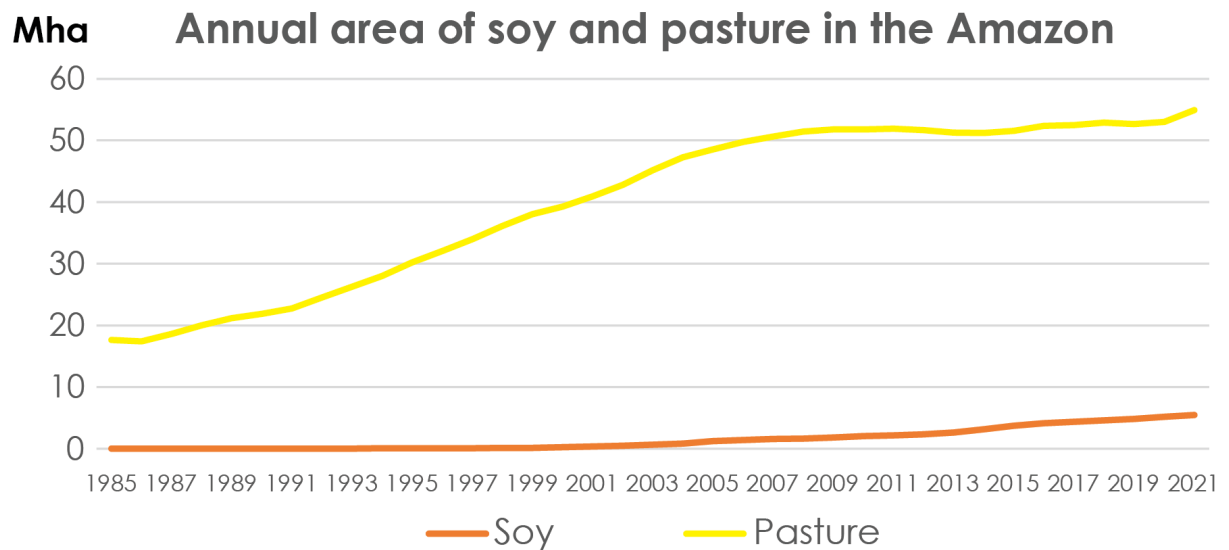


Figure 2: Annual area of soy and pasture in the Amazon biome (Mapbiomas 2022)

A typical land use progression in the Amazon might involve clearing and burning forest for pasture lands, which are managed with fire and low intensity grazing (Nepstad 2001). Once the soils are depleted, the rancher may sell the land to a soy farmer who amends the soil for agriculture, though forests were sometimes cleared and planted directly to agriculture in the past. The soils in the Amazon are acidic, so farmers today typically apply lime, while in the past they planted rice as a first crop to prepare the soil for soybeans (Brown et al. 2005).

Because soy and cattle production emerged in the Brazilian Amazon relatively recently, local traders and processors did not establish a significant presence before the arrival of national and international companies. This contrasts with other regions in Brazil such as the Cerrado and the south, where a longer history of development and proximity to major population centers led to the establishment of smaller and more local or regionally oriented processing facilities (Rausch et al. 2019; Vale et al 2022). The specialization of the Brazilian Amazon's agricultural sector in the commercial production of two main crops, plus general orientation of the sector toward value chains reaching well beyond the Amazon region are distinguishing characteristics that supported the eventual development of the ASM and the CA (Nepstad et al 2006; Walker et al 2013; Garrett et al 2013).



## *Brazil's Environmental Policies*

In response to increasing rates of deforestation in the early 2000s, a broad set of policies was adopted by the Brazilian government to reduce deforestation (Nepstad et al. 2014). The government interventions created new protected areas, introduced stronger penalties for illegal deforestation, and increased levels of enforcement and monitoring including the annual and monthly deforestation data from the PRODES and DETER projects, both published by Brazil's national space agency, INPE. Many of the interventions stem from the 2004 "Plan for the Protection and Control of Deforestation in the Amazon" (PPCDAm) which facilitated coordination across ministries including the federal police and public federal prosecutors' office (Ministério Público, or MPF) to tackle deforestation in a multifaceted way.

At the core of Brazil's policies is the Forest Code (FC), which places legal restrictions on forest clearing on private lands. The FC, which first became law in 1965, currently requires that 80% of a property located in the Amazon biome is managed as a forest reserve (*reserva legal*, or LR) (Brazil 2012). The LR requirement is lower outside of the Amazon biome (20%-35% depending on the location). Current compliance with the FC in the Amazon is very low, with roughly 3% of registered properties having intact on-property LRs (Skidmore et al. 2020; Azevedo et al 2017).

Enforcement of the FC is largely based on data from DETER and PRODES, as well as field investigations. In cases of illegal deforestation, properties can be fined or embargoed. Embargoed areas are added to a public list, and it is illegal for production to continue in embargoed areas; the ASM and the CA prohibit market access for these properties entirely.

Geolocation and mapping of properties, which is needed to estimate the areas of legal reserves and identify responsible parties, was previously a major challenge for FC enforcement but has been largely overcome in the last decade. The Rural Environmental Registry [Cadastro Ambiental Rural (CAR)] requires landholders to submit their property boundaries to the state environmental regulatory agency, which opens the door for assessing FC compliance by measuring the area of Legal Reserve and linking this information to a landowner, allowing monitoring to occur at a distance using both DETER and PRODES. The national CAR system (SiCAR) now boasts near complete coverage





(Roitman et al 2018). The CAR is self-reported, however, pending ongoing and slow-moving validation by state authorities, and does not confer land rights.

PPCDAm also helped establish an extensive network of protected areas, which includes both conservation units and indigenous reserves, and now covers nearly half of the Brazilian Amazon region including parts of the agricultural frontier. While conservation units and indigenous lands have historically contributed to conservation in the region (Jusys 2018; Pfaff et al. 2015; Soares-Filho et al. 2010), they are still subject to encroachment, leading to forest loss and fragmentation, often associated with cattle ranching (Cabral et al. 2018; Klingler et al. 2018; Kröger 2020; West et al 2022). This ongoing conversion process within PAs can also ultimately lead to downgrading, downsizing, or degazettement (Keles et al. 2020).

These public institutions and policies, such as the CAR property registries, the FC, and deforestation monitoring, created a foundation that has supported the emergence of supply chain agreements and private sector governance (Brown & Koeppe 2012). Previous work highlighted the importance of alignment among key aspects of public and private governance in helping to address the commodity-driven deforestation in the Amazon (Heilmayr et al. 2020, Lambin et al. 2014, 2018, Garrett et al. 2019).

### *Supply Chain Agreements & Private Sector Governance*

The fundamental links between the environment and economic development have long attracted interest from diverse groups to shape its governance. Although coordinated efforts among NGOs and other global organizations to increase governance in the Amazon originally focused on the rights of indigenous groups and other communities like the rubber tappers that depend on the forest for their livelihoods (Keck & Sikkink 1998), around the turn of the 21st century, academics and environmentalists began to sound the alarm on the increasing environmental impacts of soy and cattle production in the southern Amazon.

Since then, the importance of reducing deforestation has gained increasing attention, including billions of dollars committed to support forests by the private sector, increasing focus by NGOs on the commodity and finance sectors, and dozens of new zero deforestation commitments (ZDCs) and several new collective action initiatives announced at the COP26



Climate Conference. These commitments span the major forest-risk commodities, with emphasis on palm oil, cattle, and soy, and have increased public awareness, led companies to hire sustainability officers, and spurred significant improvements in traceability and monitoring. However, in most cases, their pathway for implementation is unclear, their scope is too narrow, and leakage is too high to significantly reduce deforestation (Lambin et al 2018; Garrett et al 2019).

The Brazilian Amazon has been a test bed for ZDCs — the location where traders, governments, and NGOs have taken the most coordinated action on deforestation in the soy and cattle sectors. Beyond being ZDCs, both the ASM and the CA are supply chain agreements, supply chain initiatives, or examples of supply chain governance (Lambin et al. 2018). The term supply chain agreements describes the focused application of requirements stemming from company commitments, which may be compelled by sectoral commitments or federal and state laws, as a contingency for relationships that make up all or part of a supplier network. Both the ASM and the CA act via market exclusion mechanisms whereby farms with non-compliant production are not permitted as suppliers.

## **Theoretical Framework**

### *The Three “Is” of Political Economics*

Supply chain policies like the ASM and the CA are one potential outcome of efforts to manage and shape activities like agricultural production, land use decisions, and sourcing strategies. Because the ASM and the CA have been in place for more than a decade, they offer an unparalleled opportunity to understand the conditions in which supply chain governance can emerge and persist. To guide our analysis, we briefly review the so-called “3 Is” (*Interests/Interest Groups, Institutions, and Ideas/Information*) which are concepts that are frequently utilized by political economists to characterize policy development processes. Other factors such as material elements — the commodities being produced, the landscapes in which they are produced, and even the technologies available for monitoring — as well as the existing institutional framework also influence policy development.

Political economists often emphasize the role of interest groups in policy making. Seen as discreet but not necessarily formalized entities that unify the voices of individuals around particular issues, interest groups may act as intermediaries between individuals and



governments (Potters & Sloof 1996) or to fill gaps in policy spaces where state-led governance is lacking, a scenario which has become increasingly common around issues related to environmental conservation and food systems (Roberts 2011; Mol 2015; Berny & Rootes 2018). Typically, various interest groups will engage on any given issue, if not spontaneously, then as the work of the initial interest group develops and more attention is called, creating opportunities for collaborative or adversarial positioning among different groups (Aamodt 2018). Ultimately, interactions among interest groups help shape both policymaking and policy outcomes.

The institutional context(s) in which a policymaking effort is situated may create both opportunities and constraints for the ultimate design or evolution of the policy. Institutions, which political economists define as the formal and informal rules, practices, and organizations (agencies, etc.) that exist across issue domains (Volger 2003). For example, Brazil has formal but somewhat poorly enforced private property rights regime given notoriously high rates of title fraud and land conflicts, a federal Forest Code that specifies the protection of native vegetation on privately held properties, and structured supply chains for most agricultural products, including soy and cattle, due to various licensing requirements in those sectors. Even when and where the policymaking efforts that resulted in the ASM and the CA did not include the formal participation of the state, these and other institutions were necessary considerations for policy design and, indeed, the choice to even attempt to modify the governance of soy and cattle production (Brown & Koeppel 2012).

A third concept that is useful for the analysis of policy creation includes the ideas and information that may emerge or evolve throughout the policymaking process. Ideas and information may include fundamental views held by individuals or groups, such as concerns about justice, equity, or a privileging of market preferences over other positions, as well as knowledge about components of the issue for which improved governance is sought. Indeed, creation of new knowledge and dissemination of this knowledge through media and other public channels, as well as private exchanges, is a key strategy that interest groups frequently use to forge alliances and overcome opposition (Haspari 2008). Formulation of ideas and provisioning of information is also a key aspect of engagement with the material elements of the issue being addressed, such as, in the case of the ASM and the CA, agricultural suitability, the spatial scales of production areas and of properties, and available modalities of transport between different nodes in the value chains. For example, soy is a



quintessential “food from nowhere” (McMichael 2009; Campbell 2009), as a major but invisible ingredient in many processed foods for which the links between actors in its long and sometimes spatially diffuse supply chains are impossible or extremely difficult for the ordinary consumer to ascertain. Beef, however, is less of a hidden commodity because it is consumed directly in most cases. Regardless, a major component of the efforts behind the design and implementation of both moratoria included the development and spread of knowledge about the commodities’ links to deforestation, and about their pathways from farm to consumers (Greenpeace 2006a; Greenpeace 2009a; MPF 2009).

### *Assemblages and Complexes*

Beyond the recognition of key socio-political components that shape policymaking, it can be useful to consider the dynamics of their assemblage in the course of policymaking. Utilization of the concept of an “assemblage” or “complex” can make two specific contributions to the analysis beyond the conventional political-economic approach described above. First, assemblage thinking refocuses the frame of analysis to include the process by which actors and other elements of the governance process assemble and are assembled around a particular issue, rather than result in terms of the nature and outcomes of the policy that is ultimately created (DeLanda 2006). Second, the role of material aspects of the specific governance process, including natural processes, can more easily be incorporated within this framework, which is not exclusively focused on the outcomes of human agency and permits the recognition of socio-material relationships (Córdoba et al 2022). These are two key advantages given our interest in the governance of the production of commodities and their resultant land use under policies that continue to persist while frequently being modified and remade.

The process of assembling and of disassembling, is salient to the understanding of both the ASM and the CA, which have passed through multiple phases as the interests of different actors have shifted and as knowledge about the production of each commodity, and, indeed, the nature of the production, have changed. For example, the recession of Europe as a major market for Amazon soy as well as dramatic reductions in deforestation for soy production and the changing trends in deforestation through time have at times challenged the persistence of the ASM, while new actors have come into play as the US and EU develop trade policies that aim to avoid importing agricultural commodities linked to deforestation



and the roles of original actors have evolved. In the case of the CAs, the relationships between the MPFs and some NGOs and the slaughtering companies have shifted from being adversarial to largely cooperative, and the focus of the CA is beginning to expand from establishing monitoring suppliers that sell directly to slaughterhouses, to those that sell indirectly, as technical solutions emerge. Indeed, some of these changes can be attributed to the influence of the policies themselves, while others have arisen external to the core complex of the respective policy, resulting in reconfigurations in the policies and their implementation, and in the nature of the assemblages, at times weakening or strengthening them dependent on the context.

## **The Amazon Soy Moratorium**

### *History and context*

By the mid-2000s, deforestation in the Brazilian Amazon was at record levels and was increasingly recognized as being closely linked to the production of cattle and soybeans in response to growing market demand (Barona et al. 2010). In April 2006, the Greenpeace published a provocative report entitled *Eating up the Amazon*, which documented the role of soybean production in Amazon deforestation and placed the blame on Cargill, as well as other leading traders like Bunge and Archer Daniels Midland (ADM), for their role in both buying and financing soy linked to deforestation, and on European processors and retailers such as McDonald's and Burger King for turning a blind eye (Greenpeace 2006a). A second report, focused specifically on the role of McDonalds in deforestation related to soy expansion in the Amazon (Greenpeace 2006b). These reports sparked a flurry of high-profile media coverage (Butler 2006), and their release was accompanied by non-violent protests at McDonalds and other outlets in the UK and, a few days later, at an Amsterdam port where soy shipped by Cargill from the Amazon was arriving (Eisenberg 2013).

Within hours of the protests, McDonalds agreed to cease the use of soybeans sourced from the Amazon in its Chicken McNuggets in Europe, a practice highlighted in the Greenpeace report. Similarly, Cargill released a response in May 2006 claiming that the role of soy in Amazon deforestation was less than suggested by Greenpeace, but also pledged to ensure that all suppliers met the legal requirements set out by Brazil's FC moving forward (Boucher et al. 2013; Barbosa 2015) This was a major step forward, but Greenpeace was not satisfied



and increased its pressure on Cargill by organizing protests at the company's port in Santarém and at other Cargill locations internationally over the course of the next couple of months (Eisenberg 2013).

After two months of negotiations between Cargill and Greenpeace, a critical mass of soybean buyers and processors represented by the Brazilian Association of Vegetable Oil Industries (ABIOVE) and the National Association of Cereal Exporters (ANEC) announced a moratorium on purchases from any newly deforested farmland in the Brazilian Amazon beginning on June 24, 2006 (Boucher et al. 2013). The pledge eventually became known as the "Amazon Soy Moratorium" and was initially agreed for a period of two years but was subsequently renewed several times until it was finally declared "indefinite" in 2016 (Greenpeace 2016).

#### *Development and Implementation of the ASM*

The institutional arrangements for governance under the ASM are managed by the "Soybean Working Group" (Portuguese acronym, GTS). Early members of the GTS included international and local NGOs such as the World Wildlife Fund, The Nature Conservancy, The Institute for Amazonian Research, Conservation International, Greenpeace, the Amazonia Defense Front, Articulação Soja Brasil, as well as ABIOVE and ANEC, which represented major traders like Cargill, Bunge, Archer Daniels Midland, and Amaggi (Brown and Koeppe 2012, Abiove 2007). GTS membership has evolved somewhat since its inception, as described below. According to a report published following the first year of the ASM being in force, the GTS tasked itself with two goals: developing a governance structure for the "responsible" production of soy in the Amazon Biome to "disincentivize deforestation" and to respond to the growing concern of customers of member companies about the conservation of the Amazon (Abiove 2007).

The GTS divided its work among three different subgroups: Mapping and Monitoring; Education, Information and FC; and Institutional Relations. Of these, the work of the Mapping and Monitoring group has been the most obviously consequential. This subgroup set technical criteria that defined the ASM, including the spatial scope of the monitoring efforts (the most current definition of the Amazon biome published by IBGE) and the initial use of PRODES 2007 (start date August 2006) as the forest cover baseline to identify



deforestation (Abiove 2007). The Education, Information and FC subgroup promoted knowledge about making soy more productive and sustainable to farmers, such as overviews of legal obligations including environmental registration and FC compliance (Abiove 2007). The Institutional Relations subgroup focused on seeking the support of the government for sustainable agriculture, including unspecified improvements to legislation, increased FC enforcement, development of a strategic plan for the Amazon to generate both jobs and conservation benefits, as well as actual participation in the ASM by the government (Abiove 2007). Over time, the GTS also took on the annual production of a “blacklist” of farms identified as violating the ASM by the monitoring efforts, which traders use to avoid buying soy from non-compliant farms.

In 2008, the GTS hired a consulting firm to conduct a pilot study for assessing areas of new deforestation planted to soybean in three Mato Grosso municipalities (GlobalSat 2009). The results showed no soybeans grown in the surveyed regions. Based on this success, GlobalSat published the results of more widespread monitoring in a second report, and the process became an annual exercise resulting in annual reports.

This second GTS report included the first presentation of the monitoring approach. Some of the key features include the use of official data sources such as IBGE agricultural surveys to limit the scope of the monitoring to focus on key soybean production regions (indeed, at no point in its history has the GTS attempted to or claimed to do an exhaustive survey of soybean production in the Brazilian Amazon); establishment of a minimum threshold for deforestation patches that would be assessed for soybean using satellite data and flyovers (eventually the flyovers were supplemented with field visits and, as of more recently, the analyses are based only on satellite data); and the inclusion of subsets of data that go beyond the stated guidelines for assessment (in this case, the assessment of polygons <100 ha in the three pilot municipalities) (GlobalSat 2009). Later changes involved the adoption of CAR records to identify owners of non-compliant farms and a change in the cut-off date from July 2006 to July 2008 to align with the 2012 FC updates. Indeed, a notable feature of the ASM is the continual evolution of monitoring methods although the fundamental approach has remained consistent.

The 2009 GTS report also announced the support of Brazil’s Ministry of the Environment (MMA) for the ASM which had been formalized at the agreement’s renewal the previous



year. This support signaled that the initiative would have longevity and marked the conversion to a public-private partnership (GlobalSat 2009; Brannstrom et al. 2012; Hospes et al. 2012). However, as alluded to above, even prior to this endorsement, the ASM aligned with and utilized government data and policies whenever possible to increase its credibility (GlobalSat 2009). INPE took over the lead role of monitoring under the ASM when MMA signed on, but this quickly shifted to a private firm, Agrosatélite, which was co-founded by the lead analyst for the monitoring effort at INPE. Banco do Brasil, the national bank in Brazil and conduit for a massive portion of Brazil's agricultural financing, signed on in 2010 (Barbosa 2015), which further secured the ASM's position as a public-private governance initiative.

### *Outcomes of the ASM*

Overall, the ASM has been widely viewed as successful, in terms of its reduction of deforestation in the soy supply chain, its acceptance by major stakeholders, and its longevity (Brannstrom et al. 2012; Meijer 2015; Gibbs et al. 2015; Boucher et al. 2013; Kastens et al. 2017; Abiove 2020; Heilmayr et al. 2020). Annual reports have consistently shown low levels of violations in terms of total deforested area planted to soybean and number of properties with noncompliant plantings. Various studies have found that deforestation and soy expansion became “uncoupled” (Macedo et al. 2012), that deforestation for soy decreased (Gibbs et al. 2015; Kastens et al. 2017), and that deforestation in soy producing regions decreased following the ASM (Kastens et al. 2017). Indeed, recent research shows that the ASM was responsible for sizeable reductions in the overall deforestation rate in the so-called Arc of Deforestation region in the southern and eastern Amazon (Heilmayr et al. 2020, Gollnow et al. 2022). While the ASM does not prohibit deforestation *per se*, but rather, prohibits the use of recently cleared areas for soy, this reduction in deforestation suggests that the ASM contributed to reducing the value of recently deforested areas by removing one of the main pathways for profitable land use following deforestation.

However, loopholes and opportunities for leakage remain, as the ASM does not ascribe any consequences for clearing and planting commodities other than soy on soy-producing farms and there are some soy buyers that do not participate in the ASM, though the amounts that they buy are thought to be small (Rausch & Gibbs 2016; Silva Junior & Lima 2018). Some studies have alleged that the ASM has caused leakage of increased soy production





(Moffette & Gibbs 2021) or of deforestation to the Cerrado (Dou et al. 2018), though evidence of this has not been found at biome-wide scales (Heilmayr et al. 2020).

A key factor in the ASM's success is that compliance is relatively easy for farmers in established soy production regions. This is because the ASM applies only to soy fields, not to the entire farm, meaning that deforestation on other parts of the farm not for soy purposes does not render the farm non-compliant (Gibbs et al. 2015). Deforestation in the main soy-producing regions of the Amazon was so widespread prior to 2008 that most farms have areas on or nearby to their farms that they can expand their soy fields onto without violating the ASM, and few soy farms have forested areas suitable for soy (Rausch & Gibbs 2021). Thus, most deforestation avoided under the ASM likely occurred on properties not yet incorporated into the soy sector by reducing incentives for speculative clearing, meaning that many of the costs of the ASM are passed off to would-be deforesters largely outside of the soy sector. Indeed, the ASM may have reduced the demand and price paid for land cleared prior to 2008 since it can no longer be sold as profitably.

The ASM has also served as a conduit for a political and symbolic convergence of groups with varied objectives and interests from NGOs to soy trading companies to government agencies. However, in some cases, the convergence was not durable. For example, the Associação dos Produtores de Soja (Aprosoja) initially came out publicly in support of the ASM in 2006 while simultaneously criticizing the integrity of Greenpeace (Barbosa 2015), but the group ultimately positioned itself against the agreement on the grounds the ASM prevented deforestation that was permissible under the FC (though as mentioned above, the number of such farmers was very small). Another farmer advocacy group, FAMATO (Federação da Agricultura e Pecuária do Estado do Mato Grosso) was publicly opposed to the ASM from the beginning on these same national sovereignty grounds (Barbosa 2015). Regardless, the active partnerships that the ASM fosters between NGOs and soy companies have proven to be powerful and durable.

Perhaps one of the most important impacts of the ASM has been the way that it has contributed to a culture of collaboration even among groups with naturally adversarial positions, fundamentally changing terrain of governance of commodity production and forests. For example, companies like Amaggi that were openly hostile to environmentalist concerns have transformed their production practices beyond the ASM requirements to



cater to niche markets in Europe. Companies that did not have sustainability officers in the early 2000s now have sustainability teams. The ASM also opened the door for the currently-stalled negotiations among NGOs and companies about the Cerrado, where deforestation for soy remains a significant issue and where Brazil's laws offer much less protection to native vegetation (Rausch et al. 2019; FAIRR 2018, Gollnow et al. 2022). In addition, the ASM paved the way for the emergence of ZDCs in Brazil's cattle sector.

## **The Cattle Agreements**

### *History and Context*

Three years after the ASM, Greenpeace published a second high-profile report entitled *Slaughtering the Amazon* (Greenpeace 2009a), which followed a similar script and highlighted the even larger role that cattle ranching plays in deforestation and links to other socio-environmental problems such as slave labor (Margulis 2004). Roughly concurrently, the MPF undertook an investigation of illegal activities in the cattle sector (Peinado Gomes and Alves 2017). The MPF's initial investigations lasted two years and resulted in the *Carne Legal* (Legal Beef) campaign in 2009 that featured lawsuits and threats of lawsuits against several prominent ranchers, slaughterhouses, tanneries, and retailers with ties to Amazon deforestation (Arima et al. 2014). These lawsuits were intended to pressure these actors to agree to *Termos de Ajuste de Conducta* (TACs) which committed them to ensure that their activities were free from illegal deforestation, slave labor, and other violations of socio-environmental regulations going forward. The *Carne Legal* campaign also featured social and traditional media campaigns aimed at raising the conscientiousness of the Brazilian consumer about the origins of the beef that they consume (MPF 2009).

The MPFs initially aimed incorporate the full supply chain, from farm to store, but later phases have focused more narrowly on the slaughterhouses that buy from ranchers. This is because slaughterhouses are the "pinch point" in the supply chain, in that there are relatively few of them, but they each have influence over hundreds or thousands of suppliers. Over time many more meatpacking companies have signed TACs and nearly 75% of those with state-level or federal-level inspections have now signed on (Figure 3; Barreto et al. 2015; Amaral 2016). Pressure to expand the number of slaughterhouses with TACs is ongoing,



though at different paces depending on the capacity of the MPF acting in each state. Over time, the *Carne Legal* program was streamlined to focus on the TAC process, and the media campaign component has been retired.

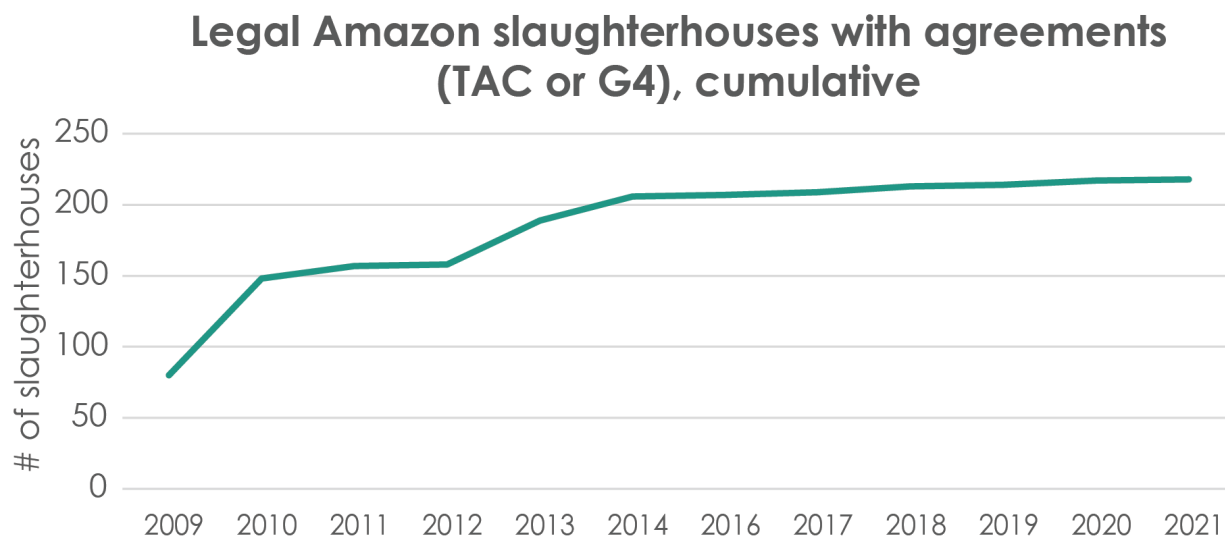


Figure 3: Slaughterhouses in the Amazon that signed the CA over time. 23 additional slaughterhouses have signed the agreement but information on the date of signing was unavailable. Figure based in part on unpublished research by Ticiana Amaral, and Barreto and Gibbs (2015).

Meanwhile, the four largest meatpacking companies in the Amazon at the time—JBS, Marfrig, Minerva, and Bertin—signed what would become known as the G4 Agreement with Greenpeace, which committed them to develop credible tools to track and monitor suppliers and decline purchases from properties with evidence of deforestation after 2009, overlaps with protected areas and indigenous territories, involvement in land conflicts, or slave labor violations (Greenpeace 2009b). As time has passed, the G4 has also become known as the Public Livestock Commitment (MPF 2020) due to both the reduction in the number of companies to just three and to Greenpeace’s public withdrawal from the commitment in 2017 due to continued non-compliance by all three companies (Greenpeace 2017).

#### *Understanding the TAC and G4*

There are many similarities between the G4 and the TACs, for which reason we refer to them collectively as the CA, though there are also some important differences. For example,



both prohibit purchases from properties that overlap with embargoed areas, indigenous areas, and conservation units, and require that properties are part of the environmental registry. Furthermore, both require companies to monitor for deforestation on their immediate (“direct”) suppliers as well as on their indirect suppliers, or those farms that sell to their direct suppliers. However, while the G4 calls for zero deforestation after October 2009, the TACs are legal instruments based on Brazilian regulations and call for no illegal deforestation after 2008 as defined by the FC. The difference between legal and zero-deforestation is significant in terms of messaging, but in practice there is very little difference because 97% of registered properties have already cleared beyond the legal limit, which means that ongoing clearing is illegal (Skidmore et al. 2020; Brandão et al. 2020). However, many areas are eligible clearing on the forest frontier where cattle production has not yet consolidated. The TAC also technically applies in the entire Legal Amazon — both the Amazon and Cerrado biome — while the G4 applies only in the Amazon biome (see Figure 1); in practice the TAC is mainly enforced in the Amazon biome.

In the wake of these two commitments, companies have sought to identify their suppliers to facilitate and document their compliance. Indeed, both commitments include requirements for companies to publicly disclose which properties they purchase from; however, to date, only JBS has complied in a meaningful way (Gibbs et al 2016). To meet the needs of the meatpacking companies to identify and assess their suppliers, a cottage industry of monitoring companies has emerged. Whereas the ASM features a communal monitoring system that produces the “blacklist” used by traders in procurement decisions, neither CA offer companies a monitoring solution. Over time, however, harmonized approaches to monitoring have been developed (MPF 2020), as discussed below, and both policies have adopted auditing processes to assess compliance (only implemented in Pará in the case of the TAC), the results of which are publicized via events and reports (e.g., Greenpeace 2015, MPF 2019). Instead of fining or suing slaughterhouses, the MPF have relied on publicity of the results to pressure the slaughterhouses to improve and avoid discouraging new companies from signing TACs, though presumably the potential for the MPF to take a slaughterhouse to court also has some influence on company decisions.

While the nature of the relationship between the companies and Greenpeace remained somewhat adversarial until Greenpeace withdrew from the G4 in 2017, in the case of the TAC, companies now have open channels of communication and generally cooperative



relationships with the MPF (Cammelli et al 2022). This has not resulted in collaboration among companies on a collective system to reduce monitoring burdens, leaving each company responsible for independently monitoring its own suppliers. In 2020, a formal partnership among some meatpackers, NGOs, and the MPF was formed under the name “Beef on Track” (Beef on Track 2021). This partnership has resulted in the development of a unified Monitoring Protocol to standardize monitoring procedures (MPF 2020) and a similar protocol to standardize auditing procedures is under development. A notable feature of the Monitoring Protocol is its definition of a pathway for non-compliant producers to come back into compliance. However, only handful of the largest slaughterhouses are partners in Beef on Track. This means that over a hundred other slaughterhouses owned by mostly smaller companies are not participating in the development of these protocols.

Perhaps the most difficult challenge for the CA is the complexity of the cattle supply chain. Cattle typically move between 2-3 farms prior to sale to slaughterhouses, and this complexity had made monitoring difficult (Pereira et al 2020). Slaughterhouses currently monitor for deforestation on their direct suppliers only. Extending the coverage to indirect suppliers requires either increased transparency about cattle supply chains or involvement of direct suppliers in monitoring, or both (Carvalho et al. 2021).

The size of this challenge, in that many documented cattle ranches never or rarely engage directly with slaughterhouses, has generated a bevy of efforts to produce both policy and technical solutions. For example, groups of slaughterhouses, NGOs and the MPF have formed working groups such as the multi-stakeholder Working Group for Indirect Suppliers (Portuguese acronym, GTFI) (GTFI n.d.). Effective auditing of the CAs, as well as most solutions to expand monitoring to include indirect suppliers, depend on the availability of official animal transit records known as GTA (*Guia de Trânsito Animal*), which must be submitted every time animals move between farms. The MPF in Pará use the GTA to audit slaughterhouses’ compliance with the TAC regarding their direct suppliers, but increased availability is needed to enable slaughterhouses to monitor their indirect suppliers and for audits in states beyond Pará. On this issue, the lack of a unified collation among critical stakeholders in the sector is clear. For example, the largest slaughterhouse in Brazil, JBS, has come out publicly in favor of increased transparency around the GTA to support deforestation monitoring (Proforest n.d.), while other parties have argued that using the GTA for deforestation monitoring will increase the incidence of undocumented cattle movements



to the detriment of the sector (Coalizão Brasil 2020). This prominent lack of consensus on the GTA reflects both the failure of a dominant coalition to emerge from the various interest groups and the nature of the challenges of addressing deforestation in supply chains of animals that move between farms.

### *Outcomes of the CA*

By all accounts, the outcomes of the CA are less clear cut than those of the ASM, though some key takeaways are emerging. One important lesson is that implementation levels have been uneven, suggesting that slaughterhouses require stronger incentives to fully leverage their influence over their suppliers and to honor their commitments in their purchasing decisions. For example, JBS, an early signatory of the agreements, quickly incentivized its suppliers in Pará to register in the CAR and shifted their procurement strategies to avoid purchase from direct suppliers with deforestation on their properties (Gibbs et al. 2016). However, more recently, both audits and research have shown high levels of non-compliance by slaughterhouses, including JBS (e.g. MPF 2021; Greenpeace 2015; Klinger et al. 2018, Skidmore et al. 2020; West et al 2022), which is not surprising, since there are essentially no penalties for non-compliance.

Evidence for reductions in deforestation resulting from the CAs is so far inconclusive, and more studies are needed. For example, Alix-Garcia and Gibbs (2017) showed that that high levels of non-compliance on direct suppliers and ample opportunities for laundering and leakage through non-monitored farms washed out reductions in deforestation on monitored farms. Indeed, that only a fraction of the total number of farms involved in cattle production are monitored reduces their ability to contribute to forest conservation (Gibbs et al. 2016; Skidmore et al. 2020). However, a more recent study found a reduction in pasture-driven deforestation in municipalities with high market share of G4 companies but less in other areas (Levy et al. 2022), while others have identified a deceleration in pasture expansion following the CA (Jung et al 2021; le Polain de Waroux et al 2019). Together, these studies suggest that that the impacts of the CA on forests may be transitory or slow to accrue and that the reduction of opportunities for leakage via expanded coverage would increase their effectiveness (Garrett et al 2019).

### **Discussion: Comparison of the ASM and CA**



Brazil's ASM and CA are among the most prominent examples of supply chain governance in the environmental sphere to date. Here we evaluate and discuss important similarities and differences between the two policies, guided by an analysis framework that draws on approaches to evaluating governance from the field of political economy and the literature on assemblage thinking.

The ASM and the CA share similar objectives, but there are fundamental differences in design due to the nature of the commodities and the structure of the supply chains and in the various political economic elements that have contributed to the governance process (**Table 1**). Ultimately, these variations, some of which are minor and others substantial, have converged to contribute to important differences in both policy outcomes and in the makeup of the assemblages around these governance processes over time.

	<i><b>Interests/ Interest Groups</b></i>	<i><b>Institutions</b></i>	<i><b>Ideas/ Information</b></i>	<i><b>Material Considerations</b></i>
<i><b>Amazon Soy Moratorium</b></i>	Greenpeace and other environmental NGOs; Soy traders; Consumer-facing companies	Brazil's Forest Code limits land use on private properties; PRODES deforestation monitoring; High level of coordination among soy traders	Expansion of soy production can continue without additional deforestation	Soy is easy to monitor; Simple supply chains with most soy sold directly from farmer to trader; Soy is difficult to substitute; Global markets influential
<i><b>Cattle Agreements</b></i>	Greenpeace and other environmental NGOs; MPF; Slaughterhouses; Retailers	Forest Code establishes monitoring at the unit of the property and limits land use on properties; PRODES deforestation monitoring; No coordination among meatpacking companies	Ranching is linked to most deforestation in Amazon biome; improved production practices may be required to offset reductions in deforestation; monitoring is too narrow and needs to expand to include indirect suppliers	Complex supply chains with cattle sold between multiple properties prior to sale to slaughterhouse; data needed for comprehensive monitoring considered sensitive; Domestic (national) markets dominate



Table 1: Summary of the ASM and the CA within expanded “3 Is” framework.

For example, the ASM was adopted nearly simultaneously by major players that buy 90% of soy produced in the Amazon (Gibbs et al. 2015), while the uptake of the CAs has been incomplete and drawn out with individual companies signing on over the span of more than a decade (Fig 3). The ASM is voluntary, though pressure from media attention and from their customers to participate surely has influenced the companies’ decisions. Participation by slaughterhouses in the G4 was similarly voluntary but coerced by negative media attention; the TAC is not technically voluntary as participation can be compelled by the MPFs, though the details of the agreements made between slaughterhouses and the MPF are negotiated to some extent (Cammelli et al 2022).

Fundamental differences in the structure of the two supply chains have also contributed to key differences between the ASM and CA; for example, nearly all soy is sold directly from the farm to the trader in the Brazilian Amazon, and the use of middlemen is rare, while most cattle in the Amazon pass through 2 or 3 farms before arriving at the slaughterhouse (Gibbs et al. 2016). Soy traders often finance Amazon soy producers, with cash loans or by offering crop inputs on credit to be paid in bags of soy at harvest time. These features of supply chain structure and relationships give the soy traders much more influence over their supplier base, increasing their ability to effectively set the terms for production, compared to the slaughterhouses which only have direct contact with the ~25% of the cattle ranchers that sell directly to them (Skidmore et al. 2020). Characteristics inherent to soybean plants and to cattle, such as soybeans’ permanence in one location and tendency to be grown in fields of 10s or 100s of hectares or more due to economies of scale, compared to cattle which move around and can be raised in almost any quantity and density on a given property, also contribute to the relative ease of monitoring soy vs. cattle. As such, cattle supply chains cannot be monitored simply with maps but instead require data about the various farms they pass through to be made available to slaughterhouses and other organizations involved in monitoring, raising complicated questions about how to balance data privacy with the need for traceability in cattle supply chains (Sanches 2021; Brazil 2012; Drummond & Barros-Platiau 2006)





The monitoring strategies also differ in other important ways — the ASM monitors only those areas where soy is grown, and deforestation outside of soy growing areas does not result in a property being blocked. Whereas, the CAs monitor for deforestation after the cut-off date, the presence of which results in the entire property being blocked, regardless of whether cattle graze there or not. The differences in the overall governance of the two agreements also offers a partial explanation for these differences; soy companies took on the role of designing and shaping the ASM through their trade organization ABIOVE from the beginning, while no similar trade organization stepped up to coordinate a response for the beef sector, leaving meatpacking companies in a defensive position.

Finally, it is possible to identify both material and contextual factors that have affected the agreements' relative outcomes. Cattle and soybeans are by far the dominant land uses tied to deforestation in the Amazon, so policies that simultaneously address these two sectors have the potential to make real impacts on deforestation rates without generating large amounts of leakage to other sectors within the same geography. Another factor is the legal-political context in which the broadly conceived federal FC already limits deforestation. In fact, the ASM and the CA have both been adapted to better align with these public policies, with such as moving the ASM's cutoff date from 2006 to 2008 to align with 2012 FC, and the publication in late 2020 of the Unified Protocol for the CAs, which included the G4 zero-deforestation requirements for the first time in an official policy document alongside the most technical and detailed description to date of how to assess property compliance with the CAs. Finally, it must be noted that due to the decades-long history of deforestation in the Amazon, there are millions of hectares of deforested land from prior to the ASM and CA cut-off dates that is useable under each agreement and very little of the ongoing deforestation is legal under the FC (Rausch & Gibbs 2021), which limits the additional costs of compliance for the average producer.

## **Conclusions**

Over a decade and a half since the ASM was first implemented, Brazil's ASM and CA remain the only examples of sectoral commitments for deforestation-risk commodities with meaningful implementation. For example, despite widespread discussion of expanding supply chain approaches for both commodities to the neighboring Brazilian Cerrado, to date there is no such commitment for soy and only very limited TAC coverage for



slaughterhouses in parts of the Cerrado that fall within the Brazilian Legal Amazon (Soterroni et al. 2019). This is in part due to the wider gap between zero-deforestation and legally permitted deforestation in the Cerrado, where up to 80 percent of each property can be cleared and most properties are able to clear more legally and in part due to the greater diversity of actors in each sector in the Cerrado (Rausch et al. 2019), which has generated producer resistance to such an agreement. Additionally, NGO campaigns and media coverage of deforestation linked to production of beef and soy in other parts of Latin America, and of other forest-risk commodities such as oil palm in Latin America and SE Asia, have not generated the kind of focused response that the Greenpeace campaigns in soy and beef and Brazil were able to generate.

Despite these challenges, efforts to promote supply chain approaches to reducing commodity agriculture in other contexts, as well as continual efforts to sustain and improve the ASM and the CA, continue to be relevant, but the means for interested groups to engage in this work is evolving. For example, there are now ongoing efforts in the European Union to implement legislation requiring companies to identify the suppliers of the agricultural commodities they purchase, and similar in France, the UK, and Germany. Such state-directed efforts are ambitious in scope, and may not have arisen without the cases of the ASM and the CA; indeed, many of the same NGOs that have participated in the ASM and the CA are involved in these new legislative efforts (Bager et al. 2021). Increasing availability of property boundaries, high-resolution deforestation maps, and trade data are technical factors that are facilitating these new governance agendas.

Replicating the success of the ASM has proven elusive, but both the ASM and the CA offer numerous lessons for policymakers and activists regarding the design of pressure campaigns, technical considerations around monitoring and verification, and the limits that private sector-led supply chain initiatives can face. The hopeful news is that many of the limitations of these agreements can be overcome with public sector support, in terms of increasing and guaranteeing transparency of data about supply chains, about deforestation, and the willingness to guarantee positive and negative incentives for compliance and transgressions, respectively. The latest frontier in supply chain governance will test the implications of strong state support from consumer countries for these approaches, while state support from producing countries remains limited.



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