TRADE, DEVELOPMENT & THE ENVIRONMENT HUB

MOVING TOWARDS A SUSTAINABLE SOYBEAN SUPPLY CHAIN

A SUSTAINABLE POLICY TOOLBOX FOR BRAZILIAN STAKEHOLDERS AND OTHER GLOBAL ACTORS

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EXECUTIVE SUMMARY

This paper takes stock of over two years of research led by different partners of the *UKRI GCRF Trade, Development and the Environment Hub* and explores different policies and instruments that have the potential to increase the level of sustainability of the soybean supply chain in Brazil – the world's largest producer and exporter of this crop – and elsewhere in the world. Soybean is one of the most important agricultural commodities in the international market, and the number and the nature of sustainability measures, policies, and initiatives in the Brazilian and in the global soybean supply chain have increased exponentially. However, the extraordinary expansion of soybean cultivation to be associated with a range of negative socio-economic and environmental impacts. Over the last 15 years, various measures and policies have been designed and implemented to address the sustainability concerns surrounding the entire soybean life cycle, but – despite some progress – none has proven to be entirely successful yet. Hence, the question of how to best design and harmonise sustainable policy instruments in the soybean supply chain remains open.

In this paper, we initially describe the main features of the Brazilian soybean supply chain – both domestically and in terms of its role in global trade flows – and the wide spectrum of related impacts on the economy, society, and natural ecosystems. Acknowledging that the boundaries between the different types of sustainability measures across the soybean supply chain can be blurred, we organise different measures into broad institutional categories – starting from international, multilateral, and bilateral agreements, moving then to domestic policies and regulations, later concentrating our attention on voluntary tools, and finally exploring other sustainability measures not included in previous groups. We review and discuss strengths and limitations associated with each measure, developing an original and intuitive visualisation framework to position different measures within the institutional landscape, pointing out their jurisdictional boundaries and highlighting the set of stakeholders vested with the power to influence the design and implementation of various instruments.

In the conclusion, we point out three key considerations. First, the same tool can have heterogeneous impacts on different communities and territories – both below and beyond national-level boundaries. Second, while sustainability measures in the soybean supply chain have increased in number and diversified in their scope, their level of integration and harmonisation is still limited, requiring further efforts for the identification of the optimal policy mix to ensure their effectiveness. Third, different measures typically address only a narrow set of dimensions of the broader social and environmental sustainability spectrum, and the level of integration of different instruments across geographies and stakeholders appears to be still limited to address global sustainability concerns in an harmonised and holistic manner.

PART 1. GLOBAL AND LOCAL FEATURES OF BRAZILIAN SOY

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PART 1. GLOBAL AND LOCAL FEATURES OF BRAZILIAN SOY

In this part of the paper, we review the evolution of the soybean supply chain over the last 25 years, with a particular focus on the role of the largest producer and exporter of this commodity: Brazil. While reporting on the extraordinary growth in consumption, production, and trade flows which made soybean the most traded agricultural commodity in the world, we also discuss the unintended consequences of the '*soybean miracle*', highlighting the range of negative impacts that are displaced on people and nature and dispersed across different stages of its supply chain.

Initially, we frame the role of Brazil at the international level, and then we explore the specific features characterising producing regions, states, and farms within the country's national borders. In the background, we also begin to introduce some of the countless interventions that have been designed and implemented by various stakeholders, and at different administrative levels, to address the *sustainability crisis* of the soybean supply chain – which will be then discussed in more detail in the following sections of the paper.

1.1. BRAZIL AND THE GLOBAL SOYBEAN SUPPLY CHAIN

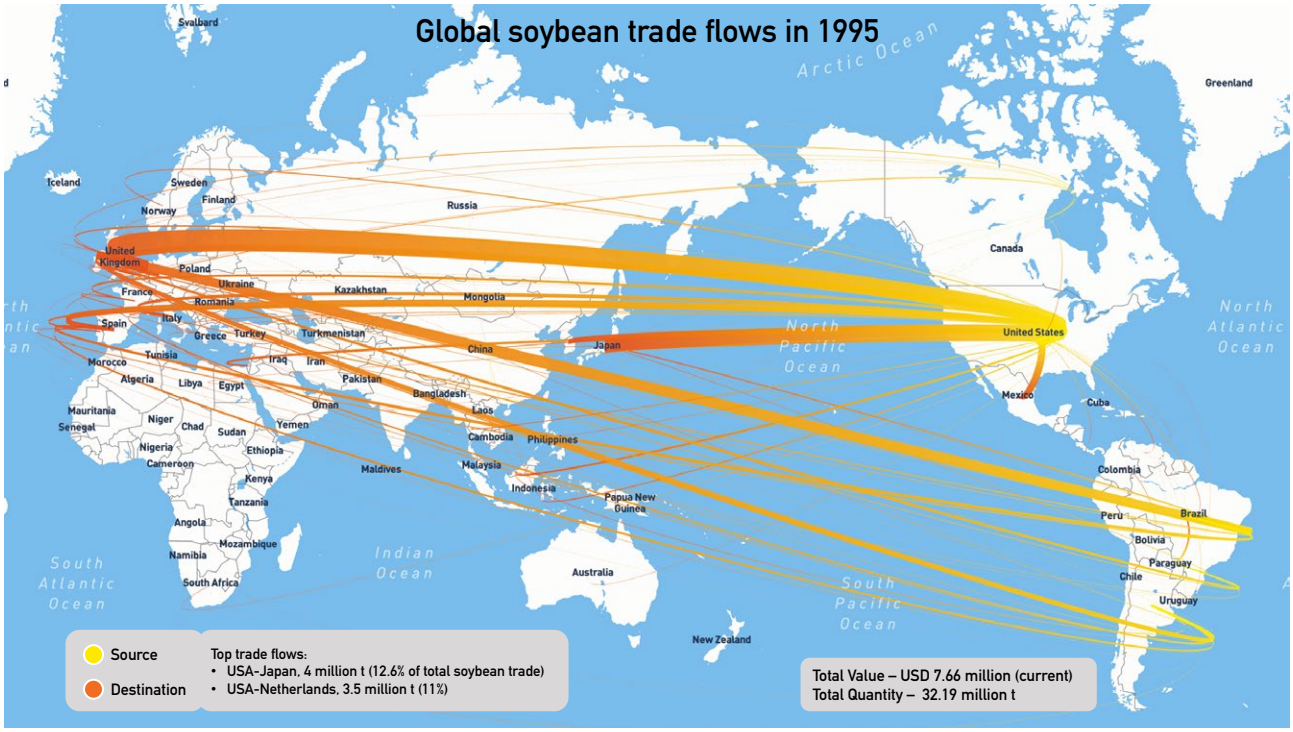
International trade for soybean has rapidly evolved in the span of a few decades, reshaping the soy supply chain both globally and locally. Brazil, together with China and the US, has been a key player in this process. In 1995[1], soybean trade was globally worth US$7.7 billion. The USA accounted for over 70% of the total export with a market share worth around US$5.5 billion, whilst Brazil – the then second-largest player in the soybean international market – accounted for just over 10% of the export, corresponding to about US$0.8 billion. The top destinations for soybean imports were the Netherlands (19% of total import, corresponding to US$1.45 billion) and Japan (15.8%, worth US$ 1.21 billion). In the same year, the USA produced about 59 million tonnes of soybean across 24.9 million hectares (ha) of land, compared to 25 million tonnes produced across 11.6 million ha in Brazil. China was the third-largest soybean producer in the world, although its participation to global trade flows was still very limited.

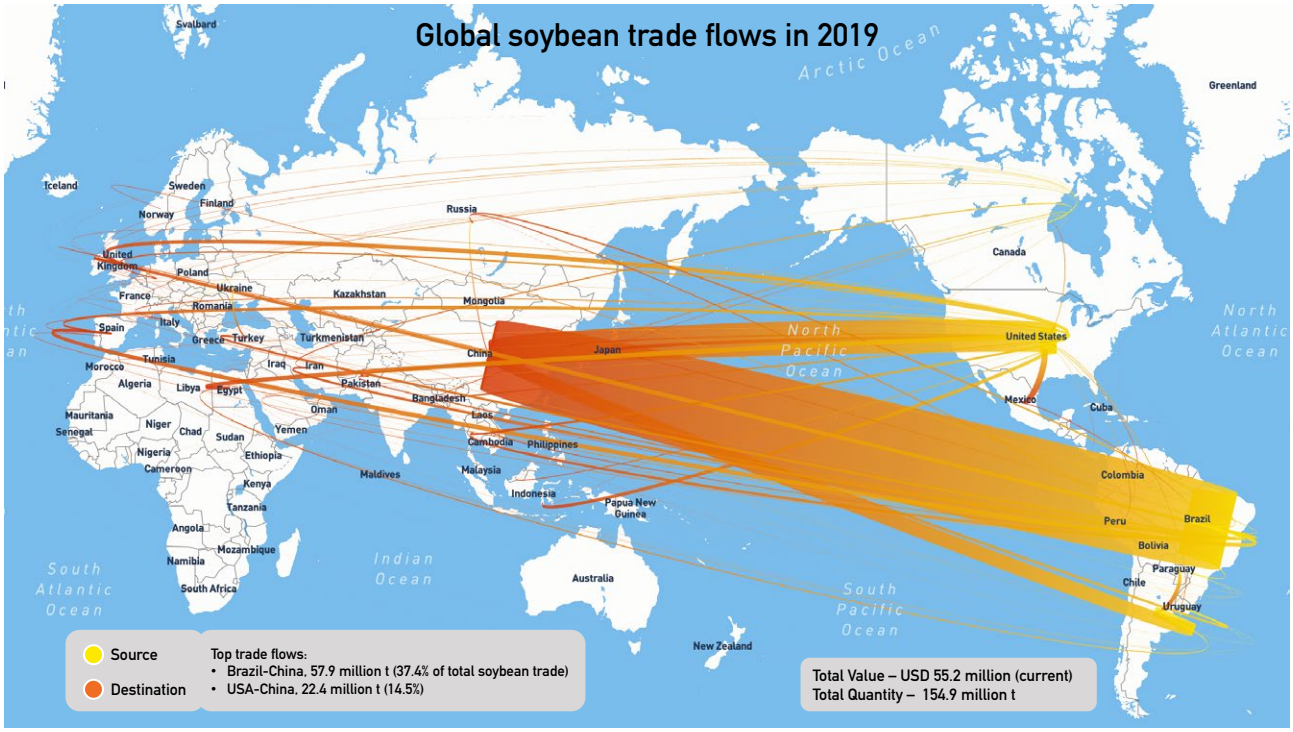
In 2019, the total value of international trade for soybean is more than 7 times larger compared to its 1995 level, reaching an estimated US$55.2 billion. Almost half of the soybean traded internationally (47.3%) is exported from Brazil – that is, a market share worth over US$26 billion. Not only Brazil is the largest soybean exporter in the world for the third year in a row, but it is also the largest producer, both in terms of area harvested (35.8 million ha in 2019) and quantity produced (114.2 million tonnes in the same year). The USA are the second largest exporter of soybean, accounting for 34.6% of total export, worth just over US$19 billion. Brazilian agriculture has constantly eroded market shares from the USA and other producing countries, but the level of concentration of soybean exports has not changed substantially since 1995. Instead, the concentration in imports has grown rapidly. Over 75% of the total soybean import are directed to Asian countries, with China being – by far – the largest soybean importer in the world. More than 58% of the soybean traded internationally in 2019 – corresponding to US$32.1 billion – reached China. Brazil alone exported US$20.5 billion worth of soybean into China, thus covering almost two-thirds of the total soybean import reaching the Chinese borders. The other leading commercial partners are the USA, feeding 24.5% of the Chinese imports, and Argentina (9.38%).

The extraordinary growth in volumes produced, consumed, and traded worldwide has been labelled as the '*soybean miracle*', and reflects the multiple uses of soybean – from animal feed to biofuel, from food production to industrial processes. However, the literature has pointed out the existence of a negative side to such a miracle growth (De Maria *et al.*, 2020). For instance, in South America alone the cultivated soybean area has grown by almost 110% – corresponding to 28.7 million ha – in the period 2000-2019, and while this expansion has in some cases been the result of replacing existing cropland, most of it has occurred on pastures originally deforested or converted from natural vegetation (Song *et al.*, 2021).

[1] Trade data used in this section were retrieved from OEC (available online: https://oec.world/en – last accessed on 02/12/2021). Figures on production quantity and area harvested were retrieved from Faostat (available online: https://www.fao.org/faostat/en/#home – last accessed on 02/12/2021).

FIGURE 1 – GLOBAL SOYBEAN TRADE FLOWS IN 1995 AND 2019





Source: Authors' elaboration on BACI HS92, v202102 (CEPII, 2021).

It is estimated that soybean was responsible for about 9% of the total forest loss in the continent over the last two decades, although this figure varies across different biomes: in the Amazon, the area devoted to soy increased by ten times reaching 4.2 million ha, with almost 50% of this expansion occurring over primary and non-primary forests; In the Cerrado, about 18% of the 1.7 million ha of additional soy plantations replaced native vegetation areas (*Ibid.*).

The gains from trade and the economic benefits generated by the rise of the soybean supply chain – and by the underlying institutional, socio-economic, and land-use changes – are counterbalanced by a range of negative impacts on people and the environment. Together with direct and indirect deforestation, the soybean expansion has been connected to the loss of natural habitats and biodiversity (Durán *et al.*, 2020; Green *et al.*, 2019; Rausch *et al.*, 2019) and a sharp increase in carbon footprint. Recent estimates suggest that emissions from Brazilian soy export in the period 2010-2015 exceeded 220 Mt of CO_2 equivalent, although the actual footprint of soy can vary considerably across Brazilian municipalities, final destination countries, and different stages of the supply chain (Escobar *et al.*, 2020). The expansion of the soybean frontier in Brazil has been also associated with both direct and indirect social impacts, affecting livelihoods, human development, and land tenure of local communities and Indigenous People (Busscher *et al.*, 2019; Favareto, Nakagawa, Pó, *et al.*, 2019; Piras *et al.*, 2021; Russo Lopes *et al.*, 2021). In a recent systematic review of the literature, Dreoni, Matthews, and Schaafsma (2022) found mixed evidence on the impacts of soy production on different dimensions of well-being. While intangible aspects such as cultural values, freedom of choice, social relations, and sense of security, appear to be impacted – unequivocally – in a negative way, the literature on the effects of soybean production on income, inequality, health, and human development is more nuanced, with a broader spectrum of negative, neutral, and positive impacts that often coexist (*Ibid.*). A recent UKRI GCRF study jointly conducted by CEBRAP and UFABC (Favareto *et al.*, 2021, p. 7) using 20 years' worth of data on soy-producing municipalities in Brazil, concludes that: "*From the socioeconomic perspective alone, the effects of soy in the producing regions do not back up the narrative that negative impacts would be offset by positive effects on economic and social indicators.* [...] *there is a group of indicators for which the results observed are inconclusive: inequality, HDI, occupation/employment, GDP and number of years in school.*"

International trade displaces the environmental and socio-economic impacts of soybean production over time and space, making it difficult to track direct and indirect changes and to attribute responsibilities (Garrett *et al.*, 2013; Lambin & Meyfroidt, 2011). Current efforts to identify and quantify the full range of – positive and negative – impacts across the soybean supply chain are intensifying (Gardner *et al.*, 2019), but the sector is still facing major sustainability challenges (Jia *et al.*, 2020).

Since the early 2000s, multiple policies and interventions affecting the sustainability of the Brazilian soybean complex have been designed and implemented, both at the domestic and at the international level: from international trade agreements such as the EU-Mercosur Trade Agreement, to the escalation of tariffs between USA and China fuelled by the '*America First*' policy of the Trump administration; from the Amazon Soy Moratorium and the Brazilian Forest Code, to multiple roundtables and voluntary standards; and from traceability tools to sustainable finance. While the multiplication of instruments might intuitively appear as a step in the right direction, it also adds further complexity to the soybean sustainability puzzle. For instance, Moffette & Gibbs (2021) found evidence of the existence of spillover and displacement effects arising from two important policies implemented in Brazil, namely the *Soy Moratorium* and the *Zero-Deforestation Cattle Commitment*. Their results suggest that while these policies were successful in limiting deforestation in the Amazon, they contributed to shift the expansion frontier for soy and cattle – and the associated pressure of forests and other natural habitats – towards other less regulated but ecologically vital regions of the country.

This last point is crucial to reinforce the idea that the impacts of the soybean supply chain, as well as the effects of the different sustainability tools that have been proposed, need to be analysed in light of the heterogeneities that characterise the structure of the Brazilian soybean complex below the national scale. And this is the focus of the next section, which will conclude *Part I* of this research.

1.2. BRAZIL AND THE LOCAL SOYBEAN SUPPLY CHAIN

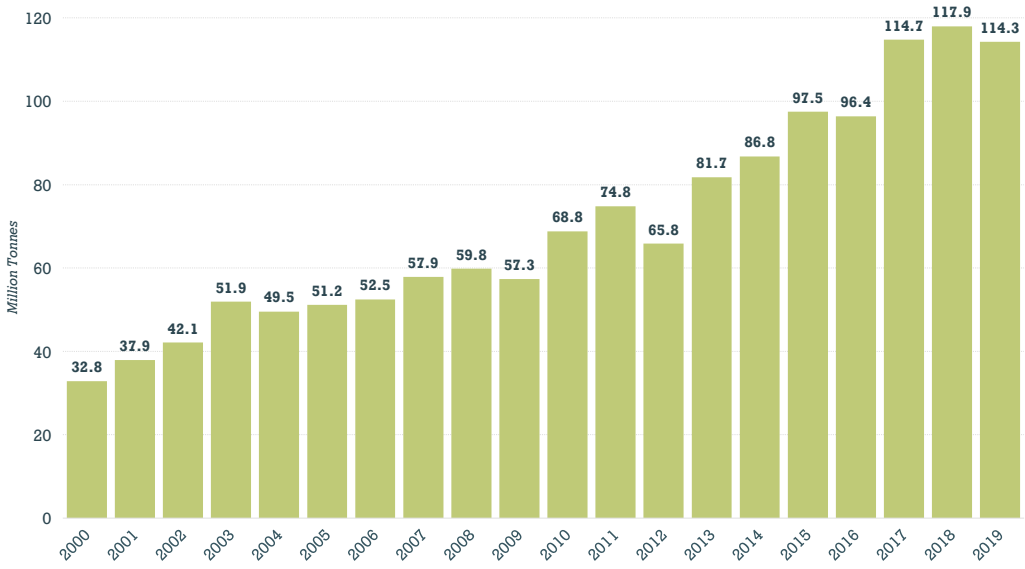
Data from the Municipal Agricultural Research (PAM, in Portuguese) of the Brazilian Institute of Geography and Statistics (IBGE, in Portuguese) reveals the magnitude of the Brazilian '*soybean miracle*'.

In just two decades, the production increased by 248%, reaching 114 million tonnes in 2019 (*Figure 2*).

This extraordinary growth has been fed by the foreign demand, and particularly by China and by other Asian countries, which represented – according to Observatory of Economic Complexity (OEC) – the destination for about 90% of the soybean export originated from Brazil in 2019. Data from the IBGE's System of National Accounts (SNA) shows that the portion of Brazilian soybean destined for foreign markets has been growing constantly over the last two decades (*Figure 3*). About one-third of the total production (33.2%) was exported in the year 2000. The same figure was more than doubled in 2018, when almost 68% of Brazilian soybean was shipped abroad. Despite the great growth in Brazilian soy export, its representativeness in the country's export basket historically accounts for a relatively small portion of the GDP – it was just 13,6% in 2020 – highlighting the low value-added directly derived from the production and trade of agricultural commodities.

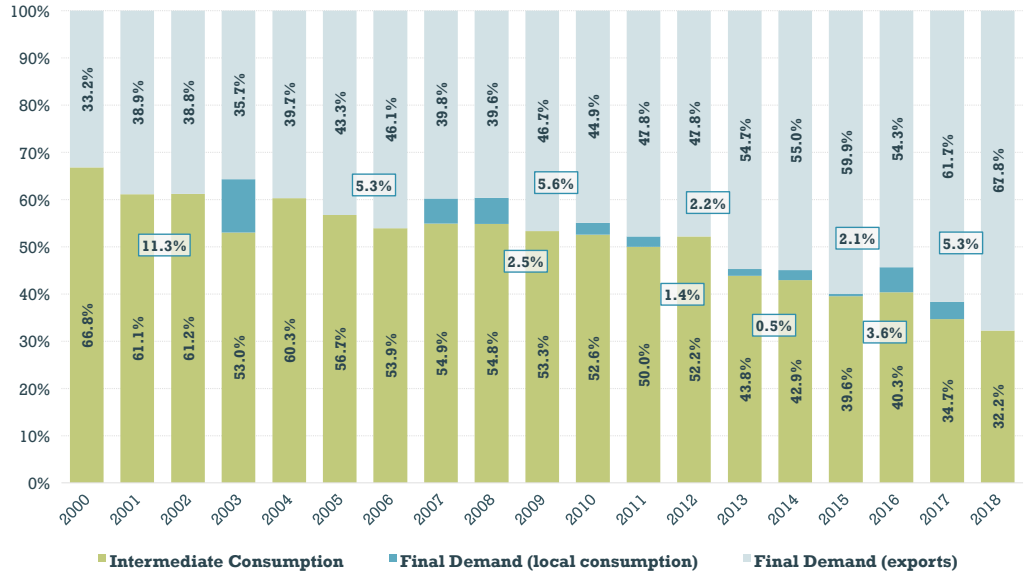
Soybean production levels, as well as their evolution over time, vary significantly across the different areas of the Country.

FIGURE 2 – SOYBEAN PRODUCTION IN BRAZIL INCREASED BY 248% IN THE PERIOD 2000-2019



Source: IIS, based on IBGE System of National Accounts (SNA)

FIGURE 3 – COMPOSITION OF DEMAND FOR SOYBEAN IN BRAZIL

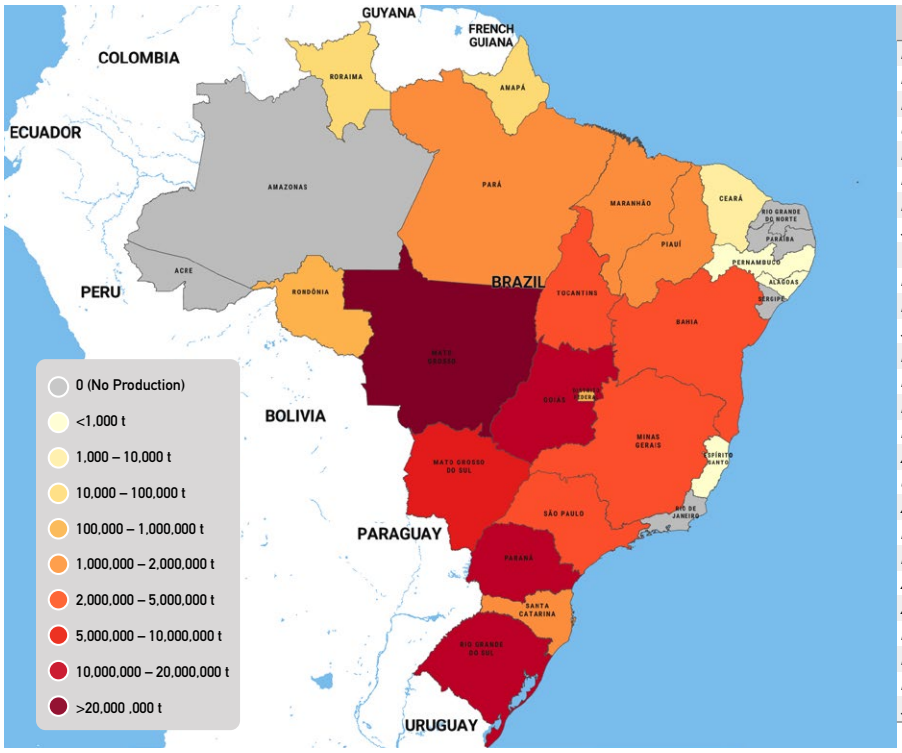


Source: IIS on IBGE's SNA – System of National Accounts.

For instance, *Figure 4* uses data from the Agricultural Census to break down soybean production levels across the 27 Federative Units that compose Brazil. While soybean was cultivated in 21 different States in 2017, four alone were responsible for over 70% of the national production – namely Mato Grosso (29%), Rio Grande do Sul (17%), Paraná (15%) and Goiás (10%).

The spatial evolution of soybean production in Brazil can be characterised by even more granularity. *Figure 5* combines data from the private properties of Brazil's land tenure database (Sparovek *et al.*, 2019) and MapBiomas (2021), showing the distribution of soybean plantations within the boundaries of Brazilian rural properties in 2000 and 2019.

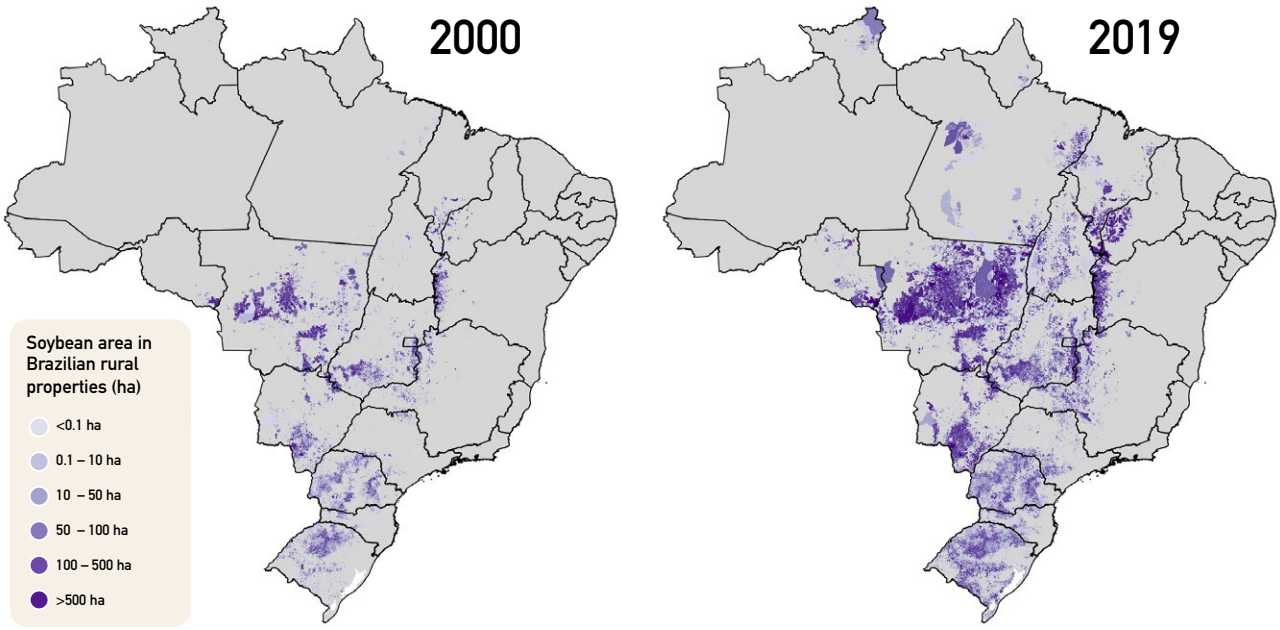
FIGURE 4 – SOYBEAN PRODUCTION LEVELS ACROSS THE BRAZILIAN STATES IN 2017



Federative unit	Soy production (t)	Share
Mato Grosso	29,778,544	28.877%
Rio Grande do Sul	17,311,971	16.782%
Paraná	15,252,347	14.785%
Goiás	10,201,843	9.890%
Mato Grosso do Sul	8,064,607	7.818%
Bahia	4,954,412	4.802%
Minas Gerais	4,666,585	4.523%
São Paulo	2,761,916	2.677%
Tocantins	2,017,693	1.956%
Piauí	1,981,892	1.921%
Maranhão	1,939,221	1.880%
Santa Catarina	1,909,053	1.850%
Pará	1,155,228	1.119%
Rondônia	800,293	0.775%
Distrito Federal	243,805	0.236%
Roraima	80,358	0.078%
Amapá	33,482	0.032%
Ceará	1,060	0.001%
Alagoas	814	0.00079%
Espírito Santo	8	0.00001%
Pernambuco	7	0.00001%
Acre	–	0%
Amazonas	–	0%
Paraíba	–	0%
Rio Grande do Norte	–	0%
Rio de Janeiro	–	0%
Sergipe	–	0%
TOTAL	**103,155,139**	**100%**

Source: Elaboration on Agricultural Census data (IBGE, 2017)

FIGURE 5 – SOYBEAN PLANTATIONS WITHIN THE BOUNDARIES OF BRAZILIAN RURAL PROPERTIES IN 2000 AND IN 2019

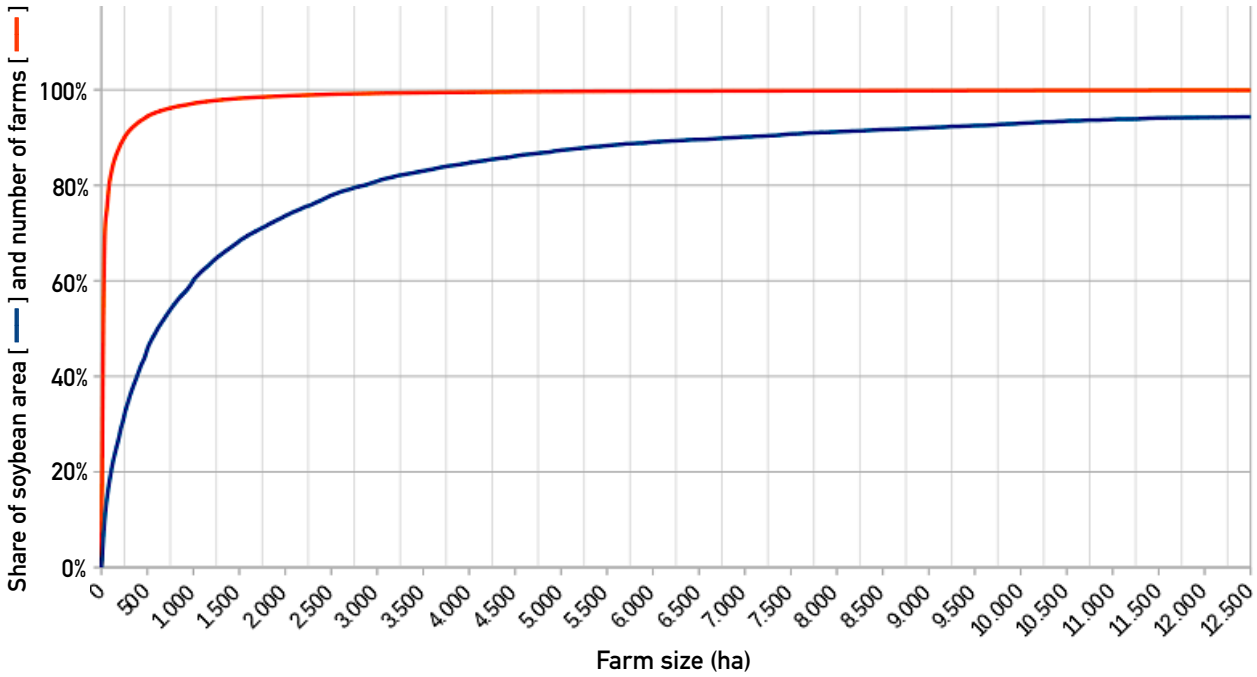


Source: Elaboration on (Sparovek et al., *2019) and MapBiomas (2021) data.*

The figure was built using data where the soybean area intersects known classes of the land tenure database. Therefore, places where soybean is planted but no spatial registry of the corresponding land property exists were eventually removed. While soybean expansion in the period 2000-2019 occurred in most of the Brazilian States, different patterns characterised each region. For instance, large areas of soybean (dark blue) can be detected in the Center-West and North regions, compared to smaller areas (light blue) in the South and Southeast. In addition, if we look at the States of Bahia, Piaui, and Minas Gerais, the soybean frontier is heavily concentrated on their western borders, whereas the expansion in top producing States such as Mato Grosso, Goiás, Paraná, and Rio Grande do Sul, appear to be more evenly spread across the territory of each federative unit.

The intersection of Brazilian land tenure data (Sparovek, 2019) with soybean area from MapBiomas (2021) allows also for an overview of the concentration of soybean cultivated area according to different classes of farm size. *Figure 6* shows that soybean production in Brazil is highly concentrated in large farms.

FIGURE 6 – DISTRIBUTION OF SOYBEAN AREA AND NUMBER OF FARMS ACCORDING TO FARM SIZE (2019)



Source: Elaboration on Sparovek et al. *(2019) and MapBiomas (2021) data.*

TABLE 1 – DISTRIBUTION BY FARM SIZE CLASS AND VARIATION OF SOYBEAN AREA IN THE PERIOD 2000-2019

Farm size class	Number of farms	Soybean area (2000)	Soybean area (2019)	Variation (%)
0 - 10 ha	186,731	185,982.3	546,142.1	+193.65%
10 - 100 ha	396,852	2,283,429.5	5,787,230.0	+153.44%
100 - 500 ha	89,835	2,798,220.7	8,579,353.6	+206.60%
500 - 1,000 ha	19,406	1,373,195.4	4,696,799.7	+242.03%
1,000 - 10,000 ha	19,345	2,598,104.7	10,761,247.4	+314.20%
> 10,000 ha	1,024	277,246.4	2,292,986.4	+727.06%
TOTAL	**713,193**	**9,516,179.0**	**32,663,759.2**	**+243.24%**

Source: Elaboration on Sparovek et al. *(2019) and MapBiomas (2021) data.*

Properties with an area of 250 ha or less represent approximately 90% of the number of properties but contain less than 40% of the total soybean area planted in the country in 2019. On the other side, 23% of the total soybean area was planted in just 7,132 farms, corresponding to the largest 1% of properties by farm size. Properties above 10,000 ha – that is, the largest farm size class in the dataset – are also the ones that expressed the largest soybean expansion in the period 2000-2019, with an increase of the soybean cultivated area (+727%) that is almost three times larger than the average for the whole country in the same period.

Spatial data also allows for the characterisation of environmental aspects associated with soybean production. For instance, *Table 2*, using data from Englund *et al.* (2017), reports the estimated value of above-ground carbon across all Brazilian farms cultivating soybean, aggregated by farm size class. The total value of above-ground carbon in soy producing farms is estimated at 4.33 GtC (corresponding to about 15.9 Gt of CO_2 equivalent). A simple measure of the average levels of above-ground carbon per hectare (tC/ha) was calculated across different farm size classes, by dividing the total carbon above ground for the corresponding total farm area in each class. The results indicate that the average above-ground carbon per hectare tends to increase with the farm size, with over 76% of the total aboveground carbon stocks (3.3 GtC) concentrated in the largest 1% of soybean-producing holdings. This finding might be potentially explained by the presence of larger properties in the Northern and Central-Western regions, which coincide with the Amazon biome, compared to the Southern states, which extends over the Cerrado and the Atlantic Forest biomes.

Estimates of aboveground carbon stocks in agricultural holdings producing soybean in Brazil cover just one of the many socio-economic and environmental ramifications of the soybean industry. And yet, this example contributes to highlighting how subnational soybean dynamics are crucial to understand and evaluate the full spectrum of – economic, social, and environmental – costs and benefits generated by this economic activity across different geographies and population groups. The presence of large external costs on people and the environment connected with the soybean supply chain – alongside with sizeable economic benefits – has virtually never been questioned, and the efforts for refining quantification techniques and the understanding of the underlying transmission mechanisms are intensifying. In parallel, since the 2000s, various policies and initiatives led by a diverse range of stakeholders have been designed and implemented to address the multiple sustainability concerns in the soybean supply chain, making the current institutional landscape a rather complex puzzle. *Part II* of this paper delves deeper into institutions and tools, positioning different instruments for sustainable soybean into the wider institutional landscape and highlighting limitations and strengths associated with each approach.

TABLE 2 – ESTIMATES OF ABOVE-GROUND CARBON IN FARMS CULTIVATING SOYBEAN BY FARM SIZE CLASS (2019)

Farm size class	Total farm area (ha)	Total above-ground carbon (GtC)	Above-ground carbon per hectare (tC/ha)
0 - 10 ha	1,090,570.23	0.009	8.47
10 - 100 ha	11,990,728.62	0.125	10.39
100 - 500 ha	20,538,742.68	0.255	12.42
500 - 1,000 ha	13,628,666.79	0.207	15.18
1,000 - 10,000 ha	45,914,849.73	1.072	23.34
> 10,000 ha	46,122,700.24	2.666	57.80
TOTAL	**139,286,258**	**4.33**	**–**

Source: Elaboration on Sparovek et al. *(2019), MapBiomas (2021) and (Englund* et al., *2017) data.*

PART 2. POLICIES, TOOLS, AND INITIATIVES FOR SUSTAINABLE SOY

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PART 2. POLICIES, TOOLS, AND INITIATIVES FOR SUSTAINABLE SOY

The transformations that characterised the soybean supply chain over the last decades occurred alongside a number of major institutional changes, both in Brazil and internationally. For instance, China became a member of the World Trade Organization (WTO) in 2001, and a few years earlier the *Complementary Law No. 87/1996* (also known as *Kandir Law*) entered in force, providing the exemption from the payment of the Tax on the Circulation of Goods and Services (ICMS, in Portuguese) on Brazilian exports of primary products, such as soybeans. In general, many instruments and initiatives have been developed, proposed, and implemented to address the sustainability crisis that emerged in parallel with the exponential growth of soybean production, consumption, and trade volumes. However, there has not been a universally agreed and complete classification for policies and instruments that affects the soybean supply chain and various dimensions of its sustainability.

This section addresses this gap in a threefold way. First, we arranged the different measures into four overarching groups based on their predominant institutional nature, differentiating between international relations, treaties and agreements; domestic policies and interventions; voluntary tools; and other potential instruments (*Figure 7*). While acknowledging the existence of potential overlaps within each category of such classification, it was nevertheless instrumental for structuring the narration coherently, providing a preliminary and intuitive way for readers to distinguish the multiple existing instruments.

Second, we developed an original set of visualisations to map the spatial boundaries (local, national, and international) and identify key groups of stakeholders (public actors, civil society, and private sector) involved in the design and decision making processes for selected instruments. If we consider again China joining the WTO and the Kandir law, while both examples of institutional change have supported – at least to some extent – the miracle growth of the soybean sector and its related impacts, the former happened at the international level while the latter was developed within the boundaries of Brazilian national sovereignty. This suggests that it is useful to map and position different measures into the wider institutional landscape, defining their geographical frontiers of influence, as well as the range of stakeholders that decide on and endorse each instrument.

FIGURE 7 – GROUPING POLICIES AND TOOLS WITH THE POTENTIAL TO AFFECT THE SUSTAINABILITY OF BRAZILIAN SOY

International relations, treaties & agreements

- WTO Agreement on Agriculture
- WTO Agreement on SPMs
- Non-Tariff Measures (NTMs)
- Bilateral & Multilateral Trade (e.g. EU-Mercosur Trade Agreement, Comprehensive Economic Partnership Agreements – CEPAs)
- Bilateral Trade Relations (e.g. US-China trade war)
- UK & EU anti-deforestation regulations

Voluntary Tools

- Amazon Soy Moratorium
- Green Grain Protocol
- Roundtables (e.g. RoundTable on Responsible Soy – RTRS) & other certification schemes
- Corporate sustainability standards and voluntary sustainability standards
- Transparency and traceability tools (e.g. Labelling, blockchain, TRASE database)

Domestic Policies and Regulations

- Rural & Agricultural policy (e.g. Agro Law, Agriculture and Livestock plan, Rural credit, Producer support)
- Environmental Policy (e.g. Forest Code, CAR)
- Financial Instruments & Credit (e.g. Sustainability-Linked Loans – SSL, National Rural Credit System – SNCR, PRONAF & PRONAMP)
- Taxation and fiscal policy (e.g. Kandir Law)

Other proposed & potential instruments

- CBAM – Carbon Border Adjustment Mechanism
- Agri-environmental payments (e.g. TFA, IDH & CAT pilots)
- Bonn challenge and other pledges & commitments
- CSO-led campaigns (e.g. boycott, awareness raising campaigns)
- Capacity building, knowledge exchange, promotion of best practices, technical support…

Source: Authors' elaboration.

2.1. INTERNATIONAL RELATIONS, TREATIES, AND AGREEMENTS

This section focuses on the role of international relations in the soybean supply chain. Although some of the tools we have included in other categories have a transnational scope (for instance there are several voluntary sustainability standards and certifications that are internationally recognised), in this section we focus mainly on international trade and foreign affairs intended as international, multilateral, and bilateral treaties and agreements, which are typically negotiated and ratified by public authorities and governmental actors.

2.1.1. WTO AND INTERNATIONAL TRADE AGREEMENTS

As argued in *Part I*, International trade is a crucial factor for the expansion of the soybean frontier in Brazil and other producing countries. For instance, China accession to the WTO in 2001, which followed a new course of domestic reforms and foreign policy in the country, rapidly shifted traditional soybean trade patterns and increased traded volumes in an unprecedented way, ultimately reshaping the entire supply chain in the coming years.

Since 1947, when 23 nations signed the General Agreements on Tariffs and Trade (GATT), trade liberalisation has made enormous progress. In January 1995, when the Marrakesh Agreement established the World Trade Organisation, there were 76 members, which became 112 before the end of the year. As of today, the WTO has 164 member states, with a further 26 nations with observer status. World trade has almost quadrupled in value and the average tariff rate is one third compared to the pre-1995 levels[2]. However, trade liberalisation of primary products has proven to be more challenging, and the empirical literature is gradually scaling down the contribution of the WTO to agricultural trade liberalisation after the year 2000 (Bureau *et al.*, 2019; Swinnen *et al.*, 2012).

The key international agreements that are relevant in our context are the WTO *Agreement on Agriculture* and the *Agreement on Sanitary and Phytosanitary (SPS) measures*, although agreements such as the ones on technical barriers to trade (TBT), tariffs and trade (GATT), services (GATS), and on intellectual property rights (TRIPS) contains relevant provisions that can potentially impact – just to mention one important example – the nexus between trade and biodiversity (UNEP, 2021a). The latest round of WTO negotiations in agriculture started in 2000 with high expectations, but progress has been slow and focused on a relatively limited number of areas. For instance, the '*Nairobi package*', signed in 2015, called for the immediate elimination of agricultural export subsidies, although – as recognized by the WTO[3] – only a "*handful of members*" were still using those subsidies. It also promoted advancements on other fronts, such as public stockholding for food security, special safeguard mechanisms for Least Developed Countries (LDCs), and international trade for cotton (Díaz-Bonilla & Hepburn, 2016). More recently, important progress has been made on fishery subsidies, with a draft text for the agreement (TN/RL/W/276/Rev.2) published in November 2021. Currently, agricultural negotiations in the WTO cover seven main areas, namely trade-distorting domestic subsidies, public stockholding for food security purposes, the special safeguard mechanism, cotton, market access, export competition, export restrictions and prohibition, and transparency.

With the WTO reform of agricultural trade stalling on several fronts and socio-environmental issues such as climate change, deforestation, biodiversity loss, and human rights being increasingly connected to international trade, new topics and approaches are informing WTO discussions. For instance, a recent OECD study (Gourdon *et al.*, 2020) focusing on the impact of different Non-Tariff Measures (NTMs) in Agriculture, estimated trade costs and trade enhancing effects for 34 Sanitary and Phytosanitary (SPS) provisions and 24 Technical Barriers to Trade (TBT), finding that the price increase effect of SPS and TBT – which can jointly inflate agricultural import prices by as much as 15% – tend to overcome the trade expansion effect. Fiankor, Haase and Brümmer (2021) have summarised well the conundrum surrounding NTMs, sustainability, and agricultural trade: "*While it may seem that countries are substituting NTMs for tariff protection, such a simple argument ignores the potential consumer or societal benefits that NTMs can entail, such as reducing information asymmetry,*

[2] See the World Bank: https://data.worldbank.org/indicator/TM.TAX.MRCH.SM.AR.ZS (last accessed16/02/2022).
[3] See the WTO Briefing Note for Agriculture issues at the 10th Ministerial Conference held in Nairobi: https://www.wto.org/english/thewto_e/minist_e/mc10_e/briefing_notes_e/brief_agriculture_e.htm (16/02/2022).

mitigating consumption risks and enhancing sustainability. However, NTMs can also be protectionist, or their associated costs may keep non-compliant countries out of global value chains."

Whether further trade liberalisation for agricultural commodities is good or bad for people and the environment remains an open empirical questions (Benton, 2021), but the existing literature concurs that trade policy is an important driver for environmental and social change (Balogh & Jámbor, 2020; Benton, 2021; Dreoni, De Maria, *et al*., 2021; Kirkpatrick & Scrieciu, 2008; Kolcava *et al*., 2019; Meyfroidt *et al*., 2010). The launch of the *Trade and Environmental Sustainability Structured Discussions* (TESSD) in 2020, and the *Ministerial Statement on Trade and Environmental Sustainability* (WT/MIN21/6) published ahead of MC12 in November 2021, signal an ongoing change of attitude across the WTO. However, while a growing front of over 50 WTO members is highlighting the importance of addressing the sustainability implications of international trade in tackling climate change and other environmental challenges, negotiations are still largely focusing on trade-specific issues, leaving environmental issues to general preambles and to the dispute settling mechanism.

The Brazilian Government considers that foreign trade is one of the guidelines for the modernization process of the Brazilian economy. Expanding the Brazilian participation in international trade is one of the priority objectives of the Ministry of Economy, as a way to increase the productivity and competitiveness of the Brazilian economy and to ensure sustainable economic growth. To achieve this objective, the Ministry of Economy has followed a strategy based on three pillars: (i) reduction of non-tariff barriers to international trade; (ii) modernization of the Mercosur tariff structure; and (iii) expansion of the country's free trade agreement network[4]. As of April 2021, according to *Siscomex*[5] – a new tool launched in December 2021 for sharing information on trade agreements negotiated and under negotiation – Brazil is involved in 49 different commercial agreements. Among these, 25 are in force, 13 are undergoing the ratification process, 4 are under negotiation, 3 are in renegotiation, 2 are in the exploratory phase, and for 2 more the negotiations have been concluded.

As one of the major exporters of agricultural commodities and a member of the G20 negotiation block, Brazil has been quite vocal since the beginning of the Doha Round in seeking further liberalisation of agricultural trade. However, the country has shown less engagement in the ongoing WTO dialogue on environment and trade, especially since changes in the Ministry of Foreign Affairs in 2019. Brazil does not figure among the proponents of TESSD, nor it has signed the Ministerial Statement on Trade and Environmental Sustainability. This is in line with the view shared by a number of WTO members, that while trade, social, and environmental issues are interlinked, they should be addressed in separate international arenas.

2.1.2. REGIONAL TRADE AGREEMENTS

The slow progress of the agricultural trade reform within the WTO Doha Round has not hampered the negotiations for Regional Trade Agreements (RTA), which typically involves a smaller number of parties therefore having more chances to find a common ground for an agreement. According to the WTO Regional Trade Agreements Database[6], there were 81 RTAs in force in 2000, compared to 353 recorded as of February 2022.

The enactment of an RTA typically promotes trade liberalisation and increases traded volumes among the signatories, but it is also often associated with a range of wider social and environmental consequences. For instance, RTAs can accelerate agricultural land conversion and deforestation, especially in developing countries and in tropical ecoregions (Abman & Lundberg, 2020), and tracking their consequences on human rights and on other non-strictly economic dimensions of well-being remain a problematic task (Zerk & Beacock, 2021). As a response to these concerns, incorporating explicit sustainability provisions into the final text of RTAs is becoming an increasingly common practice, and the number and nature of these provisions have grown considerably (George, 2014). The evidence on the impact of such provision is still scarce and mixed (Martínez-Zarzoso, 2018), but there is some consensus around the idea that sustainability provisions can be more easily negotiated and adopted at the regional level, and that once such

[4] See: https://www.gov.br/produtividade-e-comercio-exterior/pt-br/comercio-exterior-e-assuntos-internacionais/arquivos/anexo-ii_secint-proposta_mapa_a3_4-0-1.pdf

[5] See: https://www.gov.br/siscomex/pt-br/acordos-comerciais/acordos-comerciais (Accessed on 24/08/2022)

[6] See: https://rtais.wto.org/UI/charts.aspx (last accessed on 25/08/2022)

provisions are included in one or more RTAs, then they can be more easily '*multilateralised*' (Draper *et al.*, 2017).

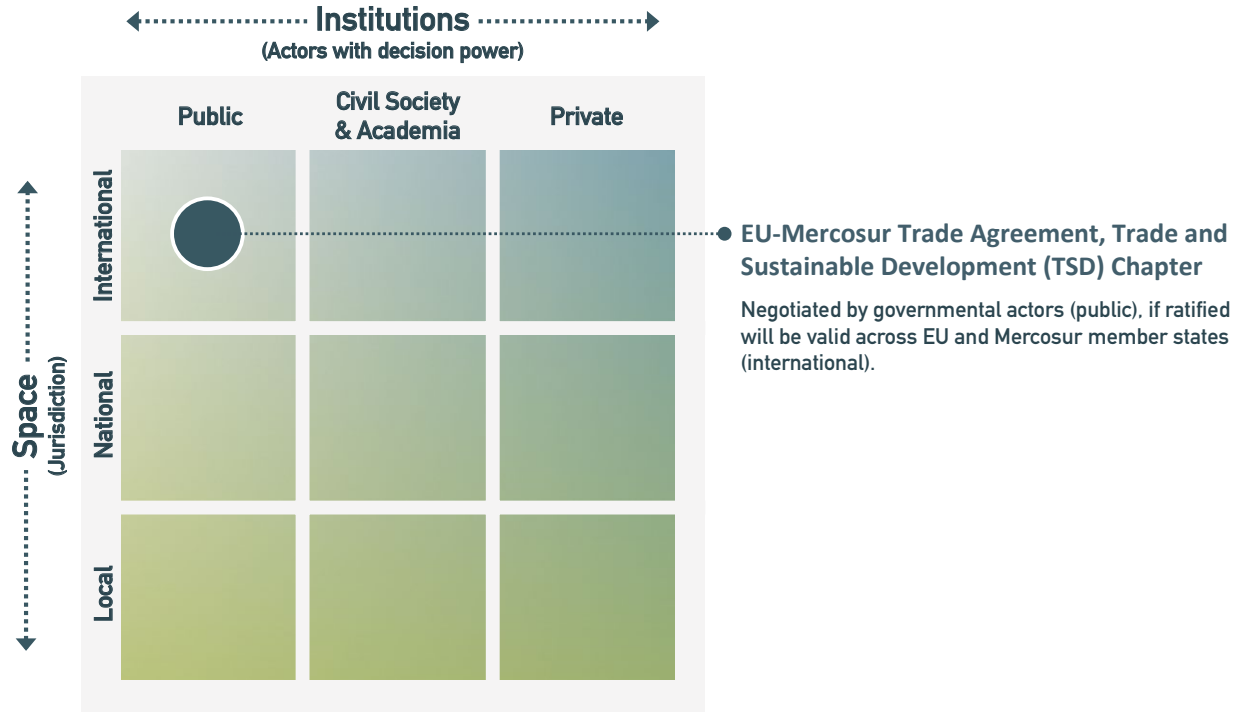
Among various RTAs, the EU-Mercosur Trade Agreement (EMTA) is particularly relevant for soybean trade, as it involves some of the top producing countries in Latin America, as well as the demand coming from the EU member states. The EMTA includes a Trade and Sustainable Development (TSD) Chapter, where all the sustainability provisions are grouped together. While this approach of including a section explicitly devoted to sustainability has been hailed as a very important step forward to include sustainability concerns in trade negotiations, it has also proved to be particularly contentious.

2.1.2.1. THE EU-MERCOSUR TRADE AGREEMENT

In 2019, about 20 years after the Heads of State and Government of Mercosur and the EU launched their negotiations for a Regional Trade Agreement, the parties reached a political agreement on the trade pillar of the EMTA. According to Siscomex, the Agreement will constitute one of the largest free trade areas in the world, integrating a 780 million people market and covering an area worth approximately a quarter of the world's GDP[7]. The Secretariat of Foreign Trade (SECEX) of the Ministry of Economy has estimated that the agreement will bring significant benefits to the Brazilian economy, boosting bilateral trade flows through the reduction of both tariff and non-tariff barriers, and contributing to the increase of total factor productivity and investments.

The text of the EMTA has been agreed in principle, and this include also the *Trade and Sustainable Development (TSD) Chapter*. However, the views on the sustainability implications of the EMTA are still mixed, and the deal has not been ratified yet. Several concerns have been raised by a vast coalition of civil society organisations, arguing that the deal, in its current shape, could aggravate climate change, deforestation, and biodiversity loss, whilst also threatening human rights and indigenous people[8].

FIGURE 8 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE EU-MERCOSUR TRADE AGREEMENT TSD



Source: Authors' elaboration.

[7] See: http://siscomex.gov.br/acordos-comerciais/mercosul-uniao-europeia/
[8] See: https://stopeumercosur.org/

A report launched by IMAZON in November 2020, highlighted how "*deforestation could increase in the Mercosur countries due the increased demand for agricultural products* [...] *and could affect sensitive regions in Brazil, including areas neighbouring indigenous lands and conservation units*" (Aguiar *et al.*, 2020, p. 7), concluding that the EMTA "*would result in additional deforestation and conflicts with indigenous populations*" and that (*Ibid.*, p. 8) "*the current agreement may not promote sustainable development as required by the EU trade regulation*". Other recent scientific articles support this view, suggesting that the EMTA could have severe consequences on people and nature (Arima *et al.*, 2021; Rajão *et al.*, 2020).

However, the official Sustainability Impact Assessment (SIA) commissioned by the EU and independently produced by the London School of Economics, takes a different stance, toning down potential negative impacts on the environment – "[...] *no significant expansion of the agricultural frontier would be expected as a result of the Agreement according to the modelling results. This seems realistic especially when we look at past and current productivity trends. Deforestation in Brazil has been on the increase since 2012 having previously declined very sharply in the period 2004-2012, while meat production continued to increase. This period 2004-2012 demonstrates that it is possible to increase agricultural and meat production without increasing pressure on forests*" (Mendez-Parra *et al.*, 2020, p. 13) – and on human rights – "*The moderate increases in GDP, income and consumption that the agreement generates in Mercosur in both scenarios can contribute to improving standards of living. The limited increase in agricultural production is not expected to impact indigenous rights substantially and it is not expected to raise further conflicts*" (*Ibid.*, p.14).

Despite different empirical estimates on the social and environmental implications of the EMTA, there is a consensus on the importance of the TSD chapter in addressing existing sustainability concerns. Even the SIA recognises that the positive outcomes of the EMTA "*will be dependent on the choice of flanking policies*" (*Ibid.*, p.13). In its position paper, the EU Commission reviews the SIA and recognises the existence of a number of sustainability concerns around deforestation, biodiversity loss, climate change, human rights, and Indigenous People, but concludes that "*the robust TSD Chapter provides an adequate legal framework and the proper tools to address these concerns*" (European Commission Services, 2021, pp. 21–22). Some authors challenge the view of the Commission, believing that – in its current shape – the chapter would fall short in addressing some important sustainability concerns. For instance, Krämer (2021), in its legal review, argues that the TSD is still incomplete when it comes to environmental protection, while Kehoe *et al.* (2020) identify three key sustainability shortfalls in the chapter, namely the limited involvement of local communities, the absence of a transparent mechanism to monitor the life cycle of traded commodities, and the lack of a robust enforcement system to uphold sustainability provisions.

The EMTA TSD chapter – at least to some extent – constitutes a precedent in international trade, shifting the focus of trade agreements from the mere trade liberalisation to a wider and more integrated conception of sustainable trade. However, sustainability is a multidimensional concept, and understanding what dimensions of sustainability are addressed by the TSD, and how, remains under debate. In addition, while trade liberalisation aspects of the agreements are less contentious, the sustainability provisions included in the TSD proved to be more controversial, ultimately slowing the ratification process of the EMTA.

2.1.3. BILATERAL TRADE RELATIONS AND SOYBEAN: THE BRAZIL-CHINA-USA NEXUS

Together with regional and multilateral trade agreements, bilateral relations between countries influence the volume, value, and direction of global trade flows. For instance, the US-China trade dispute, initiated by the Trump Administration in July 2018 by imposing a 25% tariff on an estimated US$34 billion of Chinese imports and with an immediate retaliation response from China that included, among other goods, agricultural commodities originating from the US, contributed to shifting the traditional equilibrium in the geopolitics of soybean trade, with Brazil surpassing the US and becoming the largest producer and exporter of this highly demanded crop (De Maria *et al.*, 2020). Despite some improvements in bilateral relations between USA and China following the signing of a phase one trade deal in January 2020 and the defeat of Donald Trump in the latest US presidential elections, President-elect Joe Biden made clear that his Administration was not going to lift tariffs imposed to Chinese imports in the short run[9].

[9] See: https://www.nytimes.com/2020/12/02/opinion/biden-interview-mcconnell-china-iran.html

As we write this paper, the bulk of duties imposed by USA and China on each other remains in place, and the US-China trade dispute is not over yet.

While trade barriers and bilateral relations between countries affect global trade and the economy, it is also becoming evident that they can have important sustainability implications, inducing further – direct and indirect – impacts on people and nature. For instance, looking at the escalation of the US-China trade tensions and focusing on soybean trade and production flows, Fuchs *et al.* (2019) warned about the land-use implications, estimating that an additional 5.7 to 12.9 million hectares of land would be required in Brazil to meet China's ever-growing demand and to cover for the reduction of Chinese soybean import from the US, thus increasing further the pressure on the Amazon Forest, Cerrado Ecossystems and other important Brazilian ecoregions. Yao *et al.* (2021) have estimated nitrogen and phosphorous pollution and water use consequences of China's tariffs on US agricultural commodities, finding that they would cause additional nitrogen and phosphorous pollution and increase the demand for fresh water in the USA, as local farmers substitute soybean for other more polluting and water-intensive crops. At the same time, the authors explore the consequences of the tariff-induced diversion of the Chinese demand for agricultural products from the US to Brazil, concluding that while the use of water and nitrogen would decrease in Brazil due to changes in the country's crop production mix, phosphorus pollution and deforestation would increase. He *et al.* (2019), using soybean under the US-China trade dispute scenario as an example, found empirical support for the fact that trade barriers tend to increase both economic and environmental costs, especially in the short run, thus undermining the sustainability of agricultural systems locally and globally.

The environmental risks induced by the Brazilian administration new priorities for environmental policy, which has been described as a series of "*changes to its environmental policies, including cuts to government agencies that enforce environmental protection laws*" (Arruda *et al.*, 2019, p. 1387), and which is ultimately threatening the ability of Brazilian authorities to monitor and enforce conservation and implement actions to combat deforestation (de Area Leão Pereira *et al.*, 2019).

As discussed in *Part I*, China is the largest consumer of soybean in the world. As its domestic demand for this crop continues to rise, soybean imports remain vital to China's economy and food security. At the same time, Chinese soybean buyers, processors, and consumers are heavily dependent on imported soy, and this constitutes the Achilles heel for China's soybean industry, as most of the imports are shipped by foreign companies[10] and Chinese companies have only limited direct control over productive land in Brazil (Oliveira, 2018). In this sense, Chinese access to imported soy in the long term depends on the preservation of ecosystems in source countries, and – for instance – on how well producers will cope with extreme weather events induced by deforestation and climate change, or with water scarcity, therefore sustainable production, consumption, and trade are crucial elements to mitigate supply chain risks and market fluctuations in the future (Teixeira & Rossi, 2020; Zadek *et al.*, 2014).

2.1.4. THE UK AND THE EU DUE DILIGENCE LEGISLATION FOR FOREST-RISK COMMODITIES

Multilateral, regional, and bilateral trade agreements are increasingly addressing sustainability issues, but progress remains still slow-paced compared to the rapid evolution of the global challenges – climate change, deforestation, and poverty eradication, just to mention a few – they are meant to help. Indeed, the inclusion of environmental and human rights provisions in trade negotiations has proved to be contentious, and these provisions are often watered down, or reduced in number and scope, during negotiations.

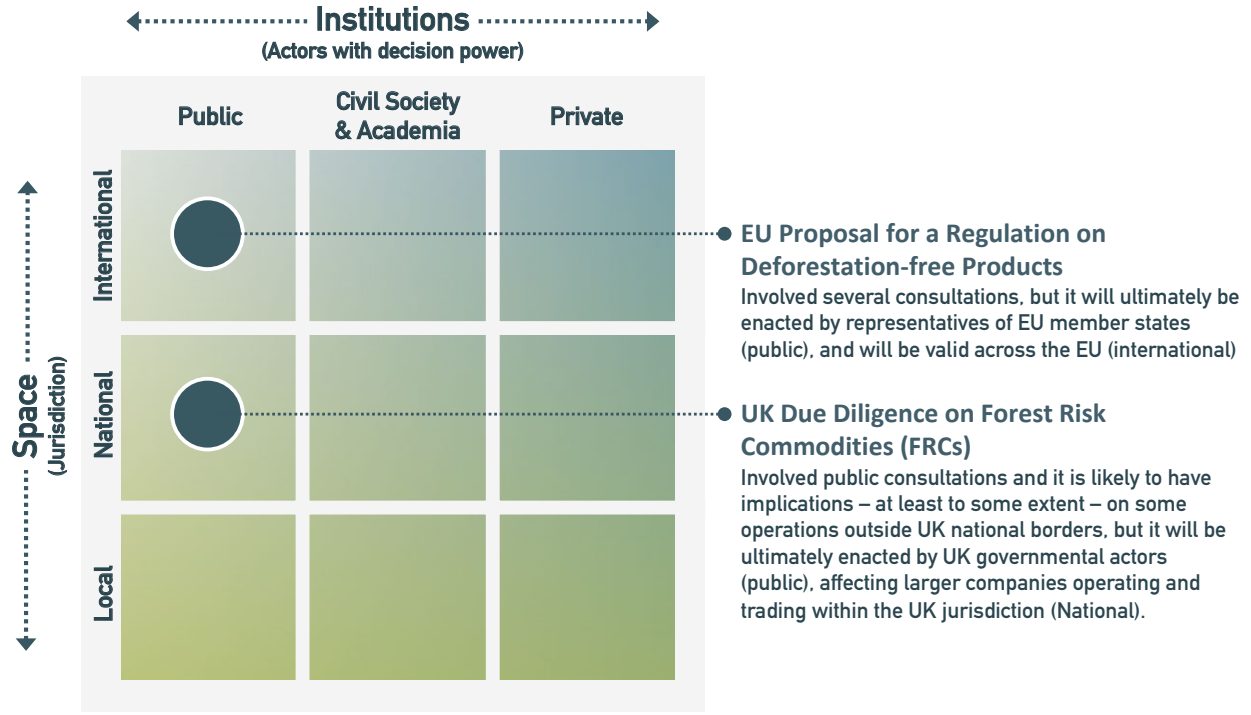
The difficulty in addressing sustainability issues in multilateral and plurilateral international forums – as reminded, for instance, by the outcomes of COP26 in Glasgow in relation to coal, where "*phase out*" was eventually replaced with "*phase down*" (Burki, 2022) – has fuelled new strategies. The so-called flanking approaches – that is, sustainability policies, regulations, and initiatives that are implemented, often domestically, by various stakeholders and in parallel with multilateral and regional agreements – are gaining traction, especially when it comes to addressing environmental issues.

[10] See TRASE supply chains data: https://supplychains.trase.earth/flows?toolLayout=1&countries=27&commodities=1&selectedColumnsIds=0_12-1_23-2_11-3_18&selectedNodesIds%5B%5D=161

The recent UK and EU deforestation due diligence laws are good examples of these new flanking approaches, aiming at dealing with the increasing complexity and interconnectedness of commodities supply chains, which is making it hard to track sustainability impacts and attribute responsibility across borders – from the original production areas to the final point(s) of consumption (Meyfroidt *et al.*, 2013). A 2020 report by WWF, for instance, reappraised the UK contribution to climate change by comparing territorial GHG emissions with the country's carbon footprint derived from domestic consumption (WWF UK, 2020). In the period 1990-2016, the UK authorities reported a 41% reduction in GHG emissions produced within the national borders. However, when looking at the carbon footprint deriving from the UK-based consumption in the same period, the estimated reduction in GHG emissions was just 15%. These figures not only suggests that the UK national efforts towards climate targets have achieved less than what it was initially envisaged, but also highlights that domestic reductions in GHG emissions have been largely obtained by offshoring emissions – mainly through imported goods and services – abroad, thus undermining international efforts to limit anthropogenic global warming. Adopting a similar rationale, Pendrill *et al.*, (2019) showed that net forest gains obtained by countries that have managed to reverse domestic deforestation, tend to be increasingly offset by the import of commodities such as beef, soybean, timber, and palm oil, that drive deforestation in foreign countries. In 2010, for instance, the forest area in the UK increased by almost 20 thousand ha, but the total deforestation embedded in UK imports in the same year was estimated at over 33 thousand ha[11].

The proposed UK and EU due diligence obligations for forest risk commodities aim at addressing this globalisation-induced risk of outsourcing and delocalising environmental damages, and in particular deforestation, outside national borders. The institutional and social boundaries of the two proposals are depicted in *Figure 9*. While these regulations vary in scope in Europe and the UK, they are similar in terms of the rationale, as they essentially require companies importing and

FIGURE 9 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE DRAFT UK AND EU DUE DILIGENCE LAWS ON FRCS



Source: Authors' elaboration.

[11] This figure was retrieved on-line, using: https://ourworldindata.org/grapher/domestic-forest-change-vs-imported-deforestation?minPopulationFilter=1000000&country=~GBR (retrieved on 10/03/2022, based on FAOSTAT and Pendrill *et al.*, 2019).

using specific commodities connected with severe deforestation risks to ensure that these have been produced and sourced in accordance with local regulation. Proposed enforcement mechanisms include – among other potential penalties – fines and stop notices. Being explicitly named as "deforestation-free" regulation, the EU proposal appears as wider in scope and ambition compared to the UK law, which in its current form is only limited to illegal deforestation (Reis *et al.*, 2021).

The general architecture of the UK due diligence on forest risk commodities has been set in section 116 of the long-awaited 2021 Environmental Act[12], but the details and its practical application are yet to be laid down with secondary legislation. Results from the consultation[13] conducted by the UK authorities suggest that the due diligence law would apply to larger companies operating with soybean, beef, leather, palm oil, cocoa, and rubber, although the suggestion to review regularly the list has been accepted (Molotoks & West, 2021). The EU proposal for a regulation on deforestation-free products[14] was published in November 2021, incorporating the findings of a large value-added assessment on different options for a EU legal framework to reverse EU-driven deforestation (Heflich, 2020). The EU proposal targets large operators and traders and extends to some extent also to small and medium-sized companies, conducting business with soy, beef, palm oil, timber, cocoa, coffee, and some important derived goods, such as leather, paper, furniture, and chocolate.

Both proposed due diligence regulations on Forest-Risk Commodities (FRCs) – together with international pledges such as the Glasgow Declaration on Forests and Land Use and the Bonn Challenge – represent a step forward in halting international deforestation and addressing the associated biodiversity and climate risks. While the jurisdictional boundaries (the UK and the EU borders) of the proposed laws might induce trade diversion via less regulated countries, these proposals are also setting a precedent, stimulating discussions around the adoption of similar approaches in other countries consuming forest-risk commodities.

The due diligence proposals discussed in this section focus mainly on deforestation and other related environmental issues, but also include some linkages with human rights and other social aspects of sustainability. However, in February 2022, the European Commission has gone one step forward, adopting what is intended as an all-encompassing due diligence proposal for a Directive on corporate sustainability, that addresses both environmental and human rights aspects of sustainability throughout global value chains[15]. These novel due-diligence-oriented flanking approaches appear very promising on paper, but it is still too early to evaluate their actual impact on different but interconnected dimensions of the sustainability of global commodity trade, production, and consumption flows. In a series of internal workshop held with Trade Hub partners in spring 2022, a number of key issues related to the EU and UK due diligence proposals emerged. First, it is unclear how different due diligence regulations, once implemented, will interact with each other and with existing regulations and standards; second, the impact on third party countries and on various stakeholders in producing regions outside the UK and EU jurisdictions is still not fully understood, which hihglights the importance of mapping capacity building and traning needs of smallholders and other supply chain actors, and at the same time raises the question of what would be the optimal mix of incentives to ensure full compliance in producing countires; third, different due diligence proposals are likely to produce – at least to some extent – trade diversion, leakage, and displacement effects, which might ultimately erode the net sustainability gains generated by these instruments; finally there is also an issue of technical feasibility that relates to the full traceability of commodities up to the sourcing plot of land, and while this is potentially feasibile, it is unclear weather this is something that can be implemented everywhere in the near future.

[12] See: https://www.legislation.gov.uk/ukpga/2021/30/contents (Last accessed on 12/03/2022).
[13] See: https://consult.defra.gov.uk/international-biodiversity-and-climate/implementing-due-diligence-forest-risk-commodities/ (Last accessed on 12/03/2022).
[14] See: https://ec.europa.eu/environment/publications/proposal-regulation-deforestation-free-products_en (Last accessed on 12/03/2022).
[15] See: https://ec.europa.eu/info/publications/proposal-directive-corporate-sustainable-due-diligence-and-annex_en (Last accessed on 10/03/2022).12/03/2022).

2.1.5. BEYOND TRADE: ENVIRONMENT AND HUMAN RIGHTS IN INTERNATIONAL AGREEMENTS

Social and environmental aspects of sustainability go beyond trade and global commodity supply chains. Indeed, environmental, wellbeing, and human rights issues are also regulated through a number of high-level international treaties, agreements, and conventions. If these international laws transcend the scope of this work, it is nevertheless important to mention at least some of the texts that constitute the backbone of transnational legal frameworks, as they define the global institutional context in which global efforts towards sustainable trade are taking place.

In an extensive review of the linkages between sustainable trade and biodiversity, UNEP (2021) identifies the key international treaties and conventions in this field. Alongside the Convention on Biological Diversity (CBD), which is defined as the "*centrepiece of global biodiversity governance*" (*ibid*., p.7), the authors list the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES), the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS), the *United Nations Convention to Combat Desertification* (UNCCD), the *Convention on Wetlands* (also known as the *Ramsar Convention*), the *World Heritage Convention* (WHC) and the *International Treaty on Plant Genetic Resources for Food and Agriculture*.

The cornerstone of international laws to combat climate change is the 1992 *United Nations Framework Convention on Climate Change* (UNFCCC), together with the legally binding instruments represented by the 1997 *Kyoto Protocol* and by the 2015 *Paris Agreement*. The main decisions around the evolution and the implementation of the UNFCCC are taken in annual meetings known as *Conference of Parties* (COP) – and we have previously mentioned COP26, which took place in Glasgow in 2021. Other important pieces of international law crucial to environmental sustainability are the *Montreal Protocol on Substances that Deplete the Ozone Layer* (1997), the *Geneva Convention on Long-range Transboundary Air Pollution* (CLRTAP, 1979) and its protocols, the *Convention on the Protection and Use of Transboundary Watercourses and International Lakes* (also known as the *Water Convention*, it was signed in 1992 and enacted in 1996), and the *Protocol on Water and Health*. However, this list is not exhaustive.

When it comes to social sustainability, and human rights in particular, the UN Office of the High Commissioner on Human Rights (OHCHR) lists 9 core international instruments[16]: the *International Convention on the Elimination of All Forms of Racial Discrimination*; the *International Covenant on Civil and Political Rights*; the *International Covenant on Economic, Social and Cultural Rights*; the *Convention on the Elimination of All Forms of Discrimination against Women*; the *Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment*; the *Convention on the Rights of the Child*; the *International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families*; the *International Convention for the Protection of All Persons from Enforced Disappearance*; and the *Convention on the Rights of Persons with Disabilities*. It is worth mentioning also the 1998 *ILO Declaration on Fundamental Principles and Rights at Work*, which is itself informed by a number of international labour conventions, and the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP, 2007). In addition, in July 2022 the UN General Assembly passed the resolution A/76/L.75, which recognises the right to a clean, healthy, and sustainable environment as a human right.

Finally, it is impossible not to acknowledge what is arguably the most important and all-encompassing UN Resolution for sustainable development, formally known as *Transforming our world: the 2030 Agenda for Sustainable Development* (A/RES/70/1). Adopted by all UN members in 2015, this document provides a shared international roadmap to achieve sustainable development, setting 17 Sustainable Development Goals (SDGs), which are then further disaggregated into 169 measurable targets. Section 68 of Agenda 2030 recognises international trade as "*an engine for inclusive economic growth and poverty reduction*", that "*contributes to the promotion of sustainable development*", with SDG targets 17.10, 17.11, and 17.12 promoting "*a universal, rules-based, open, transparent, predictable, inclusive, non-discriminatory and equitable multilateral trading system under the World Trade Organization, as well as meaningful trade liberalization*".

[16] See: https://www.ohchr.org/en/professionalinterest/pages/coreinstruments.aspx (last accessed on 13/03/2022).

2.2. DOMESTIC POLICIES AND REGULATIONS

The international context, as argued in the previous section of this paper, is crucial for sustainable trade. However, the nature of domestic institutional contexts also provides opportunities and challenges to address sustainability issues at various levels of global supply chains. This section of the paper reviews domestic policies and regulations in Brazil, that have the potential to affect the sustainability of the soybean industry.

2.2.1. AGRICULTURAL POLICY

Brazil, with its vast exported-oriented agri-food sector, is one of the largest producers and exporters of agricultural commodities in the world. Since the early 2000s, the country has decreased its agricultural market price support system and gradually dismantled other potentially distorting support mechanisms. At present, the levels of support and protection for its agriculture remain generally low, and domestic prices for commodities are largely aligned with international prices (OECD, 2021b).

Rural credit is the cornerstone of Brazilian agricultural policy, with PRONAF and PRONAMP providing access to credit at preferential rates to small-scale and medium farms, respectively. The 2020/2021 Agriculture and Livestock Plan, which was released by the Brazilian Ministry for Agriculture, Livestock and Food on annual basis, allocated the equivalent of 53 billion US$ for rural credit, with two shares of about 14% each committed for PRONAF and PRONAMP, and the remaining 72% allocated for other farmers outside the PRONAF and PRONAMP remit (*Ibid.*).

Since 2008, all rural credit is subject to various criteria of environmental conditionality, and it has been linked to the Environmental Rural Registry (in Portuguese, Cadastro Ambiental Rural – CAR) after its inception in 2012. Recent studies started to explore the sustainability implications of rural credit, assessing for instance the impact of rural credit on income inequalities in rural areas (Neves *et al.*, 2020) and on the adoption of sustainable farming practices, such as integrated crop-livestock systems (Carrer *et al.*, 2020).

Other important instruments of agricultural policy in Brazil include the so-called '*Agro law*' (Federal Law 13.986 of 7 April 2020); the zoning of agricultural areas based on climatic risk (ZARC – Agricultural Risk Zoning); the promotion of sustainable agricultural practices, for instance via specific credit lines provided under the Low Carbon Agriculture Program; various forms of insurance to reduce risks and uncertainty in agriculture associated with natural disaster; and interventions in the biofuels sector, which since 2017 have been linked to the efforts in reducing GHG emission under the Paris Agreement through the RenovaBio national policy initiative.

Some original local-level interventions with explicit sustainability goals are being implemented, such as the Green Grain Protocol in the State of Pará (hereinafter, simply the Protocol), which is discussed in the next section. The participation of private sector companies is voluntary and this instrument could have been as well included in the section on voluntary tools, but the Protocol was spearheaded by a coalition of public actors, including the Government of the State of Pará, the Public Prosecutor's Office, and a number of public officials from local Municipalities, so it was eventually decided to discuss it here, as a relevant example of devolved policy tool for sustainable soy.

2.2.1.1. THE GREEN GRAIN PROTOCOL

The Grain Green Protocol of Pará (Governo do Pará *et al.*, 2017) was launched in 2014[17] to define criteria and guidelines to prevent the sourcing of grains – namely soybean, rice, and maize – produced and traded in the State from illegally deforested areas. The agreement resulted from a partnership between the Federal Prosecutor Office (MPF in Portuguese), the Government of the State of Pará, the grain-producing and trading companies led by the Brazilian Oilseed Processors Association (ABIOVE in Portuguese), and other private actors. As of May 2021, over 30 companies have voluntarily subscribed the Protocol, including the largest soybean trading companies, ADM, Bunge, Cargill, and COFCO.

The signatories committed to purchasing grain only from producers with rural properties that: 1) are registered in the Environmental Rural Registry (CAR); 2) have regular purchase invoices; 3) do

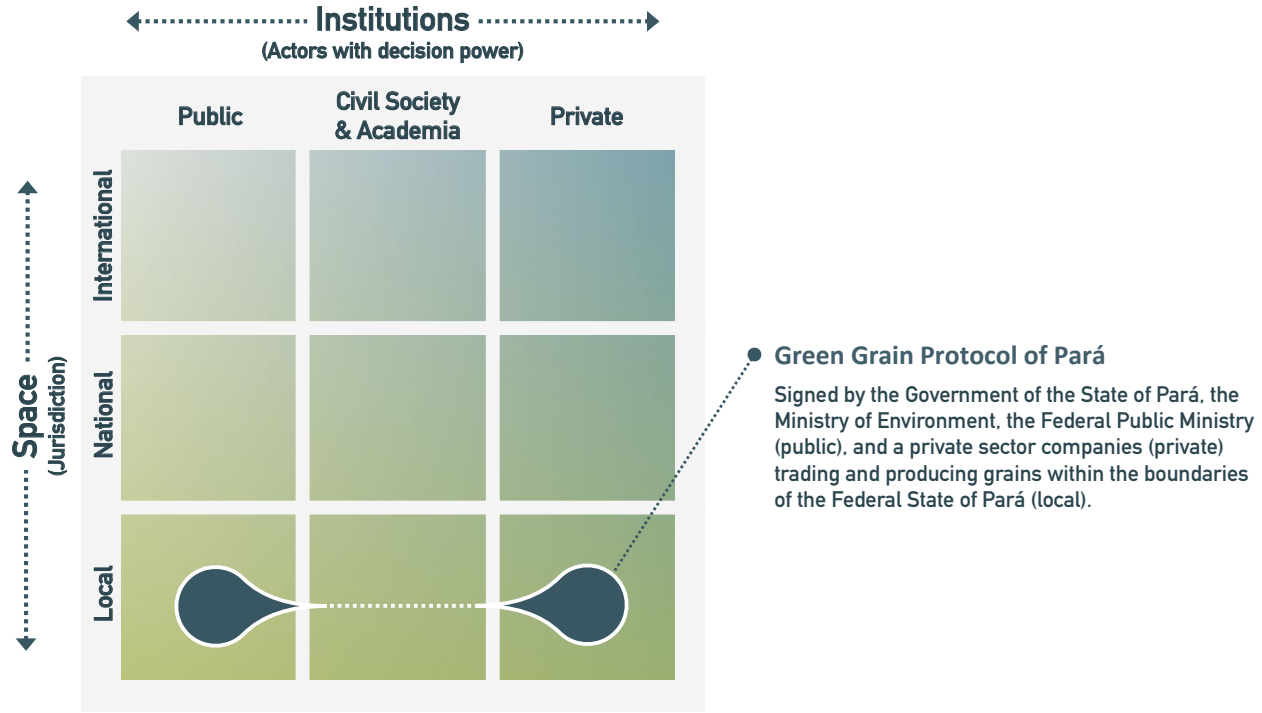
[17] See: https://www.soyontrack.org/public/media/arquivos/1634662970-008_-_19.10.2021_-_protocolo-de-graos-versao-assinada.pdf (last accessed on 16/02/2022).

not figure on the list of areas embargoed by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA in Portuguese); 4) do not figure on the so-called "*slave labour dirty list*" (*Lista Suja do Trabalho Escravo*[18] in Portuguese, which is compiled by the Brazilian Ministry of Labour); 5) have not deforested illegally after July 2008, and; 6) are not in areas overlapping with conservation units, Indigenous land, and Quilombolas. Another relevant point is the inclusion of a proportionality criteria between the amount of grains produced by each property and the productive capacity of the area. This is to avoid "*grain laundry*" – that is, the practice of allocating grain originally produced elsewhere, and potentially in areas that do not meet the standards set in the Protocol, to different farm units. For soybean, the maximum threshold is set at 60 bags (corresponding to approximately 66 kg) per hectare,. More recently, in 2017, a new criterion was integrated into the Protocol, requiring that the producing property is not involved in any environmental-damage-related litigation with the MPF or with other public authorities.

The compliance with the requirements set in the Protocol is monitored annually, through an independent audit process. A Steering Committee of public and private sector representatives of the signatories closely follow and inform monitoring and evaluation activities, including the audit process. The penalty for companies dealing with grains sourced from irregular properties is a three-year embargo on purchasing soybean produced in the whole Pará State (Governo do Pará *et al.*, 2017; Nunes *et al.*, 2017).

The Protocol was originally signed in Belém in 2014, but some aspects of its actual implementation proved to be slow-paced. For instance, the first independent audit covered the 2017-2018 campaign, and results were communicated to the Steering Committee only in 2019. According to Gueiros *et al.* (2021) and based on interviews with a member of the Steering Committee of the Protocol, the delay reflected the installation of the new State Prosecutor, but also the efforts for the approval of the Terms of Reference of the Protocol, as well as negotiations with new prospective signatories.

FIGURE 10 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE GREEN GRAIN PROTOCOL OF THE STATE OF PARÁ



Source: Authors' elaboration.

[18] See: https://www.gov.br/trabalho-e-previdencia/pt-br/composicao/orgaos-especificos/secretaria-de-trabalho/inspecao/areas-de-atuacao/cadastro_de_empregadores.pdf (Last accessed on 08/02/2020).

One of the strengths of this Protocol is that its implementation is monitored at the level of individual rural properties, which reduces the possibility to challenge the audit results in terms of the attribution of deforestation to specific farming units. This system differs from the Soy Moratorium, where monitoring operations target area polygons to detect deforestation via satellite imageries, with potential problems in identifying the boundaries of each property within a given polygon. On the one hand, the Protocol prohibits the purchase of grains only from illegally deforested areas, while the Moratorium targets both legally and illegally deforested areas. On the other hand, the protocol goes further in terms of social sustainability, including provisions not only related to slave labour, but also to Indigenous land and Quilombolas. Overall, the combination of these two instruments – the Protocol and the Soy Moratorium – has the potential to generate positive synergies in reducing commodity-led deforestation and land-use conflicts in the State of Pará, although the protocol might have a trade diversion effect, indirectly favouring other producing regions in the Amazon and elsewhere, with lower sustainability standards.

2.2.2. ENVIRONMENTAL POLICY AND THE NEW FOREST CODE IN BRAZIL

Chapter VI of Title VIII of the Brazilian Federal Constitution (Chamber of Deputies, 2010) sets the foundation of the country's environmental policy, with Article 225 stating that "*All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations*". However, many have challenged the evolution of Brazilian environmental policy under the current Administration (Barbosa *et al.*, 2021; Rajão *et al.*, 2020). For instance, Arruda *et al.* (2019, p. 1387) have argued that under the new administration Brazil has enacted a series of changes on the priorities for its environmental policies, "*including cuts to government agencies that enforce environmental protection laws,* [...] *leading to an alarming increase in deforestation that has affected both protected areas and indigenous lands*". A recent OECD review of the environmental policy and performance in Brazil, acknowledged that while the country has developed a robust legislation on aspects such as water, waste management, environmental information, and biodiversity, the actual implementation of biodiversity, sustainable natural resource management, and forest laws is still challenging, with other areas of the country's environmental policy falling behind OECD standards (OECD, 2021a).

The tension between the ongoing demand for expansion of the agricultural and livestock sectors and the need to preserve biodiversity and natural ecosystems in the country, is well captured in the debate around the new Forest Code in Brazil (Azevedo *et al.*, 2017; Brandão *et al.*, 2020). Formally known as the Native Vegetation Protection Law No.12651/2012, the new Forest Code was informed by several technical and public consultations, and nevertheless it was the cause of a vigorous debate in the Brazilian Congress and remained under review by Federal Supreme Court from 2013 to 2018.

The new Forest Code establishes the general rules on the Protection of Native Vegetation and introduces three main conservation instruments, namely the *Legal Reserve* (RL), *Permanent Preservation Areas* (APP), and the already mentioned CAR – the *Rural Environmental Registry*. The RL is calculated as a proportion of the area of agricultural holdings, and depending on the specific type of vegetation and location, it ranges from 20% to 80%, with higher proportions typically applied within the Legal Amazon (Chiavari & Leme Lopes, 2015). The APPs are conservation areas of critical importance for ecosystem functions (generally riparian forests and hilltop vegetation), where the natural vegetation has to be left wholly intact. The CAR database is a tool for the control of deforestation in private rural properties, and it is accompanied by the Environmental Regularisation Program (PRA), which aims at facilitating compliance with the provisions of the new Forest Code for landowners under the so-called 'special regime' – that is, owners who irregularly cleared forests within their properties before July 2008.

In principle, the registration of all rural properties into the CAR should be mandatory, and access to the PRA and to various public and private sources of agricultural credit are subject to it. As of February 2022, over 6.5 million rural properties covering about 618 million ha were formally inscribed in the CAR, 52% of which have applied to join the Environmental Regularisation Program (Serviço Florestal Brasileiro, 2022). However, after a decade from its official publication, the new Forest Code and the related interventions facilitating registration and regularisation are progressing at a slow pace and they are still facing major implementation challenges in many States of the Brazilian Federation (Chiavari *et al.*, 2020).

Carvalho *et al.* (2019) argue that Brazil's

enforcement and legal systems provide multiple opportunities for infractions of environmental laws. For instance, CAR and PRA information are largely based on self-declarations by landowners, which are typically accepted by licensing authorities when issuing deforestation permits. Other experts have focused on the limits of the new Forest Code in halting deforestation, highlighting the lack of economic incentives for property owners to fully comply with the legislation (Azevedo *et al.*, 2017), and the limits of a legality-based approach, in a country where an estimated 3.5 million ha of natural ecosystems are at high-risk of legal deforestation – without even taking into account the impact of the country-wide regularisation program for properties that deforested illegally before July 2008 (Reis *et al.*, 2021). If soy-led deforestation rates are starting to slow down in the Amazon after a new spike post-2012, in the Cerrado it is estimated more than half of rural properties producing soybean have violated the provisions of the new Forest Code, a figure that is approximately five times the average violation rate observed for all other agricultural units in the same region (Rausch *et al.*, 2019).

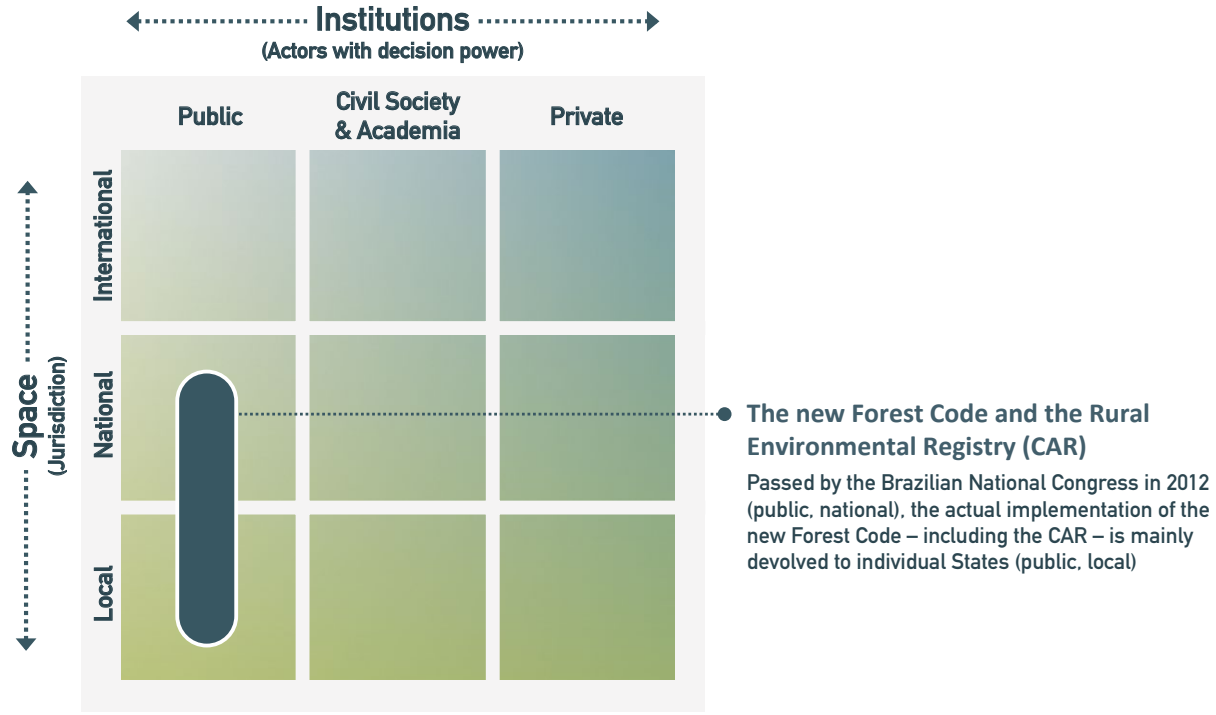
2.2.3. FINANCIAL INSTRUMENTS

In the report Banking Beyond Deforestation, The University of Cambridge Institute for Sustainability Leadership (2021) argued that banks, and trade finance in particular, could play a central role in supporting traceability efforts in partnership with data providers; in raising sustainability standards and requiring traceability and transparency as a condition to access finance; and in mobilising funds that channel finance and promote sustainable practices in agricultural supply chains.

Alongside existing public credit programs administered under the *Rural Credit* policy in Brazil, there are also a number of other important agricultural financial mechanisms promoted jointly or in parallel by the private sector. For instance, law number 13.986/2020, also known as *MP do Agro* or simply *Agro law*, addressed some of the controversial restrictions on foreign ownership of rural land in Brazil. While a number of limitations on extraterritorial land ownership remain in place, the Agro law entitled foreign-controlled entities to receive fiduciary liens on land, thus opening new lines of public and private credit based on the extension to foreigners of this form of security interest.

In Brazil, most financial mechanisms promoting sustainable soy focus on producers. Brazilian banks are legally required to contribute to the Brazilian National Rural Credit System (SNCR), which is designed to provide rural credit at low-interest rates to producers. The first phase of the *ABC Program* (Low Carbon Agricultural Program) ran between 2010 and 2020. It was developed to finance

FIGURE 11 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE NEW FOREST CODE AND THE CAR



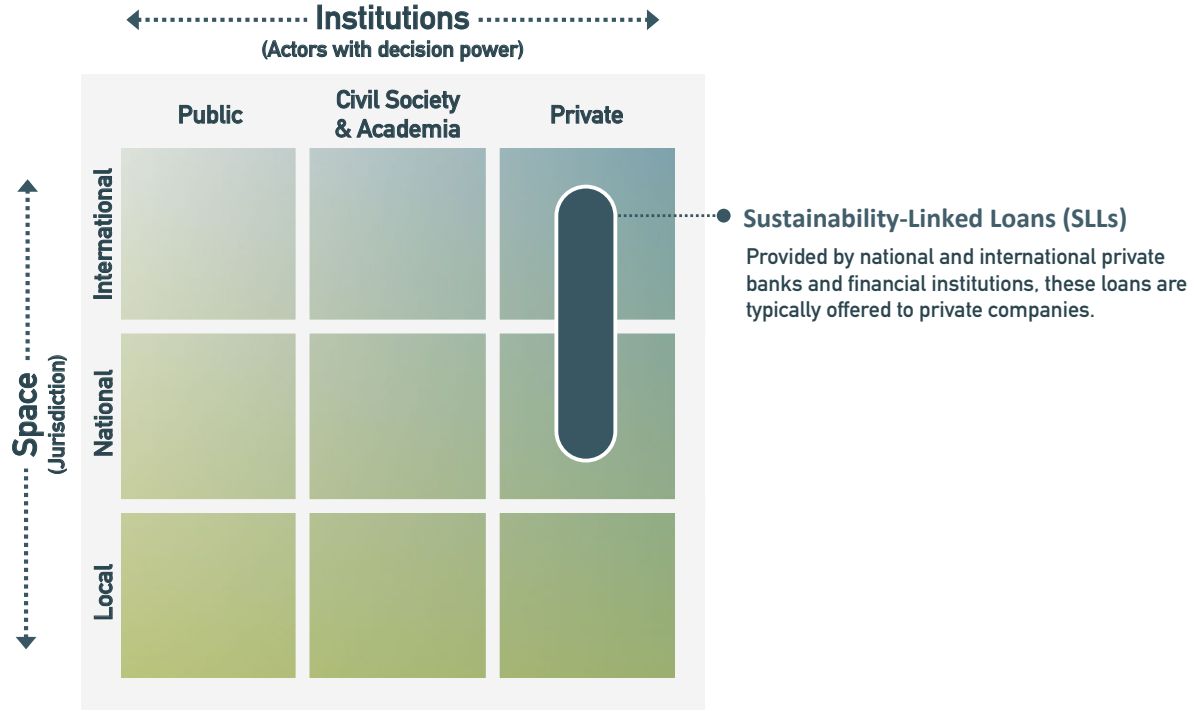
Source: Authors' elaboration.

agricultural practices aiming to intensify production and reduce GHG emissions. However, due to the lack of banks' readiness to develop a market for it and the difficulties for producers to meet its eligibility criteria, its uptake has generally been very low. For instance, in 2015 granted loans through the *ABC Program* only represented 1.9% of the total rural credit available and its potential to promote sustainable practices was considered limited (Lopes & Lowery, 2015). The ABC program was reviewed and eventually renewed for the period 2020-2030 by the Brazilian Minister of Agriculture, Livestock and Food Supply, which labelled the new plan as '*ABC plus*' (Brazil Ministry of Agriculture, Livestock and Food Supply, 2021).

When it comes to making supply chains more sustainable, international banks play an important overarching role. According to the WTO[19], between 80 and 90% of global trade relies on various forms of trade finance, so international banks are well-positioned to facilitate the adoption of anti-deforestation and other sustainability commitments for global supply chains. In recent years banks have put in place new anti-deforestation policies to manage their exposure to deforestation risks. They are generally applied during their customers' onboarding process and adopt an inclusion-exclusion approach (Global Canopy, 2021).

The Banking Environment Initiative (BEI) argued that linking sustainability incentives to the cost of trade finance was the most viable option to promote sustainable trade in commodities in the short term, and suggested that Central Banks, Multilateral Development Banks, Export Credit Agencies and government sovereign funds should facilitate access to cheaper capital and to share risk for sustainable finance purposes (CISL, 2016). The World Economic Forum and Tropical Forest Alliance (2018) jointly called for new financing models that incorporate supply chain sustainability incentives – such as linking interest payments to sustainability performance – as a mechanism to remove deforestation from commodity supply chains. These initiatives led to the creation of Sustainability Linked Loans (SLLs), which provide incentives to the borrower to achieve predetermined social and environmental sustainability targets measured through specific Key Performance Indicators (KPIs) (Loan Market Association, 2019). Sigles Robert and Tayleur (2020) explored the potential of SLLs offered by international banks to halt deforestation in the Brazil-China soy supply chain.

FIGURE 12 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF SUSTAINABILITY-LINKED LOANS (SLLS)



Source: Authors' elaboration.

[19] See: https://www.wto.org/english/thewto_e/coher_e/tr_finance_e.htm.

It was found that while SLLs can be an incentive to accelerate the achievement of traders' sustainability commitments, the level of adoption is still low due to factors such as the high costs of verification of targets, the lack of specific KPIs on deforestation, and the low attractiveness of the incentives currently offered. Their research also concluded that, although traders and credit institutes should join forces, banks are potentially better positioned to influence Chinese soy buyers in adopting anti-deforestation reporting and promoting the uptake of certifications for sustainably sourced and produced soy.

Some experiments of blended – public and private – finance for a sustainable supply chain are important to mention. In Brazil, for instance, the Treasury pays for the difference between the market interest rates and the discounted interest rates offered through the Rural Credit to promote sustainable agriculture, but this only applies to Brazilian banks and producers, thus reducing the scope to domestic finance only and excluding most international supply chain actors (Lopes & Lowery, 2015). The Forest Investment Program[20] – administered by the World Bank and implemented with four other Development Banks – constitutes another example of blended finance, supporting public and private investments designed to reduce deforestation and forest degradation in developing countries. Finally, the *Agri3Fund*[21], which is a partnership between UNEP, the Dutch Development Bank, IDH, and Rabobank, offers producers committing to forest preservation and restoration access to special forms of credit granting a longer tenor as well as a capital interest discount.

2.3. VOLUNTARY TOOLS

The urgency of addressing sustainability challenges in global commodity supply chains has contributed to the rapid multiplication and diversification of voluntary instruments over the last two decades. For instance, out of a total of 318 sustainability standards listed in the ITC Standards Map[22] as we write this paper, there are 95 different standards for soybean, of which at least 55 are focusing on Brazil as a country of origin. These standards address different dimensions of sustainability – from human and labour rights to gender disparities, and from climate change to food security. Alongside Voluntary Sustainability Standards (VSS) and certifications, several other sustainability-oriented supply chain initiatives promoted by civil society coalitions, NGOs, and private companies have been developed. These include multistakeholder initiatives such as roundtables, as well as voluntary pledges and corporate commitments. In an extensive review of such interventions with a focus on anti-deforestation, Lambin *et al.* (2018, p. 109) argued that "*they fall short on several fronts*" and that "*Zero-deforestation policies by companies may be insufficient to achieve broader impact on their own due to leakage, lack of transparency and traceability, selective adoption and smallholder marginalization*", *concluding that ultimately "Public–private policy mixes are needed to increase the effectiveness of supply-chain initiatives that aim to reduce deforestation*".

This section of the paper focuses on voluntary sustainability tools, exploring key opportunities and challenges associated with roundtables, standards, certifications, pledges, and other voluntary commitments. We focus on those voluntary instruments that have the potential to increase the sustainability of the soybean supply chain, particularly in Brazil.

2.3.1. ROUNDTABLES, STANDARDS, CERTIFICATIONS, AND OTHER VOLUNTARY COMMITMENTS

Certification schemes based on sustainability criteria are increasingly used by agri-food firms to label products as environmentally or socially sustainable, with important implications on the sustainable management of natural resources both globally and locally, but also on the ability to access different markets and on the competitiveness of companies involved in international trade operations (OECD, 2016; Prag *et al.*, 2016). When it comes to soybean, *ProTerra* and the *Roundtable on Responsible Soy* (RTRS) are arguably the main certification schemes. Certification schemes are increasingly used as compliance criteria for corporate sustainability standards, private finance in the agricultural sector, and – to some extent – government regulations and international agreements. This is the case for palm oil in the Comprehensive Economic Partnership Agreement (CEPA) signed between Indonesia the European Free Trade Association (Global Canopy, 2021;

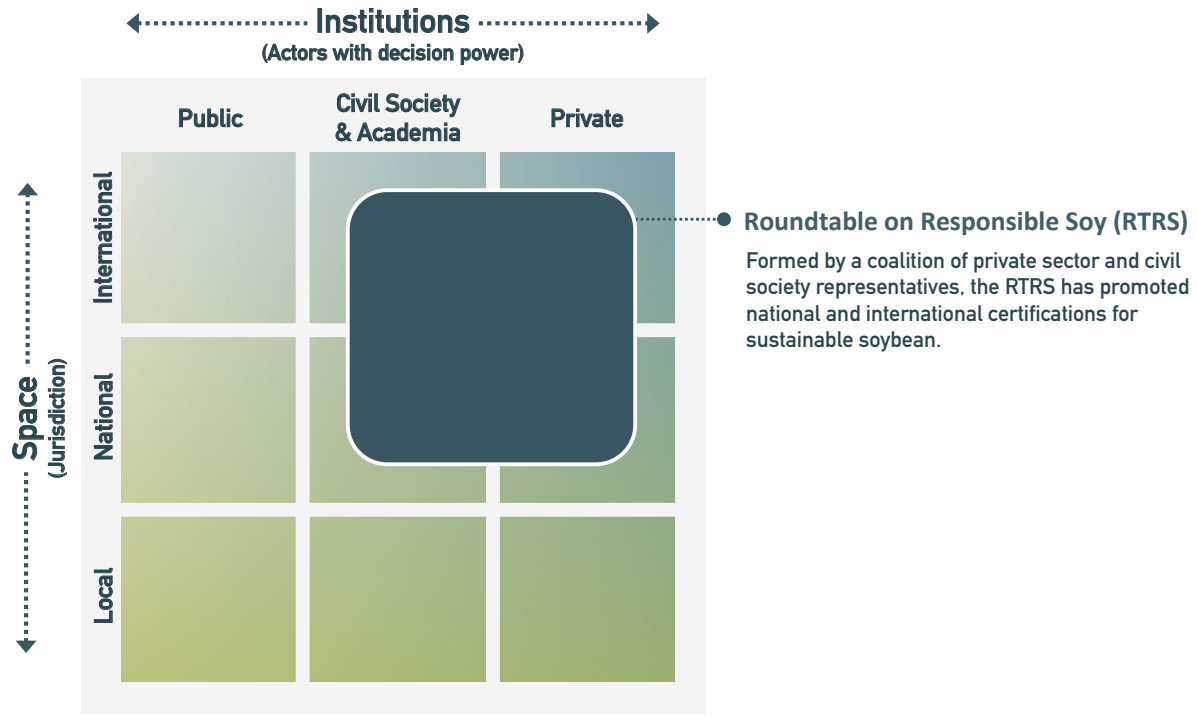
[20] See: https://www.climateinvestmentfunds.org/topics/sustainable-forests.
[21] See: https://agri3.com/about/.
[22] See: https://www.standardsmap.org/en/home.

Lambin & Thorlakson, 2018; UNEP, 2021a). While certifications are flexible enough to address various social and environmental dimensions of sustainable development, including sustainable commodity trade, their uptake is still generally too low to accelerate systemic change, and important barriers continue to limit their adoption particularly in developing countries (UNCTAD, 2021). For instance, IISD estimated that soybean production compliant with the main Voluntary Sustainability Standards (VSS) existing in the sector corresponded to only about 2% of the total soybean production in 2018 (Voora *et al.*, 2020), although it must be also acknowledged that certification schemes for other commodities such as coffee or tea have recorded higher levels of adoption (FAO, 2017).

Another drawback of different VSS is that they impose direct and indirect costs to producers and traders. For instance, the additional costs required to produce RTRS-certified soy – between $3 to $4 per metric ton – are generally seen as too high to meet the demand coming from the Chinese soy industry, which needs to keep processing costs below $20 per metric ton to be profitable (World Economic Forum & Tropical Forest Alliance, 2018). Moreover, although surveys of Chinese consumers found that 44% of respondents actively look for information on product sustainability (Hayward *et al.*, 2014) and that over 70% are willing to pay a 10% premium for sustainably produced products (Li *et al.*, 2017), this has not translated into higher demand for certified soy. Indeed, it can be argued that soybean is a low-visibility commodity on product labels (e.g. meat packaging), so the potential for product differentiation is negligible, and this also makes it difficult to justify premium prices (Mayer & Gereffi, 2010; Rueda *et al.*, 2017). In this sense, a lack of downstream demand from consumers appears to be a key barrier to the mainstreaming of private 'market-based' certification schemes.

A series of new private- and civil-society-led initiatives have gained momentum in the last few decades. Known as roundtables or multistakeholder initiatives, these tools are often seen as an alternative way to break the political impasse that often characterises public policymaking and legislation processes, while also promoting dialogue and participation across various stakeholders with potentially conflicting interests. Increasingly viewed as an innovatitve solution to the controversies surrounding sustainability issues in global commodity supply chains, these initiatives have been also seen as a paradox. For instance, Turcotte and Pasquero (2001) argued that while Roundtables typically address major and intractable sustainability challenges, they often only

FIGURE 13 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE ROUNDTABLE ON RESPONSIBLE SOY (RTRS)



Source: Authors' elaboration.

contribute to 'small wins'. Schouten, Leroy, and Glasbergen (2012) analysed the democratic nature of deliberative processes embedded in roundtables and concluded that they tend to lack inclusiveness, also highlighting that (*ibid*., p. 42) "*On the one hand, private multi-stakeholder arrangements are seen as a way of democratizing international environmental governance. On the other hand, the democratic potential of these arrangements has been heavily criticized and interpreted as a privatization of what should be public*". Despite these limitations in terms of democratic representativeness, effectiveness, and legitimisation, roundtables remain at the forefront of global and local efforts towards sustainable supply chains, and initiatives such as the Roundtable on Responsible Soy (RTRS) and the Global Roundtable for Sustainable Beef (GRSB) in the Brazilian soybean and beef complex continue to play a crucial role in addressing socio-economic and environmental concerns (Buckley *et al*., 2019; Nakagawa *et al*., 2021).

Commitments and pledges are other expressions of voluntary sustainability tools that are becoming increasingly popular, especially when it comes to forest-risk commodities. According to Garrett *et al*. (2019, p. 135):

"Anti-deforestation commitments are a type of voluntary sustainability initiative that companies adopt to signal their intention to reduce or eliminate deforestation associated with commodities that they produce, trade, and/or sell. Because each company defines its own zero-deforestation commitment goals and implementation mechanisms, commitment content varies widely. This creates challenges for the assessment of commitment implementation or effectiveness".

However, according to the 5-year assessment report on the New York Declaration on Forests, with over 850 anti-deforestation commitments set by 481 different companies for 2020, the number of commitments is staggering, but so it is also the lack of tangible and verifiable progress (NYDF Assessment Partners, 2019). Despite having pledged over 12 million ha of forests for restoration under the Bonn Challenge (IUCN, 2021), Brazil lost 1.7 million ha of primary forests in 2020 alone, according to data from WRI's Forest Pulse[23]. While an estimated 49% of Brazilian soy exports were covered by some kind of anti-deforestation commitment in 2017 (Kuepper *et al*., 2017), soybean traders who engaged in anti-deforestation commitments have been associated with similar deforestation-risk rates to those with no commitments (Trase, 2020), ultimately suggesting that policy definitions and implementation mechanisms have not been fully effective. There are a number of reasons for the limited progress to date on anti-deforestation commitments, including weak reporting practices, the lack of intermediate milestones and the incomplete definition of measurable targets, and multiple – and sometimes conflicting – definitions of 'forests' and 'deforestation' (Brown & Zarin, 2013; Garrett *et al*., 2019)

2.3.1.1. THE SOY MORATORIUM: FROM THE AMAZON FOREST TO THE CERRADO AND BEYOND

With hybrid elements from various voluntary certification schemes, roundtables, and commitments, the Amazon Soy Moratorium is arguably the most important anti-deforestation initiative for the soybean sector in the Brazilian Amazon. First launched in 2006 and renewed indefinitely in May 2016[24], the Soy Moratorium prevents companies from buying or producing soy in areas of the Amazon biome deforested after July 2008 – in line with the threshold date set in the Environmental Regularisation Program that accompanies the new Forest Code in Brazil.

Compared to other voluntary tools, the Soy Moratorium has achieved a very wide level of adoption, covering over 90% of the soybean traders operating in the Amazon region (Zu Ermgassen *et al*., 2020). This element, together with a rigorous monitoring process through satellite imagery that has been refined over the years (ABIOVE *et al*., 2019), have contributed to the success of this initiative, ultimately reducing soy-led deforestation in the Amazon biome (Heilmayr *et al*., 2020; Inakake de Souza *et al*., 2016).

However, while the Soy Moratorium increased the control over deforestation in the Amazon, it was also conducive of a shift of the soybean frontier towards other less regulated regions in Brazil (Moffette & Gibbs, 2021). It is estimated that the area devoted to soybean has more than doubled in South America since the year 2000, but almost half of this expansion has occurred in the Cerrado, mainly replacing existing pasture and grassland areas, as well as non-primary forests (Song *et al*., 2021). Given this picture, many have called for an extension of the soy moratorium to neighbouring areas, including the Cerrado biome in the MATOPIBA region (Brandão *et al*., 2020; Inakake de Souza *et al*., 2016; Nepstad *et*

[23] See: https://research.wri.org/gfr/forest-pulse.
[24] See: https://www.soyontrack.org/public/media/arquivos/1604689680-amazon_soy_moratorium.pdf.

al., 2019; Soterroni *et al.*, 2019).

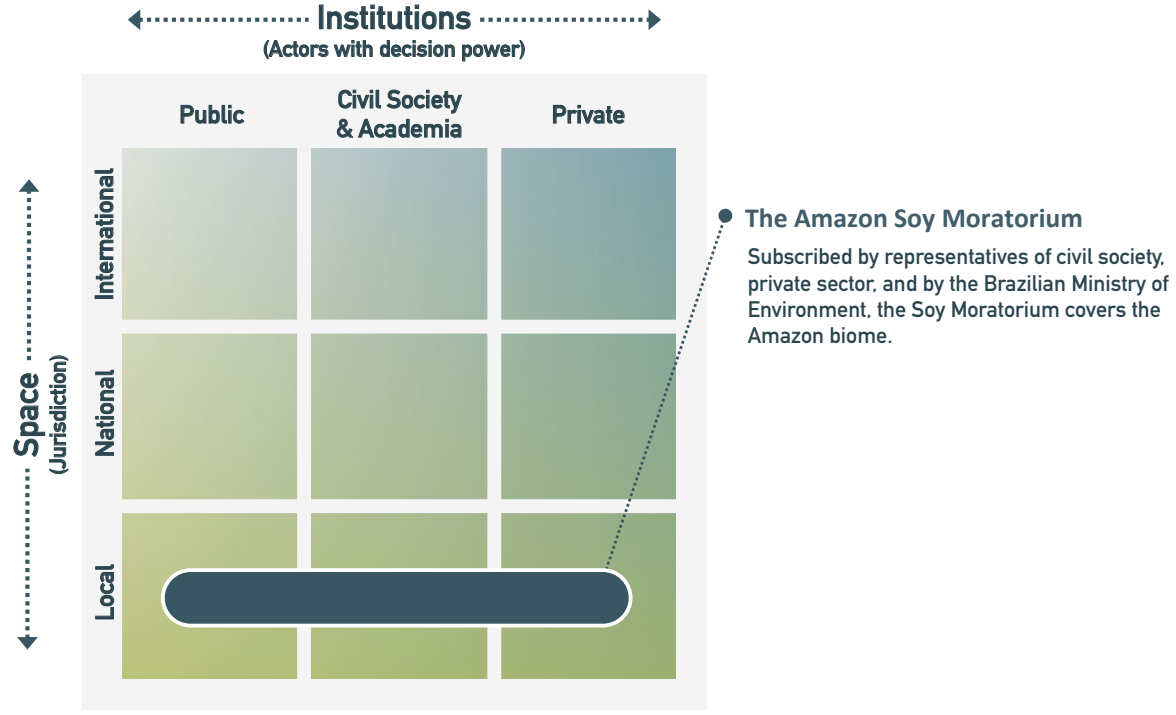
While the literature assessing the deforestation-related effects of the Soy Moratorium is burgeoning, its socio-economic implications have received less attention so far. In general, the rapid growth of soybean cultivated areas across different Brazilian regions has been associated with mixed development and wellbeing outcomes (Dreoni, Schaafsma, *et al.*, 2021; Favareto *et al.*, 2021; Piras *et al.*, 2021), but there is growing evidence supporting the idea that the soybean miracle is fostering dynamics of dispossession and exclusion of local actors, alienating local communities and Indigenous people from the governance of natural resources of from local food systems (Russo Lopes *et al.*, 2021). In this sense, the Soy Moratorium explicitly addresses in its audit process the issue of labour exploitation with a reference to the so called "*slave labour dirty list of employers*", but it remains unclear what other dimensions across the spectrum of socio-economic sustainability are addressed by this instrument.

2.4. OTHER INSTRUMENTS

The list of sustainability-related instruments and initiatives relevant for the Brazilian soybean supply chain is already very extended, but there are a number of other potential tools – which will be discussed in this section – that would not necessarily fit under the categories analysed previously, or that are still at a piloting stage.

One such tool, for instance, is the Carbon Border Adjustment Mechanism (CBAM), which aims at reducing the risk of carbon leakage. In particular, according to the 2021 Emission Gap Report (UNEP, 2021b, p. XI) the CBAM is a "*Mechanisms that act to equalize the price of carbon between domestic products and imports to eliminate financial incentives in order to relocate production outside of regions with strong climate controls*". As part of the package of reforms known as the European Green Deal, the EU is planning to introduce a CBAM that will initially apply to a limited number of carbon-intensive goods at a high risk of carbon leakage, including iron, steel, cement, fertiliser, aluminium and the energy sector[25]. While a number of studies assess the impacts of different configurations of the CBAM, the discussions around the possibility to extend this mechanism to the agricultural sector are still at a very preliminary stage (Eicke *et al.*, 2021; EU Parliament, 2021; Mörsdorf, 2022), even though the global agri-food sector is a large GHG emitter (Schmitz *et al.*, 2012).

FIGURE 14 – INSTITUTIONAL AND SPATIAL BOUNDARIES OF THE AMAZON SOY MORATORIUM



Source: Authors' elaboration.

[25] See https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661.

Payments for Environmental and Ecosystem Services (PEES) are not new in the Brazilian agricultural sector (Pagiola *et al*., 2013; Ruggiero *et al*., 2019; WWF, 2014), but new pilot schemes such as the one run by the Tropical Forest Alliance[26] or the new regulatory plan enacted by the National Congress with law 14.119/2021[27], have given new momentum to this type of instruments. A recent article by Garrett *et al*. (2022) addresses the case of PEES for zero-deforestation supply chains by focusing on soy in the Brazilian Cerrado. The authors of the study conclude that "*While the appearance of PES in multi-stakeholder dialogues for supply chain governance is not surprising given its high potential legitimacy among farmers of the target commodity, it is clear that such an approach would be neither equitable, effective, nor cost-effective*", and recommend as an optimal policy mix a blend of market exclusion mechanisms (such as the Soy Moratorium), PEES targeting smallholder and disadvantaged farmers in the Cerrado, and a broader jurisdictional approach that involves stakeholders responsible for land-use changes other than just soybean producers.

The last family of instruments to be addressed in this section is positioned at the intersection between transparency, improved traceability opportunities offered by new information technologies, and sustainability. A concrete example is the TRASE platform[28], which arguably is the most complete supply chain mapping and transparency initiative, providing reliable and open access spatial data on various sustainability aspects related with agricultural and livestock commodity production, consumption, and trade.

The existence of strong links between transparency and sustainability in the commodities supply chain is increasingly becoming the object of debate, speculation, and research (Godar *et al*., 2016; Kashmanian, 2017; Wognum *et al*., 2011). For instance, Gardner *et al*. (2019) have argued that while transparency has the potential to improve our understanding of the complexity of supply chains and their sustainability implications and inform policy and decision making in this area, it can also be a double-edged sword. Indeed, too many data can lead to decisional paralysis and might pose new challenges in terms of balancing the scale and the level of detail of the information generated. Ultimately, supply chain transparency has to be intended as means, and not as an end per se, and it is not a necessary and sufficient condition for the achievement of sustainable trade and natural resource governance.

Sigles Robert (2020), in a series of in-depth interviews with professionals working at the intersection between supply chains and sustainability, found a consensus around the idea that this is a crucial moment in time to design digital platforms to enhance traceability and facilitate real-time sustainability assessments across various commodities supply chains. It was also found that major retailers and banks have already run pilots for blockchain-based solutions in agricultural supply chains, with benefits for the business sector ranging from increased transactional speed to real-time monitoring of operations, and also from lower operational costs to improved security and fraud control.

Distributed ledger technologies have been also proposed as a solution to the traceability problem in the Soybean supply chain. In particular, Salah *et al*. (2019) have suggested an approach that combines Ethereum blockchain and smart contracts, arguing that such a system, where all transactions across the soybean supply chain would be permanently and securely recorded on the digital distributed ledger, would support real-time traceability, reduce information gathering costs, and remove the need for centralised authority. However, the authors also recognised that the proposed solution would also face traditional challenges associated with blockchain technologies, which remains – at least to some extent – unsolved and include – among other issues – governance, scalability, and privacy problems.

[26] See: https://www.tropicalforestalliance.org/en/news-and-events/news/press-release-payment-for-environmental-services-can-unite-agribusiness-environmentalists-and-government-around-the-same-purpose-say-sector-leaders.
[27] See: http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/lei/L14119.htm.
[28] See: https://www.trase.earth/about/

CONCLUSIONS

In *Part I* of this paper we described the historical evolution and the current state of the soybean supply chain, linking local features characterising the sector across different regions in Brazil with its global ramifications. We highlighted how the '*soybean miracle*' is intrinsically linked with a '*sustainability crisis*', producing a wide range of direct and indirect costs and benefits for people and nature, which are interconnected but heterogeneously distributed across regions, ecosystems, and stakeholders. In *Part II* we proposed a general classification for different sustainable policy instruments and initiatives that have been developed over time to reconcile and address the '*miracle*' and the '*crisis*' narratives in the soybean supply chain. Given the multiplication and the diversification of interventions, we developed an original '*policy toolbox*' for sustainable soybean, classifying different tools based on their scope and nature. We further dissected selected measures, mapping their jurisdictional and institutional boundaries through an original and intuitive two-way visualisation, and reviewing their strengths and limitations.

Institutions are a key factor in explaining territorial heterogeneities. They can drive change across regions and communities, and at the same time they are influenced by how societies and territories evolve over time (Acemoglu & Robinson, 2010; Mahoney & Thelen, 2009; North, 1990). The multiplication of policy instruments and initiatives for sustainable soybean over the last two decades in Brazil and elsewhere, together with the growing diversification in their scope and nature, reflect a snowballing interest in tackling the unintended consequences of the soybean expansion, but also the two-way relation characterising institutions, local communities, and the landscapes they live in.

The conventional agricultural development model postulates that the expansion of commodity production brings new opportunities for economic growth and well-being. However, when this is true, the distribution of development benefits is not necessarily proportional across various local population groups and municipalities (Berdegué *et al.*, 2015). The view that deforestation due to soybean expansion in the MATOPIBA is a necessary cost to ensure the socio-economic progress of the region has been challenged by several authors (Favareto *et al.*, 2021; Favareto, Nakagawa, Kleeb, *et al.*, 2019; Russo Lopes *et al.*, 2021). This critique also extends beyond nature and conservation issues. For instance, Favareto *et al.*, (2019) suggested that the current transformation process that is turning the MATOPIBA region into an export-oriented agricultural commodity powerhouse, is associated with spatially limited and short lasting benefits for local populations, thus disputing the idea that major development benefits and positive spillovers will materialise at a later moment in time.

Our review of existing policy instruments and initiatives for sustainable soybean pointed out that spatial and social heterogeneities can affect the outcome of different measures, with unintended and disproportional leakage and displacement effects on people and nature. While the empirical and theoretical knowledge of intended and unintended consequences of each sustainability tools is increasing, their interdependence is still less understood. A better integration among different interventions is crucial to maximise the potential sustainability gains and limit negative spillovers and interaction effects.

In this sense, positioning different tools in the institutional space where they intervene, was a useful exercise to facilitate the identification of opportunities for policy integration across jurisdictions and actors. For instance, the UK and EU due diligence proposals on forest-risk commodities would benefit from a better integration with other sustainability instruments, and offer an unprecedented opportunity to align with, improve, and amplify the impact of existing measures in producing countries – such as an 'extended' Soy Moratorium, the CAR, and the New Forest Code in Brazil – and other voluntary sustainability standards and commitments. However, even the most successful tools typically focus only a narrow set of dimensions of the broader social and environmental sustainability spectrum of the soybean supply chain in Brazil and elsewhere, and further efforts are needed to define the sustainability profile of each instrument and improve their level of harmonisation and effectiveness.

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