Policy coherence for a sustainable land use governance: the effectiveness and implementation of land use policies in Brazil and the role of the Deforestation-Free Products Regulation (EUDR)

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Table of contents

Preface i

List of figures ii

List of tables iii

Abstract 1

Zusammenfassung 2

Executive Summary 3

1 Introduction 7

2 Methods 9

2.1 Definition of policy aims 9

2.2 Deep review of national policy strategies and operational instruments 9

2.3 Identification of policy aims within strategies and instruments and policy instrument grouping 10

2.4 Analysis of interconnections through network analysis 10

2.5 Validation through expert and stakeholder interviews 11

3 Results 11

3.1 Coherence of land use aims 11

3.2 Network analysis of policy instruments 13

3.3 Potential effectiveness and implementation status of policy instruments 17

3.3.1 Land register, monitoring and private land regularization (PrLandRegMon) 22

3.3.2 Combat illegality (CombIlleg) 24

3.3.3 Public Forest, Conservation, Public Land regularization (PubLandRegForCons) 25

3.3.4 Green finance (GreeFina) 26

3.3.5 Agricultural support (AgriSupp) 28

3.4 EUDR regulation perceptions and anticipated effects 29

3.4.1 Is EUDR perceived rather as a risk or opportunity? 29

3.4.2 Is Brazil prepared for EUDR implementation? 30

3.4.3 Will EUDR be an important instrument to curb deforestation in Brazil? 31

3.4.4 Potential effects on soy and beef trade 33

3.4.5 Brussels effect 34

4 Discussion 35

4.1 Policy coherence for a sustainable land use governance framework: the effectiveness and implementation of land use policies in Brazil 35

4.2 Risks, opportunities and potential effects of the EUDR regulation on the implementation of sustainable land use policies 40

5 Limitations and future research 42

6 Conclusions 43

References 44

Appendices 49

Appendix 1: List of interviewees 49

Appendix 2: Questionnaire 51

Appendix 3: Operational policy instruments 55

Appendix 4: Summary of effectiveness and implementation of all policy groups and by stakeholder category 60

Preface

This research was conducted under the umbrella of the project “EUDR effects” (Land use change and trade effects of the EU regulation for deforestation-free products in Brazil and Paraguay). EUDR Effects aims to assess effects of the EUDR on soy and cattle production in and between Brazil and Paraguay in order to evaluate whether this regulation has the potential to reduce deforestation, greenhouse gas emissions and biodiversity loss. The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

The authors would like to express their immense gratitude to the BMZ for funding, the survey participants from renowned governmental, non-governmental, academic and private sector institutions (Appendix 1), the Forestry Worldwide unit at the Thünen Institute of Forestry for their contributions during team meetings, Sven Günter for his detailed review and valuable comments, Matthias Dieter for his availability and final review, and Anna Frerck for all support in text formatting.

List of figures

Figure 1: Relevance of policy objectives (Land use policy objectives of Brazil as analyzed in content analysis of high-level policies, as well as in stakeholder priorities and current land use as perceived by 45 interviewed key experts); ForestProd –production aims in forestry, Agriculture – production aims in agriculture, Agri plus – support for explicitly sustainable agriculture, Cons&Climate – conservation and climate adaptation/mitigation aim. 3

Figure 2: Stakeholder perceptions related to EUDR in Brazil 6

Figure 3: Mean rank of the seven land-use policy aims: Forest Production (ForProd), Conventional Agriculture (Agri), Sustainable Agriculture (Agri+), Infrastructure Development (Infra-Dev), Conservation (Conserv), Climate (Clim), and Cultural (Cult), across four analytical dimensions: (i) presence in national policies, (ii) presence in operational policy instruments, (iii) stakeholders' personal priority attribution, and (iv) perceived current role in Brazilian land-use governance. 11

Figure 4: Network analysis of operational policy instruments by modularity class. 14

Figure 5: Network analysis of operational policy instruments 16

Figure 6: Mean weighted degrees of instruments in the respective operational policy instruments group 17

Figure 7: Percentage of answers related to the potential effectiveness of the operational policy instruments groups in balancing agricultural production and forest conservation 18

Figure 8: Percentage of answers for ranking of policy instrument groups into top 1 to top 5 categories for potential effectiveness with regards to a balance of agricultural production and forest conservation 19

Figure 9: Percentage of answers in five categories of implementation status of the operational policy instrument groups (100% is the total of the respondents in each group, values below 100% indicate missing answsers) 20

Figure 10: Percentage distribution of stakeholders' perceptions of EDUR being a risk or an opportunity 30

Figure 11: Percentage distribution of stakeholders' perception about how far Brazil is prepared for EUDR 31

Figure 12: Percentage distribution of stakeholders' perception of the potential of EUDR to curb deforestation 32

Figure 13: Percentage distribution of stakeholders' perception of the potential effects of EDUR on soy trade 33

Figure 14: Percentage distribution of stakeholders' perception of the potential effects of EDUR on beef trade 34

Figure 15: Percentage distribution of stakeholders' perception of EUDR "Brussels effect" 35

List of tables

Table 1: Aggregated groups of policy instruments resulting from policy coherence analysis with summarized scores and qualitative arguments for effectiveness and implementation status resulting from stakeholder interviews. Effectiveness refers to the instruments' perceived potential to contribute to a balanced land use taking into account conservation and production aims. 4

Table 2: Groups of operational policy instruments 14

Table 3: Aggregation into effectiveness and implementation levels and synthesis of qualitative answers and comments related to potential effectiveness for a balanced land use and implementation status for 11 policy instrument groups. For details of qualitative answers see Appendix 3 20

Table 4: Policy instruments encompassed by PrLandRegMon group 23

Table 5: Policy instruments encompassed by CombIlleg group 25

Table 6: Policy instruments encompassed by PubLandRegForCons group 26

Table 7: Policy instruments encompassed by GreeFina group 27

Table 8: Policy instruments encompassed by AgriSupp group 29

Abstract

Achieving sustainable land-use governance in tropical commodity-producing countries requires coherent policy frameworks capable of balancing agricultural production, forest conservation, climate mitigation, and rural development. In Brazil, the implementation of the European Union Deforestation-Free Products Regulation (EUDR) introduces new opportunities and challenges by linking market access to legality, traceability, and deforestation-free production. This study evaluates the coherence of Brazil's land-use governance framework and examines how the EUDR may influence the effectiveness and implementation of existing policy instruments. A mixed-methods approach combined a systematic review of more than 100 national laws, decrees, plans, and private initiatives with policy network analysis, and 45 semi-structured interviews involving representatives from government, academia, civil society, producer organizations, financial institutions, and the private sector. Operational policy instruments were grouped into 11 categories, and stakeholders assessed their effectiveness, implementation status, and the expected implications of the EUDR. Results show that Brazil has a diversified institutional framework for sustainable land-use governance, but important implementation gaps persist. While national policies emphasize conservation, climate, and forest production, stakeholders perceive conventional agriculture as the dominant force shaping current land use. Land registration, monitoring, private land regularization, public forest governance, and measures to combat illegality emerged as the most central and effective policy instruments, although their implementation remains constrained by institutional fragmentation and limited enforcement capacity. Due diligence and traceability instruments are already well integrated into the governance framework, highlighting strong complementarities with EUDR requirements. Although it’s direct contribution to reducing deforestation is expected to be limited, stakeholders predominantly perceive the EUDR as an important catalyst for improving policy coherence and reinforcing Brazil's existing governance architecture toward more sustainable and deforestation-free supply chains.

Keywords: Land-use governance, Policy coherence, EUDR, Traceability, Deforestation-free supply chains

Zusammenfassung

Eine nachhaltige Landnutzungspolitik in tropischen rohstoffproduzierenden Ländern erfordert kohärente politische Rahmenbedingungen, die landwirtschaftliche Produktion, Waldschutz, Klimaschutz und ländliche Entwicklung miteinander in Einklang bringen. In Brasilien schafft die Umsetzung der Verordnung der Europäischen Union über entwaldungsfreie Produkte (European Union Deforestation-Free Products Regulation, EUDR) neue Chancen und Herausforderungen, indem der Marktzugang an Rechtmäßigkeit, Rückverfolgbarkeit und entwaldungsfreie Produktion geknüpft wird. Diese Studie analysiert die Kohärenz des brasilianischen Governance-Rahmens für die Landnutzung und untersucht, wie die EUDR die Wirksamkeit und Umsetzung bestehender Politikinstrumente beeinflussen könnte. Hierfür wurde ein Mixed-Methods-Ansatz angewendet, der eine systematische Analyse von mehr als 100 nationalen Gesetzen, Verordnungen, Plänen und privaten Initiativen mit einer Politikanalyse mittels Sozialer Netzwerke Analyse (Policy Network Analysis) sowie 45 halbstrukturierten Interviews mit Vertreterinnen und Vertretern aus Regierung, Wissenschaft, Zivilgesellschaft, Erzeugerorganisationen, Finanzinstitutionen und dem Privatsektor kombiniert. Die operativen Politikinstrumente wurden in elf Kategorien zusammengefasst. Die Stakeholder bewerteten deren Wirksamkeit, Umsetzungsstand sowie die erwarteten Auswirkungen der EUDR. Die Ergebnisse zeigen, dass Brasilien über einen vielfältigen institutionellen Rahmen für eine nachhaltige Landnutzungspolitik verfügt, jedoch weiterhin erhebliche Defizite bei der Umsetzung bestehen. Während nationale Politiken den Schwerpunkt auf Naturschutz, Klimaschutz und nachhaltige Waldwirtschaft legen, betrachten die Stakeholder die konventionelle Landwirtschaft als den dominierenden Einflussfaktor auf die gegenwärtige Landnutzung. Instrumente zur Landregistrierung, Überwachung, Regulierung privater Grundstücke, Governance öffentlicher Wälder sowie Maßnahmen zur Bekämpfung illegaler Aktivitäten erwiesen sich als die zentralsten und wirksamsten Politikinstrumente, ihre Umsetzung wird jedoch weiterhin durch institutionelle Fragmentierung und begrenzte Vollzugskapazitäten eingeschränkt. Instrumente der Sorgfaltspflicht (Due Diligence) und Rückverfolgbarkeit sind bereits gut in den Governance-Rahmen integriert und weisen eine hohe Komplementarität zu den Anforderungen der EUDR auf. Obwohl ihr direkter Beitrag zur Verringerung der Entwaldung voraussichtlich begrenzt sein wird, betrachten die Stakeholder die EUDR überwiegend als einen wichtigen Katalysator zur Verbesserung der Politikkohärenz und für die Entwicklung von nachhaltigeren und entwaldungsfreien Lieferketten.

Schlüsselwörter: Landnutzungspolitik, Politikkohärenz, EU-Verordnung über entwaldungsfreie Produkte (EUDR), Rückverfolgbarkeit, Entwaldungsfreie Lieferketten.

Executive Summary

The effectiveness of the EU Deforestation-Free Products Regulation (EUDR) needs to be analyzed in the context of national land use policies

Sustainable land use taking into account conservation requirements, agricultural production and rural livelihoods remains a key challenge amid environmental change, rising demand, and complex governance systems. The Deforestation-Free Products Regulation (EUDR) of the EU sets globally new requirements for agricultural and forestry commodities that are required to be produced without being linked to deforestation. However, for the EUDR to achieve this objective and be effective, an analysis of the effectiveness and implementation of national policies of producing countries that share the same objective may be useful in anticipating the potential effects of the EUDR. In these countries where land-use governance already relies on a complex mix of public and private instruments, policies like EUDR may thus in a positive scenario act as an external mechanism supporting the enforcement of existing legislation and as a catalyst for long-standing domestic policy debates, or in the worst case as an obstruction that is hampering international trade due to such substantial formal requirements.

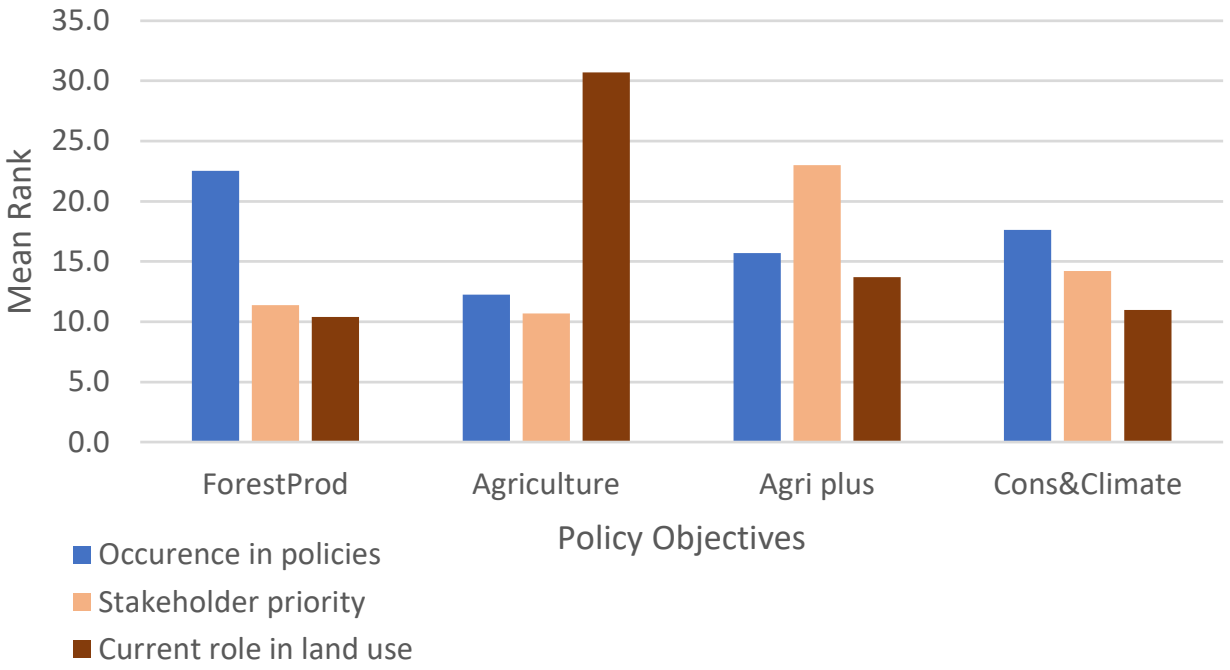
This working paper analyzes possible EUDR related effects for the case of Brazil, as one of the global main producers of related commodities such as soy and beef. Specifically, it assesses the existing national land use policy framework in order to evaluate its coherence, as well as its effectiveness and adequate implementation to achieve sustainable land use aims within a multilevel governance context. Furthermore, within this policy mix, the dependencies and relationships with requirements related to the EUDR were also analyzed. It relies on a desk study of more than 100 policy documents, more specifically through a qualitative grouping and network analysis aimed at investigating the coherence of these policies among themselves and with sustainable land use aims. Finally, through the perception of 45 key stakeholders from government, academia, industry, NGOs interviewed between October and December 2025, the effectiveness and implementation of these policies were examined.

High-level policy framework is diversified, but with uneven implementation and divergent stakeholder preferences

Strengthening alignment between high-level policies and operational instruments in line with stakeholder priorities emerges as a central challenge for achieving sustainable land-use outcomes. Forestry is the most emphasized objective in Brazilian land use policies, followed by conservation and climate objectives. In current land use and in stakeholder priorities, forest production however, plays a less important role. In contrast, conventional agriculture is perceived by the key stakeholders as the dominating objective of current land use, even though it is not formulated as such in the high-level policies. According to them, explicitly sustainable agriculture as well as conservation and climate objectives need to play stronger roles.

Figure 1: Relevance of policy objectives (Land use policy objectives of Brazil as analyzed in content analysis of high-level policies, as well as in stakeholder priorities and current land use as perceived by 45 interviewed key experts); ForestProd –production aims in forestry,

Agriculture – production aims in agriculture, Agri plus – support for explicitly sustainable agriculture, Cons&Climate – conservation and climate adaptation/mitigation aim.



Ps.: For the mean rank in the case of occurrence in policies, the calculation was performed by considering the total score and the specific score assigned by the authors to each policy for each policy objective; conversely, for priority and current role in land use, the score (in %) assigned by the respondents was considered.

Source: Author's compilation

The mix of operational policy instruments is comprehensive, including already well-established EUDR tools

As a result of qualitative grouping and network analysis, 45 operational policy instruments were identified in the analyzed documents and aggregated into 11 instrument groups (see Table 1). They provide a broad and comprehensive set of highly interlinked regulatory, economic and informational tools related to the high-level policy aims. According to stakeholder responses, they differ substantially in their potential effectiveness and current implementation. Land registers and regularization supported by monitoring data, public forest designation and conservation as well as measures to combat illegality received highest stakeholder priorities. Network analysis shows that due diligence and traceability tools which are needed for EUDR implementation are already well integrated into the policy mix, despite the relatively recent focus which is on them. Stakeholders assessed due diligence and traceability tools as having medium to high potential effectiveness to achieve sustainable land use aims. Results suggest that the EUDR can catalyze the implementation of existing policy instruments, but, at the same time, their implementation is a precondition for the effectiveness of the EUDR. Implementation of all policy instruments is in general rather poor and needs clear improvement.

Table 1: **Aggregated groups of policy instruments resulting from policy coherence analysis with summarized scores and qualitative arguments for effectiveness and implementation status resulting from stakeholder interviews. Effectiveness refers to the instruments' perceived potential to contribute to a balanced land use taking into account conservation and production aims.**

Potential effectiveness	Policy Instrument Group	Implementation status
HIGH	**Land register, monitoring data and private land regularization**	**MED-LOW**

Potential effectiveness	Policy Instrument Group	Implementation status
Basic tool to enable many others like legality verification, restoration, credit conditionality, traceability, PES, carbon markets and EUDR.		Low validation rate of Environmental Registry (CAR) is major bottleneck, fragmented integration of different institutions and tools.
HIGH	**Combat illegality**	**MED**
Direct and measurable impact on deforestation when consistently enforced; substantial deterrence function.		Under-resourced, uneven enforcement, political constraints; often targets operational actors rather than systemic drivers.
HIGH	**Public forest, conservation, public land regularization**	**MED-LOW**
Reduces land grabbing and speculative deforestation by clarifying tenure; high climate and biodiversity relevance of direct conservation.		Strong legal basis but weak operational governance; limited progress in public land designation.
HIGH-MED	**Green finances**	**MED-LOW**
Potential to shift production towards degraded lands and low-carbon systems; aligns financial incentives with conservation.		Limited scale compared to conventional credit; weak conditionality and poor fit to territorial needs.
HIGH-MED	**Due diligence and traceability**	**MED-LOW**
Enhances transparency and accountability in supply chains, particularly soy; strategic for EU market access and compliance.		Technically feasible but constrained by land registry weaknesses and logistical/segregation limitations.
HIGH-MED	**Agricultural support**	**MED**
Influences production patterns and competitiveness; can support transition towards explicitly sustainable agriculture.		Policy incoherence persists: conventional incentives outweigh low-carbon instruments; infrastructure gaps increase traceability costs.
HIGH-MED	**Restoration**	**MED-LOW**
Long-term structural potential for reducing expansion pressure and meeting climate targets; integrates mitigation and adaptation goals.		Limited scale compared to national targets; weak integration with land tenure clarification and enforcement; lack of scientific basis.
HIGH-MED	**Support to traditional communities and smallholders**	**MED-LOW**
Strong correlation with conservation outcomes; socially and environmentally strategic in principle.		Underfunded, slow demarcation processes, limited integration into broader climate and land-use governance.
MED	**Timber production and trade**	**MED**
Legal concessions can reconcile production and conservation, but less explored compared to non-native forestry plantations despite recent advances in regulation. Risk of triggering degradation if not controlled.		Institutional framework exists, but often low enforcement, limited investment in sustainable native forest management.
MED	**Carbon market and payment for ecosystem services**	**MED-LOW**
Potential to internalize conservation opportunity costs, but dependent on strong governance and additionality.		Weak regulation, limited scale, low producer incentives, critical credibility debates.

Potential effectiveness	Policy Instrument Group	Implementation status
MED-LOW	**Certification and roundtables**	**MED-LOW**
Operates as a signaling tool in niche markets; limited influence on macro land-use dynamics due to low coverage.	Operational in specific sectors but fragmented standards and the lack of a premium price reduce the transformative impact	

Source: Author's compilation

EUDR is an opportunity but with rather catalyzing indirect effects on reduced deforestation

The EUDR is rather perceived as an opportunity than as risk and an external driver that can accelerate improvements in traceability, monitoring, and compliance systems in Brazil. However, its direct impact on deforestation is expected to be limited, as the EU represents only a portion of global demand, allowing potential leakage to other markets such as China or domestic consumption. The regulation's main influence is therefore indirect, functioning as a catalyst for domestic policy debates and institutional strengthening. The legality requirement that is included in Art. 3 of the EUDR is thus a well justified and necessary component of the regulation. Also, the perceived positive regulatory diffusion mentioned by the stakeholders through the "Brussels effect" question during the interviews, indicates that EUDR is rather an indirect driver for land-use change with reduced deforestation. The majority of the respondents, which were largely focusing on soy and cattle value chains, regards Brazil as being prepared for EUDR implementation. Specifically, the soy sector is perceived as being largely prepared, as companies have already invested in full physical segregation pilot activities and there is experience e.g., through the Soy Moratorium and previous certification schemes. Industry actors from the beef sector frame EUDR more as a niche market requirement that may lead to selective segregation of export flows rather than systemic restructuring, especially given the persistent challenge of monitoring indirect suppliers and informal slaughter channels. The overall transformative success will depend on the realization of price premiums, according to stakeholders' perception. First cautious estimates for additional costs for soy are around USD 30 per ton (approximately 6-7% of the product price). More detailed calculations and estimates are needed and will be targeted in an upcoming project component.

Figure 2: Stakeholder perceptions related to EUDR in Brazil



Source: Author's compilation

Outlook

This working paper demonstrates that Brazil's land-use governance system possesses a comparatively advanced and diversified institutional architecture capable of supporting sustainable land-use transitions and deforestation-free supply chains. However, the findings also reveal a persistent gap between the policy instruments and their operational implementation as perceived by land use stakeholders. The effectiveness of governance therefore depends less on introducing new instruments and more on strengthening the integration, enforcement, and territorial implementation of existing ones. EUDR legality requirements can contribute to strengthening of a number of national policy instruments and their implementation.

1 Introduction

Achieving sustainable land use in countries producing forest and agricultural commodities remains a central challenge in the context of accelerating global environmental change, growing agricultural demand, and increasingly complex governance arrangements (Pendrill et al., 2019). In this context, international market-driven regulations are becoming increasingly influential. The European Union Deforestation Regulation (EUDR), under discussion since 2022 and scheduled to be implemented from January 2027, is such an example. The regulation forms part of a broader suite of European Union (EU) policies, under the umbrella of the European Green Deal together with e.g., the EU Biodiversity, Forest and Farm to Fork strategies as well as the EU Land Use, Land-Use Change, and Forestry (LULUCF) regulation and others which aim to reduce the EU's overall environmental footprint by 2050. Its core objective is to prevent specific commodities from being placed on or exported from the EU market when they fail to meet the requirements set out in Article 3 of the Regulation: (i) being deforestation-free, defined as not produced on land subject to deforestation after 31 December 2020; (ii) being produced in accordance with the relevant legislation of the country of production; and (iii) being covered by a due diligence statement demonstrating compliance along the supply chain.

The EUDR introduces a binding due-diligence obligation for operators and traders, thereby linking European market access directly to land-use outcomes and domestic governance conditions in producing countries (Muradian et al., 2025). As such, its potential effects extend beyond compliance at farm or supply-chain level, as it is interacting with existing national policy instruments, data infrastructures, and enforcement capacities. In producing countries where land-use governance already relies on a complex mix of public and private instruments, policies like EUDR may thus in a positive scenario act as an external mechanism supporting the enforcement of existing legislation and as a catalyst for long-standing domestic policy debates, or in the worst case as an obstruction that is hampering international trade due to such substantial formal requirements (Sellare et al., 2022). At the same time, EUDR represents not only a trade measure, but also a stress test for domestic policy coherence, as its legality requirement may reveal complementarities, overlaps, and contradictions within national and also global land-use governance systems, especially in telecoupled systems (Cotta et al., 2022; Dürr et al., 2026).

Brazil is an important player in global trade and a strategic partner for Europe. The country is currently the world's largest exporter of soybeans and beef, producing more than 150 million tons of soy annually and exporting over 90 million tons, representing more than half of global soybean trade, while beef production fluctuates around 10-11 million tons per year, with approximately 25-30% destined for export markets (FAO, 2023; USDA, 2023). The European Union remains a strategic trade partner, particularly for soy used in animal feed and for high-value beef segments, reinforcing Brazil's geopolitical and economic relevance also within the EU - Mercosur relations. At the same time, Brazil hosts roughly 60% of the Amazon rainforest and large shares of the Cerrado and Atlantic Forest biomes, placing it among the most biodiverse countries in the world (Baptiste et al., 2018; Vergara et al., 2022). The Amazon alone stores an estimated 90-140 billion tons of carbon and plays a crucial role in global climate regulation (Hubau et al., 2020; Saatchi et al., 2011).

Over the last two decades, Brazil has developed extensive policy frameworks aimed at reconciling agricultural production with forest conservation, combining national strategies, sectoral plans, and a diverse set of operational policy instruments (Azevedo-Ramos et al., 2026). On public lands, the consolidation and expansion of protected areas under the National System of Conservation Units (Lei nº 9.985/2000), together with territorial planning instruments such as Ecological-Economic Zoning (Decree 4.297/2002), provide a solid legal and institutional foundation for biodiversity conservation and sustainable territorial planning. These instruments aim to steer and structure land use allocation and strengthen preventative governance in deforestation frontier regions, yet, implementation of these legislations remains a challenge in many cases due to issues such as fragile financial situation of environmental agencies and the high costs of land tenure regularization (Gonçalves-Souza et al., 2021; Pacheco et al., 2018). Another important issue in Brazil is the governance of public lands, especially public forests. These lands have not yet been designated by the government for specific uses, such as Conservation Units or Indigenous Territories, and are constantly experiencing land grabbing (Azevedo-Ramos et

al., 2020). The Public Forest Management Law (Law No. 11,284/2006), updated by Law No. 14,590/2023, defines the rules for the designation of these lands and also the sustainable use of these areas by traditional communities or through forest concessions.

On private lands, the Brazilian Forest Code (Law nº 12.651/2012) update two key instruments for maintaining native vegetation within rural properties from the previous Forest Code: the Legal Reserve (RL) which mandates varying percentages of native vegetation preservation depending on the biome and Permanent Preservation Areas (APPs) located around watercourses and on sloping terrain. Furthermore, in accordance with the cutoff date established by the Environmental Crimes Law (Lei nº 9.605/1998), any deforestation carried out on a property after July 2008 that was not authorized by a vegetation suppression permit (excluding the aforementioned special areas) is subject to fines, and the affected area must be restored. The Brazilian Forest Code also establishes a georeferenced environmental compliance architecture based on the Rural Environmental Registry (CAR), Environmental Regularization Programs (PRA), and Environmental Reserve Quotas (CRA), reinforced by land tenure reforms under Law nº 13.465/2017 (Soares-Filho et al., 2014). Combined with satellite-based deforestation monitoring systems such as Project for Monitoring Deforestation in the Brazilian Amazon Rainforest by Satellite (PRODES) and Real-Time Deforestation Detection System (DETER), operated by National Institute for Space Research (INPE), and enforcement mechanisms including property embargoes and environmental sanctions specified in the Environmental Crimes Law, this integrated governance architecture has enhanced legal certainty, transparency, and accountability at the property level (Nepstad et al., 2014). The interaction between georeferenced registries (e.g., CAR), real-time monitoring, and sanctioning instruments has strengthened Brazil's capacity to identify illegal deforestation, enforce restoration obligations, and provide verifiable compliance information, key elements for supporting sustainable land use and deforestation-free supply chains (Rajão et al., 2020), even though that illegal land use practices remain a major threat to sustainable land use. In parallel, hybrid governance arrangements involving the private sector have complemented state-led regulation, notably the Soy Moratorium and the Beef Conduct Adjustment Agreements (TACs), which introduced market-based exclusion mechanisms and supply chain monitoring commitments, further aligning commodity production with zero-deforestation objectives (Gibbs et al., 2016; Skidmore et al., 2021).

However, sustainability outcomes depend not only on the presence of policy instruments, but also on their coherence across sectors (Browne et al., 2023; Coscieme et al., 2021; Fischer et al., 2023). Land use governance is basically shaped by: a) all formal and informal, public and private regulatory structures, i.e., institutions consisting of rules, norms, principles, decision procedures, concerning forests, their utilization and their conservation, b) the interactions between public and private actors therein and c) the effects of either on land use and land use changes (adapted from Giessen and Buttoud, 2014). In the case of Brazil, due to its vast territorial extent, marked socio-ecological heterogeneity, and with a strategic position as a leading global agricultural producer, such governance for sustainable land use has become even more challenging, especially in face of new external demands such as the EUDR. Together with the above-described complexity of the legal system and diverging interests of a heterogeneous stakeholder landscape, these dynamics often result in fragmented policy mixes, where ambitious regulatory frameworks coexist with limited enforcement capacity, uneven implementation, or contradictory incentives across sectors. Policy coherence in its essence has been defined as the systematic alignment of policy objectives and instruments in order to reduce conflicts and promote synergies between different policy areas and jurisdictions to achieve the results associated with jointly agreed policy objectives (Nilsson et al., 2012), and for this reason it can be a fundamental path for monitoring policy frameworks in countries like Brazil. A comprehensive view on policy coherence encompasses policies, which are understood as high level documents that outline overall political aims and strategic directions as well as policy instruments which are understood as the state, non-state or hybrid tools designed to implement policy objectives in the field and that are themselves defined in laws, regulations, decrees or non-state initiatives.

In this working paper, we examine policy coherence in Brazil through a hierarchical analytical framework based on a review of high-level policies, laws, rules and regulations as well as policy instruments combined with an in-depth analysis, integrating cluster and network analysis to identify interconnections, synergies and trade-offs,

among policy instruments for sustainable land use in Brazil, including instruments for due diligence such as required by the EUDR regulation. In addition, based on semi-structured interviews with stakeholders on national level, we assess perceptions of effectiveness and implementation, particularly regarding the capacity of policy instruments to balance forest conservation and agricultural production, and finally the risks, opportunities, challenges and potential preliminary effects of the EUDR regulation within this mix of policy instruments in Brazil. The report is guided by two main research questions:

RQ1) How coherent are land use policies and policy instruments in Brazil? Are policy instruments effective and adequately implemented to achieve sustainable land use aims within a multilevel governance context?

RQ2) To which extent is the EUDR regulation regarded as a risk or an opportunity for effectiveness and implementation of sustainable land use policies in Brazil? What are the challenges, and potential effects related to deforestation and trade that emerge with its implementation?

2 Methods

This report applies a mixed qualitative and quantitative methodology to assess policy coherence, effectiveness, and implementation of land-use governance instruments in Brazil, and to examine how the EUDR interacts with existing national policy mixes. The methodological approach is organized into five sequential and interlinked steps.

2.1 Definition of policy aims

Policy aims were defined based on a classification that relies on ecosystem services (Haines-Young and Potschin, 2018) and sustainability objectives relevant to land-use systems, also taking into account requirements of internationally recognized frameworks and commitments, including climate and biodiversity-related agendas under the United Nations Framework Convention on Climate Change, the UN Convention on Biological Diversity and related multilateral processes. This step provided a standardized and comparable set of policy aims against which national policies and operational instruments could be assessed. They include aspects of forest conservation, climate regulation, agricultural production, biodiversity protection, socio-economic development as well as cultural aims. Seven land-use policy aims were identified: Forest Production (ForProd), Conventional Agriculture (Agri), Explicitly sustainable Agriculture (Agri+), Infrastructure Development (Infra-Dev), Conservation (Conserv), Climate (Clim), and Cultural aims (Cult). The presence and relative weight of these aims in both national policies and operational policy instruments were assessed using the five-point scoring framework developed by Von Lüpke et al., 2026. Policies in which objectives are explicitly stated receive the highest score; those in which they are perceived indirectly or implicitly receive intermediate scores; and those containing no reference receive the lowest score. Furthermore, the congruence between these de jure formulated aims and their currently perceived role within current Brazilian land use policies and policy instruments (see step 2) was examined, along with the priority given to them by each of the interviewed stakeholders.

2.2 Deep review of national policy strategies and operational instruments

A systematic review, adopting an inclusive approach (Uttley et al., 2023), was conducted to identify and catalogue national policies, national laws, rules, regulations and initiatives and operational policy instruments relevant to conservation, traditional communities, land use, agriculture, forests, climate, and trade in Brazil. Policies refer to overarching national plans, laws, and sectoral frameworks that articulate long-term objectives. Laws, decrees, regulations, executive orders, and non-state initiatives provide specific guidance for implementing policy objectives. A comprehensive compilation of these forms the basis to identify policy instruments. Active de jure legislation has been analysed irrespective of current level of enforcement. Operational policy instruments include

regulatory, economic, informational, and monitoring tools through which policies and the policy aims are implemented in practice. Based on the legal de jure analysis, operational instruments are defined and specified.

A policy instrument is understood as a specific tool or measure that is operationally defined and applied to regulate, modify, control, or improve land use at the national level. Only policy instruments applicable on national level were considered. Subnational measures, district-level initiatives, and project activities were excluded. A single policy instrument may be established and regulated through one specific law or regulation, or through several legal documents. Conversely, one law may provide the basis for multiple policy instruments.

2.3 Identification of policy aims within strategies and instruments and policy instrument grouping

For each policy and each of the identified policy instruments, a content analysis was carried out in order to identify the policy objectives contained in these. Based on the content analysis, numeric scores ranging from -1 (antagonistic) and 0 (not contained) to 1 (implicitly contained), 2 (explicit secondary aim), and 3 (explicit predominant aim) were applied to quantify the extent to which respective objectives were contained in each of the policies and instruments. Scoring requires in-depth understanding and in cases of implicitly contained objectives interpretation by the analyzing experts. In controversial cases and for a subset of selected examples, these scores were discussed in depth with a second expert and individually cross-checked with three other experts for validation. This allocation of scores enables the comparison of formal aims as expressed in the high-level policies with the aims of the policy instruments foreseen to be implemented on the ground, as well as with aims of the stakeholders in order to evaluate the relevance of the policies and instruments. In order to facilitate communication and interviews with key stakeholders, the single policy instruments were aggregated into groups of policy instruments. This grouping occurred qualitatively in an iterative top-down and bottom-up approach. The top-down component takes into account the ongoing discourse on development and improvement of land use and deforestation reduction in Brazil. Literature helped to identify main discourses on how and by which means and instruments future land use is recommended and required to become more sustainable (see Table 2). The bottom-up component consists in grouping instruments with similar objectives and as well takes advantage of network analysis tools (see next section). The overall aim was to create groups of instruments with similar aims and functionality in practice. The process of grouping instruments thus requires expert understanding and knowledge of the respective land use sector. For the study, a pilot phase preceding the stakeholder interviews was used to cross check and validate the designated policy instrument groups with two experts in Brazil, one representing the academia and one the Brazilian government.

2.4 Analysis of interconnections through network analysis

Interconnections between operational policy instruments, including the traceability and geolocation tools relevant for the EUDR, were examined using network analysis, which was based on a matrix which identified the relations between all possible pairs of policy instruments. In this matrix, each single relation was rated as -1 (antagonistic), 0 (not existing), 1 (implicit relation), 2 (explicit relation / dependency). The network analysis depicts the single relations. Instruments were treated as so-called nodes, i.e., single entities that are connected by functional, institutional, or implementation-related relations, so-called edges. This approach allowed for the identification of central and bridging instruments within the policy mix, highlighting among others those that play a key role in balancing agricultural production and forest conservation. Network metrics were used to assess degrees as the number of connections per node. Weighted degrees take into account the strength of the connections, i.e., whether these were assessed as implicit or explicit. Degrees are a measure of centrality (Hanneman, 2001), for structural importance and power of instruments (Aurenhammer, 2016), providing insights into policy integration and systemic leverage points. The open-source software package of Gephi was used to run network analysis (Bastian et al., 2009).

2.5 Validation through expert and stakeholder interviews

The analytical results were validated through semi-structured interviews with 45 experts and key stakeholders from government agencies, producer organizations, civil society, academia, and the private sector conducted between October 2025 and January 2026. Only experts active on national level were interviewed. Stakeholders were selected who hold leadership positions within governmental structures (ministries, agencies, etc.), academia, NGOs, or industries, focusing on issues of sustainable land use specifically relevant to the defined policy objectives. Interviews focused on perceived policy effectiveness, implementation gaps, institutional coordination, and the practical implications of the EUDR. The questionnaire was split in three blocks: 1) interviewee characteristics and power indicators (resources, information, and coercive capacity) to contextualize stakeholder influence; 2) perception of policy aims, their relative importance and current implementation, as well as potential effectiveness and implementation status of key land-use instruments on a 1-5 scale (being 1 low, 2 medium-low, 3 medium, 4 medium-high and 5 high); 3) stakeholder perceptions of the EUDR (also between 1 and 5 scores, representing the extremes), including risks and opportunities, preparedness, impacts on deforestation, beef and soy sectors, and the so-called Brussels effect which means effects on policies beyond Brazil and the EU. The complete questionnaire is included in Appendix 2. Stakeholder perspectives were used to triangulate findings from the policy review and network analysis, ensuring that the assessment reflects both formal policy design and real-world implementation dynamics.

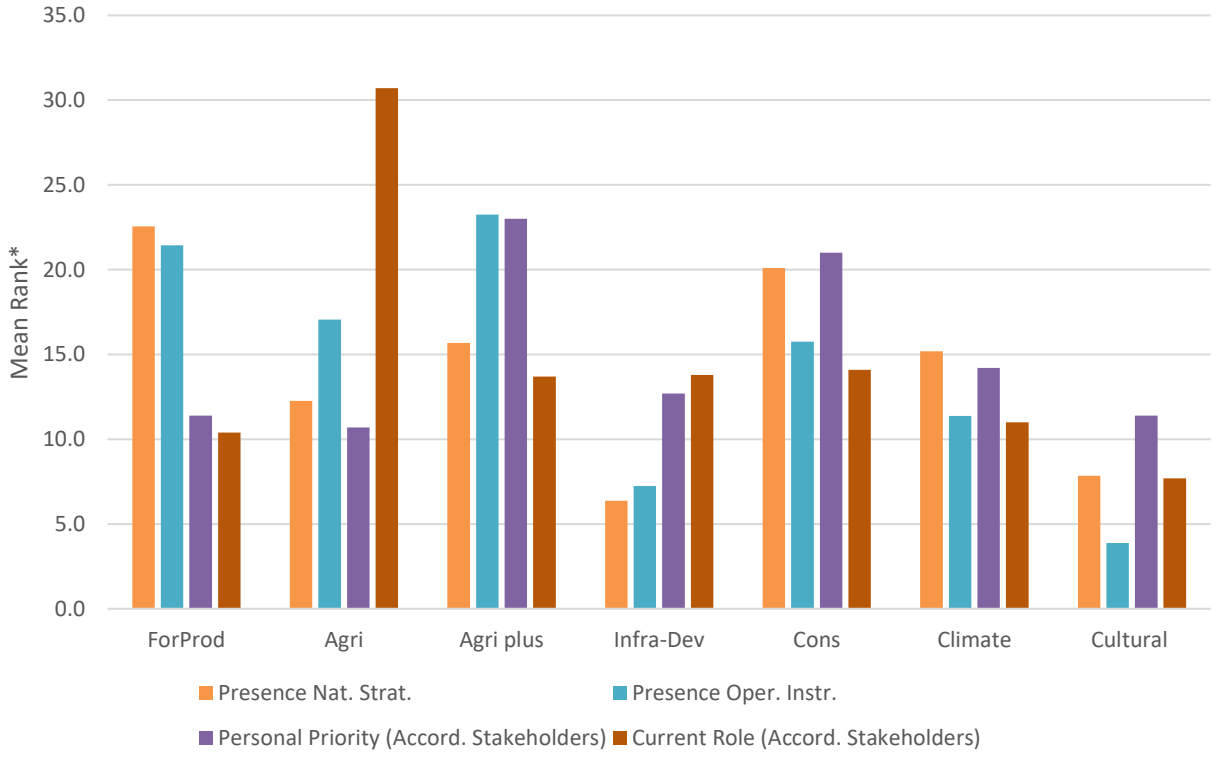
3 Results

3.1 Coherence of land use aims

The combined assessment of objectives as formulated in policies and operational policy instruments as well as perceived by stakeholders allows for a structured evaluation of policy coherence of Brazil's land-use governance framework (Figure 3).

Figure 3: **Mean rank of the seven land-use policy aims: Forest Production (ForProd), Conventional Agriculture (Agri), Sustainable Agriculture (Agri+), Infrastructure Development (Infra-Dev), Conservation (Conserv), Climate (Clim), and Cultural (Cult), across four analytical dimensions: (i) presence in national policies, (ii) presence in operational policy instruments, (iii)**

stakeholders' personal priority attribution, and (iv) perceived current role in Brazilian land-use governance.



Ps.: For the mean rank in the case of occurrence in policies, the calculation was performed by considering the total score and the specific score assigned by the authors to each policy for each policy objective; conversely, for priority and current role in land use, the score (in %) assigned by the respondents was considered.

Source: Author's compilation

Within national high-level policies, Conservation and Forest Production receive highest mean scores and thus can formally be regarded as the most predominant national land use aims, followed by Climate and Agri+. Conventional Agriculture and Infrastructure appear comparatively less dominant in the formal strategic framing, yet all these objectives are still clearly formulated. This distribution suggests that Brazil's high-level policy architecture aims to encompass conservation and climate objectives alongside productive land-use goals. However, the translation of these aims into operational instruments as formulated in the land use governance framework reveals a shift. Agri+ (sustainable or low-carbon agriculture) becomes the most prominent category at the implementation level. Conventional Agriculture also gains relative weight in operational instruments compared to its strategic framing, while Conservation and Climate play a smaller role on the operational level compared the higher importance in the policies. Cultural aims received the lowest score regarding the presence in operational policy instruments, and for the presence in national strategies this aim ranked only slightly above the infrastructure/development aim. This presence was also reflected in the perceptions of stakeholders regarding the implementation of this aim in the country.

The stakeholders' personal priorities and perceptions as assessed in the interviews further nuance this picture. Conservation and Agri+ receive the highest personal priority scores, followed by Climate and Infrastructure. Conventional Agriculture and Forest Production receive comparatively lower personal priority. The differentiation between stakeholder categories, such as government, industry, NGOs and multistakeholder platforms, and others including financial institutions and banks, and academia (not depicted) does not show large differences between stakeholders related to these perceptions. This agreement across stakeholder categories is also an encouraging finding as it suggests that at least among the stakeholders engaged on national level, no

major controversies are visible. Yet, the perceptions of stakeholders on field level are outstanding and subject of ongoing analysis.

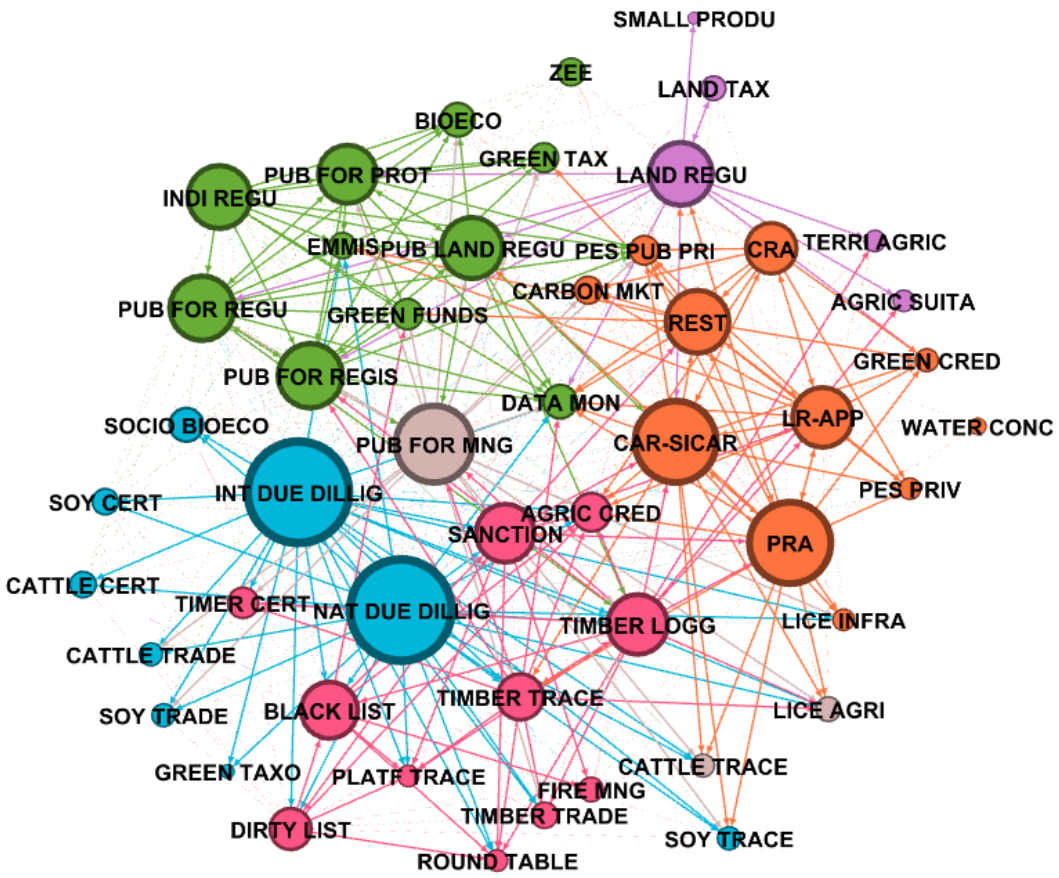
The alignment between stakeholder priorities and the operational prominence of Agri+ suggests some convergence toward transition-oriented instruments, yet the weaker operational weight of Conservation and Climate reveals incomplete alignment with normative preferences. The additional dimension of the perceived current role in Brazilian land-use governance provides a critical insight into de facto policy orientation. While Conservation and Climate feature strongly in strategic high-level policies and stakeholder priorities, their perceived current role is lower than that of Agriculture. In practice and in contrast to the rather low priority in national policy aims, production-oriented conventional Agriculture is seen as playing the most dominant role in shaping land-use outcomes. Infrastructure, although not dominant in the aims of neither policies, nor policy instruments, is perceived as more important. Qualitative comments show that this is due to its enabling function for agricultural expansion and trade integration. Cultural aims remain consistently marginal across all four dimensions.

For Conservation and Climate related objectives the importance in the strategic high level policies match with the priorities assigned by stakeholders, yet their implementation foreseen through operational policy instruments as well as perceived current roles lag behind, which means that implementation of these objectives might need to be more accentuated. Forest productivity has high scores in policy aims and operational instruments, but has little priority both in priorities of the stakeholders and perceived implementation. It might be interpreted that forest productivity has low importance, which is however accepted by stakeholders. High discrepancies occur for Agriculture: in line with priorities of the stakeholders, it receives limited importance in the strategic policies, yet it seems to play the dominant role in current land use activities. A discourse on the importance of agricultural aims is clearly needed. There seems to be a shift towards explicitly Sustainable Agriculture. This objective has highest priority for the stakeholders and operational instruments are already in place, even though the perceived current de facto role lags behind and might need reinforcement. Implementation of Infrastructure and Development objectives is in line with stakeholder priorities but could be more explicitly mentioned in the policies. It seems that this is implemented despite being mentioned in high level policies and without dedicated policy instruments. Cultural aims which also include indigenous peoples' needs has higher priority for stakeholders as compared to policy formulation and its current de facto role. A stronger focus on these aims is needed.

3.2 Network analysis of policy instruments

Based on an analysis of over 100 Brazilian public and non-governmental standards, including laws, decrees, plans, and programs, 50 operational policy instruments were identified (Appendix 2). A network analysis was generated using the Gephi software, based on a matrix that scored all (implicit and explicit) relationships between each pair of operational policy instruments. In Gephi, the operational instruments were aggregated into six modularity classes (Figure 4). A modularity class is the result of a community detection algorithm (Louvain method) that identifies groups (clusters) of nodes that are more densely connected to each other than to the rest of the network (Blondel et al., 2008).

Figure 4: Network analysis of operational policy instruments by modularity class.



Source: Author's compilation

Taking into account the modularity classes, and based on the qualitative understanding of policy instruments in ongoing discourses and the objectives identified in the content analysis, a final aggregation into 11 iterative discourse-based groups (Table 2) was carried out. A second network shows only the explicit relations (score 2) to focus on the highest interactions within the matrix. Coloring in the second network is based on the pre-defined 11 iterative discourse-based groups.

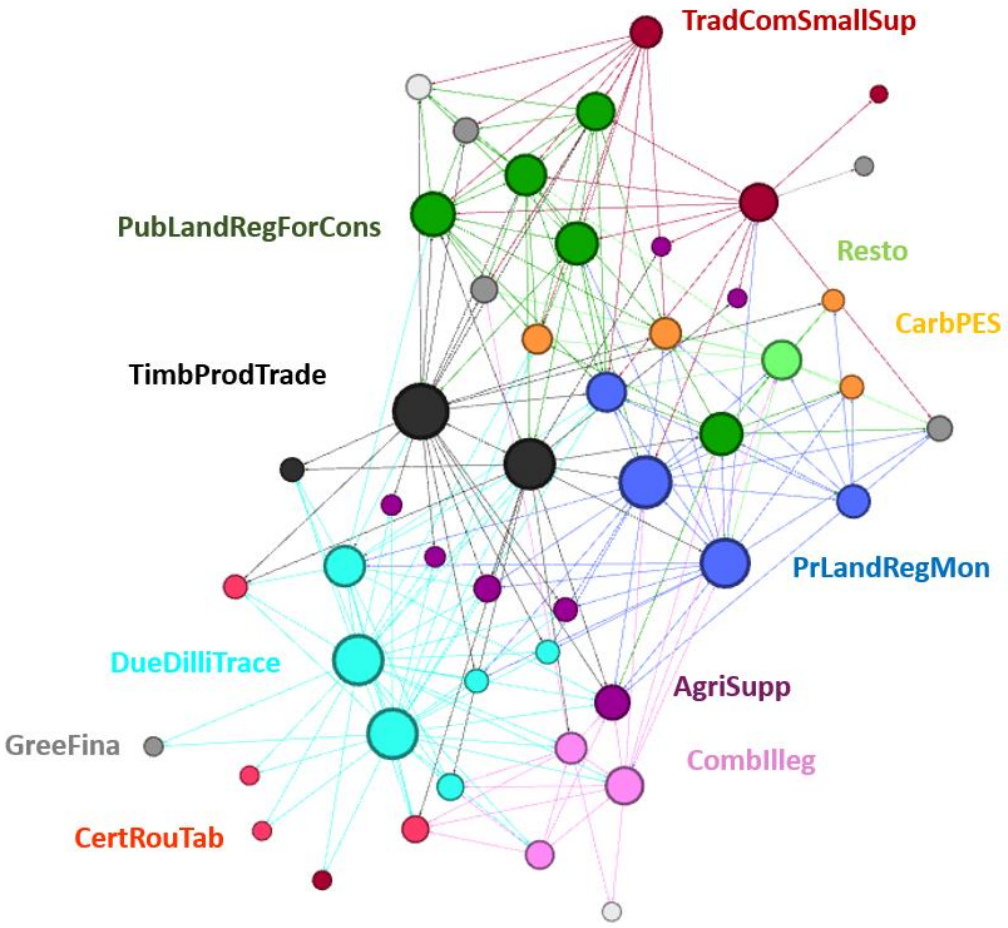
Table 2: Groups of operational policy instruments

Group of operational policy instrument	Operational policy instruments	Discourse literature	Network analysis color in Figure 5
Land register, monitoring and private land regularization (PrLandRegMon)	LR-APP; CAR-SICAR; PRA, CRA; PRIVATE LAND TAX; DATA-MONITORING	Furumo et al., 2024; Leme et al., 2025	Blue
Combat illegality (CombIlleg)	SANCTION; BLACK LIST; DIRTY LIST;	Nunes et al., 2024; Coelho-Junior et al., 2022; Miranda et al., 2026	Pink
Public Forest, Conservation, Public Land regularization (PubLandRegForCons)	PUBLIC FOREST- REGISTER; PUBLIC FOREST - INTEGRAL PROTECTION; PUBLIC FOREST - REGULARIZATION; PUBLIC	Azevedo-Ramos et al., 2020; Salomao et al., 2021;	Green

Group of operational policy instrument	Operational policy instruments	Discourse literature	Network analysis color in Figure 5
	FOREST MANAG AND CONCESSION; PUBLIC LAND REGULARIZATION; ZEE; DIRECT SUPPORT BIOECONOMY; FIRE MANAG		
Green Finances (GreenFina)	GREEN FUNDS; GREEN FISCAL TAX; GREEN TAXONOMY; GREEN AGRIC CREDITS	André and Ramos-Tallada, 2025; Knoch et al. 2020; COP30 2025; Chiavari et al., 2024; OECD 2025	Grey
Agricultural support (AgriSupp)	CATTLE TRADE; SOYBEAN TRADE; WATER CONCESSION; ENVIRONMENTAL LICENSE - ATIVIDADES AGRÍCOLAS; ENVIRONMENTAL LICENSE - BIG INFRA; AGRIC CREDIT; SPECIAL TERRITORIES (AGRIC)	TEEB, 2018; Angelsen & Kaimowitz, 2001; Lambin & Mayfroidt 2018; Jain et al., 2023; Assunção, Gandour & Rocha, 2013	Purple
Due Dilligence and Traceability (DueDilliTrace)	NATIONAL DUE DILLIGENCE; INTERNATIONAL DUE DILLIGENCE; TIMBER - TRACE; CATTLE-TRACE; SOYBEAN - TRACE; PLATFORMS TRACE	GOVBR 2025; Ruviaro et al., 2014; Santos et al., 2026	Light blue
Restoration (Resto)	RESTORATION	Pedro H.S. Brancalion et al., 2019; Toto et al., 2025	Light green
Support to Traditional communities and smallholders (TradComSmallSup)	INDIGENOUS LAND REGULARIZATION; LAND REGULARIZATION; DIRECT SUPPORT SOCIO- BIOECONOMY; SUPPORT SMALLHOLDERS PRODUCTION; CAPACITY BUILDING	Salomão et al. 2021; Jain et al., 2023;	Red
Timber Production and Trade (TimbProdTrade)	TIMBER LOGGING; TIMBER TRADE	IBAMA 2019; Rolim et al., 2019; Franca et al., 2023	Black
Carbon market and payment for ecosystem service (CarbPES)	EMISSIONS; VOLUNTARY CARBON MARKET; PES-PUBLIC AND PRIVATE AREAS; PES-PRIVATE AREAS;	Delacote et al., 2022; Engel et al., 2008; Sommerville et al., 2009	Orange
Certification and Roundtables (CertrRoundTab)	CATTLE CERTIFICATION; TIMBER CERTIFICATION; SOYBEAN CERTIFICATION; ROUND TABLE/WORKING GROUP INITIATIVES	Von Dorrien & Efken 2022; Taylor et al., 2026; Edwards and Laurance, 2012; Garrett et al., 2016	Light red

Source: Author's compilation

Figure 5: Network analysis of operational policy instruments



Ps.: Single nodes represent policy instruments. Colouring according to policy instrument groups (see Table 2). Node size reflects weighted degrees within the network, highlighting instruments that play a more influential or connecting role within the network.

Source: Author's compilation

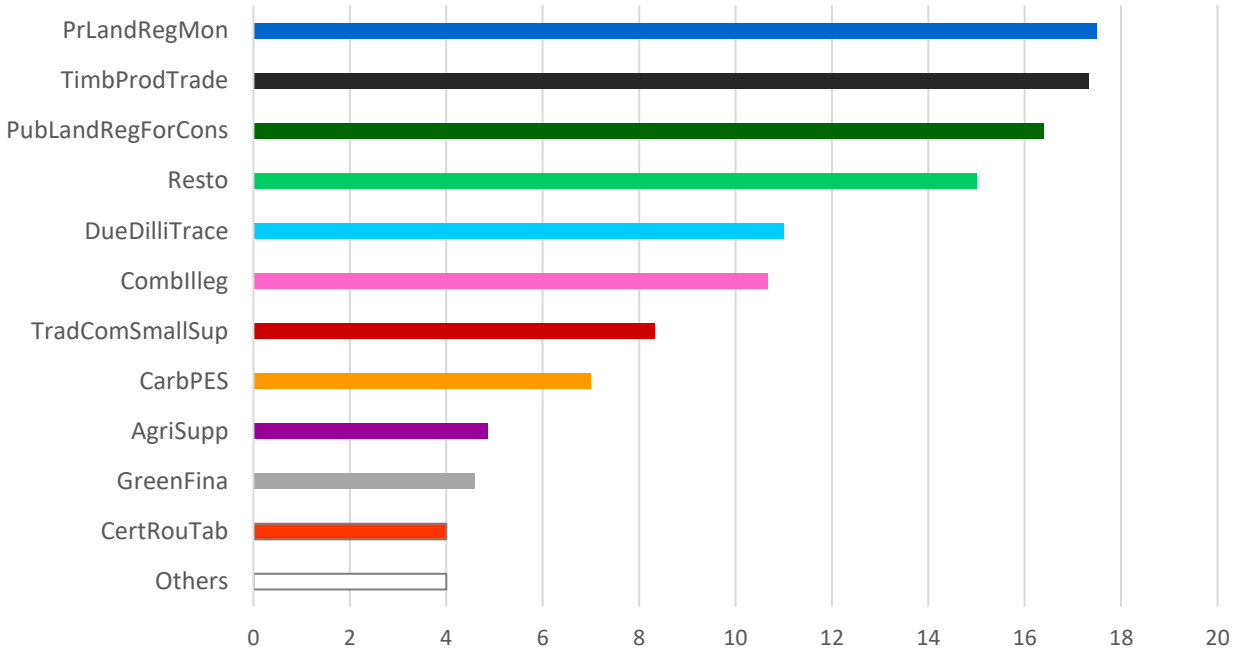
The visualization reveals several structurally central groups of policy instruments. PrLandRegMon occupies a highly connected and central position, showing the central importance of the Land registry and information and monitoring systems compared to several other instruments. The category DueDilliTrace forms a distinct cluster with strong connections to both, production and market-oriented instruments like timber and agriculture and regulatory frameworks, reflecting its bridging function between and at the same time dependence on domestic regulation and international trade requirements. PubLandRegForCons also shows high internal cohesion and multiple cross-cluster connections, particularly with restoration and land tenure instruments. In contrast, CarbPES appears more peripheral, connected but less central in shaping the overall governance structure.

On the production-oriented side, AgriSupp and TimbProdTrade groups demonstrate strong internal interlinkage and multiple linkages to enforcement and traceability instruments. CombIlleg acts as an intermediary group, linking enforcement mechanisms with both conservation and production domains. CertRouTab and GreenFina appear more loosely integrated, suggesting complementary but less structurally influential roles. Overall, the network structure highlights a highly interconnected but uneven governance landscape, where land registry, traceability, and conservation instruments act as central policy instrument categories, while market-based and voluntary mechanisms remain more peripheral. The figure underscores the systemic importance of legality

verification and monitoring as bridging elements between conservation objectives and agricultural production dynamics.

Based on the network analysis, the accumulated degrees ("connectedness"), summarize the structural hierarchies among policy instrument groups (Figure 6). PrLandRegMon emerges as the most interconnected group, closely followed by TimbProdTrade and PubLandRegForCons, confirming their central bridging role across conservation and production domains. Resto and DueDilliTrace also display relatively high connectivity, indicating their integrative function between regulatory enforcement and market requirements. In contrast, CertRouTab, GreenFina and AgriSupp show lower degrees of connectedness, suggesting more peripheral or complementary roles within the overall land-use governance network.

Figure 6: Mean weighted degrees of instruments in the respective operational policy instruments group



Source: Author's compilation

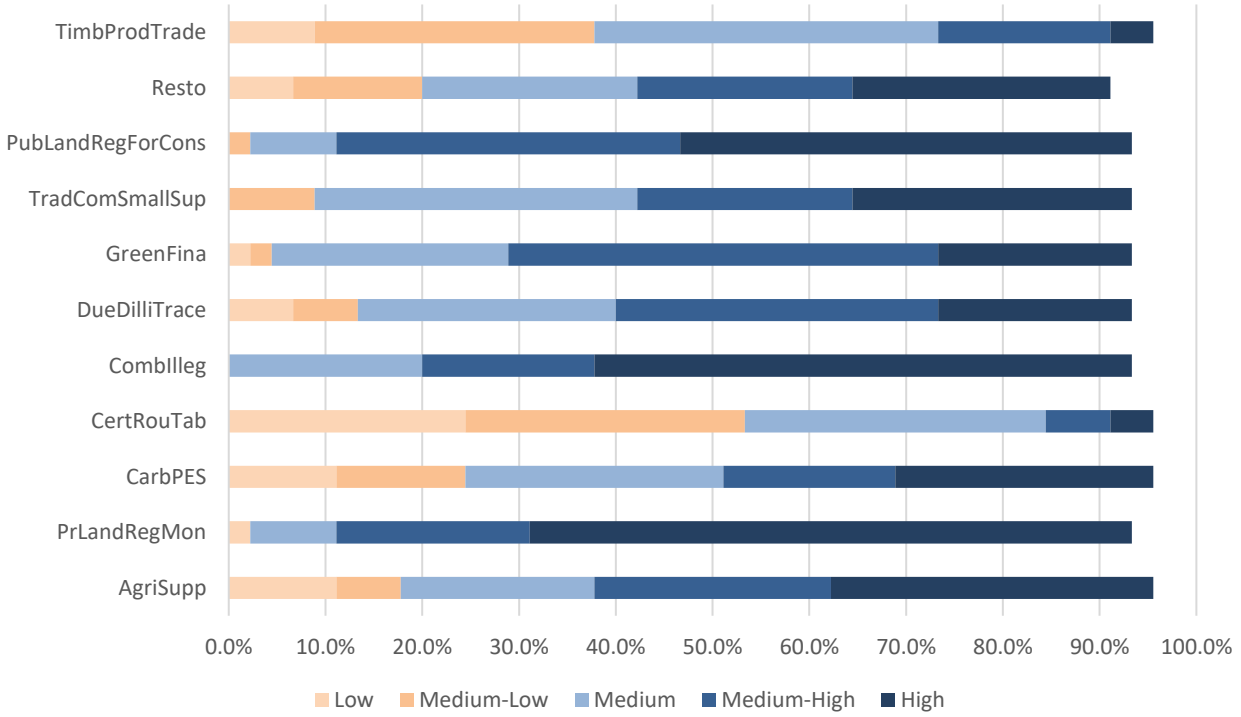
3.3 Potential effectiveness and implementation status of policy instruments

This section evaluates the potential effectiveness of policy instrument groups to balance agricultural production and forest conservation, as well the implementation status of the 11 groups of operational policy instruments shaping Brazil's land-use governance framework as perceived by interviewed stakeholders. Potential effectiveness can be interpreted as stakeholders' preferences for specific instrument groups. Mixed quantitative and qualitative interviews were conducted with 45 stakeholders, to assess the theoretical potential of instruments to contribute to the balance between agricultural and forest production and forest conservation and to compare it with status of operational implementation of each of the policy instrument groups. This dual assessment provides insight into structural bottlenecks, institutional asymmetries, and coherence gaps between policy design and implementation, thereby offering a clearer understanding of the strengths and weaknesses of Brazil's current land-use governance architecture.

The distribution of potential effectiveness (Figure 7) reveals that for all instrument groups (with exception of CertRouTab) half of the stakeholders assigned at least medium effectiveness scores; for some groups nearly all stakeholders assigned at least medium values. PrLandRegMon shows the highest share of positive appraisals, with 82.2% of responses classifying these iinstruments as medium-high or high, and only a marginal share assigning lower categories. PubLandRegForCons and CombIlleg instruments follow closely, with each of the

groups displaying roughly 73.3% combined medium-high and high ratings, confirming their perceived structural importance for addressing deforestation drivers. Resto and DueDilliTrace show a more moderate effectiveness, with around 50% of responses in medium-high and high categories- suggesting that their effectiveness is viewed as conditional upon implementation quality and institutional integration. In contrast, CertRouTab, CarbPES, and TimbProdTrade show considerably higher shares in lower effectiveness categories, with high ratings generally below 45%, and substantial proportions concentrated in medium–low and low categories.

Figure 7: Percentage of answers related to the potential effectiveness of the operational policy instruments groups in balancing agricultural production and forest conservation

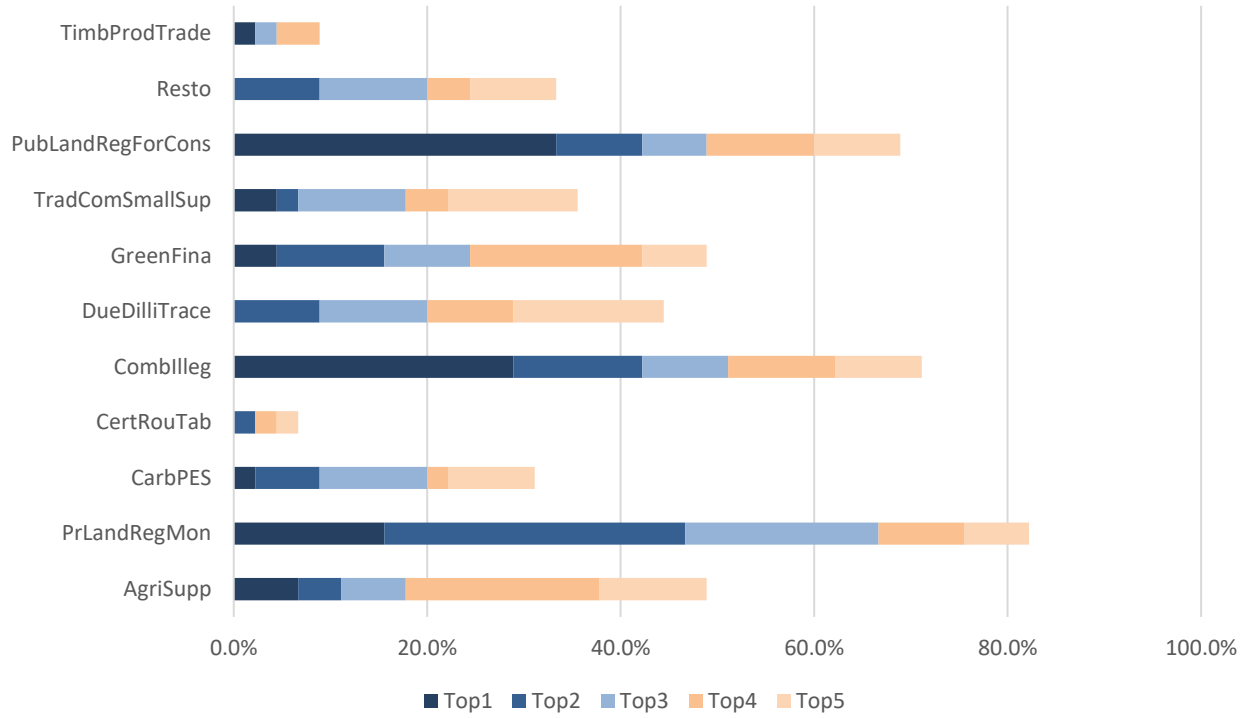


Ps: The percentages missing from the total of 100% are due to stakeholders who chose not to answer this question.

Source: Author's compilation

In order to provide a more pronounced distribution interviewees were asked to rank their preferences for specific instrument groups. Each participant was asked to indicate the five most important groups with top5 indicating the most important groups. PrLandRegMon, CombIlleg, PubLandRegForCons, GreenFina and AgriSupp were mostly mentioned to be within the 5 most important instrument groups of potential effectiveness, with respectively 86.7%, 75.3%, 73.3%, 53.3% and 53.3% of the respondents categorizing them as such (Figure 8).

Figure 8: Percentage of answers for ranking of policy instrument groups into top 1 to top 5 categories for potential effectiveness with regards to a balance of agricultural production and forest conservation

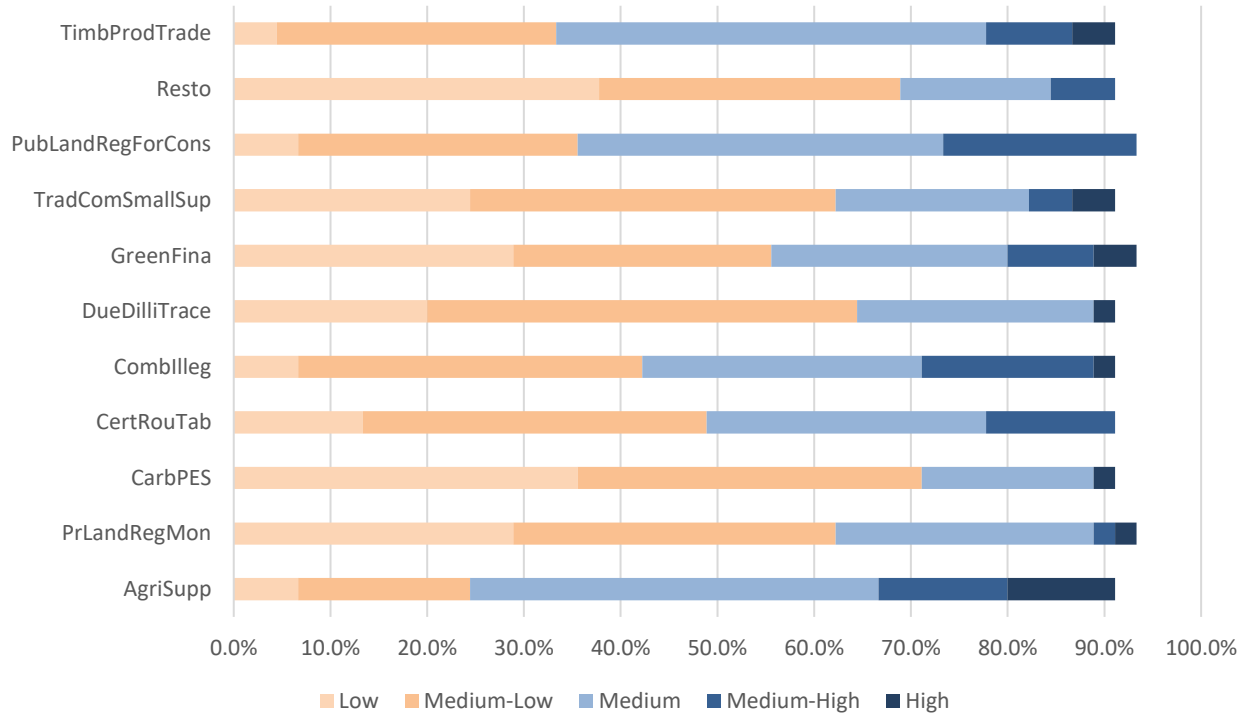


Source: Author's compilation

The answers related to implementation status reveal that overall, implementation (Figure 9) was perceived as rather low, indicating general constraints at the operational level. For hardly any of the instrument groups more than 20% of the stakeholders indicated medium-high or high implementation. For all groups low, low-medium, and medium scores constitute the largest shares of the responses. The PrLandRegMon policy instrument group, despite being ranked among the potentially most effective group, shows a large concentration in the low and medium-low categories, with only 26.7% of the respondents ranking it with a medium to implementation status. The PubLandRegForCons policy instrument group displays a predominantly medium implementation profile (37.8%), with substantial medium-low shares and none of the respondents rating it as highly implemented. CombIlleg shows a comparable pattern, with the answers concentrated in medium and medium-low categories (28.9% and 35.6% respectively). These results suggest that even the structurally central governance instruments face significant implementation bottlenecks despite their high perceived effectiveness.

CarbPES and GreenFinan range predominantly in medium-low and low categories (35.6% and 28.9 respectively). Agricultural support policies also show a predominantly medium implementation profile, with medium-high and high ratings remaining below one-third of responses. Overall, the results demonstrate a structural implementation gap: instruments perceived as most effective are not always those with the highest implementation status. Market-based and production-linked instruments appear slightly more operationally consolidated.

Figure 9: **Percentage of answers in five categories of implementation status of the operational policy instrument groups (100% is the total of the respondents in each group, values below 100% indicate missing answsers)**



Source: Author's compilation

Based on the scores chosen by stakeholders (between 1-5) for effectiveness and implementation in each group, an average was calculated and is shown in Table 2. A summary of the stakeholders' statements is also included in the same table.

Table 3: **Aggregation into effectiveness and implementation levels and synthesis of qualitative answers and comments related to potential effectiveness for a balanced land use and implementation status for 11 policy instrument groups. For details of qualitative answers see Appendix 3**

Group of operational policy instrument	Effectiveness Level (1–5)	Summary of qualitative comments justifying the scores for stakeholders' preferences	Implementation Status (1–5)	Summary of qualitative comments justifying the scores for Implementation Status
Land register, monitoring and private land regularization (PrLandRegMon)	High (5)	Foundational instrument enabling legality verification, restoration, credit conditionality, traceability, PES, carbon markets and EUDR compliance. System-wide leverage across all land tenures.	Medium-Low (2)	Major bottleneck due to low CAR validation, weak interoperability with SIGEF, and fragmented institutional integration

Group of operational policy instrument	Effectiveness Level (1–5)	Summary of qualitative comments justifying the scores for stakeholders' preferences	Implementation Status (1–5)	Summary of qualitative comments justifying the scores for Implementation Status
Combat illegality (CombIlleg)	High (5)	Direct and measurable impact on deforestation when consistently enforced; substantial deterrence function in frontier regions.	Medium (3)	Under-resourced, uneven enforcement, political constraints; often targets operational actors rather than systemic drivers
Public Forest, Conservation, Public Land regularization (PubLandRegForCons)	Medium-High (4)	Structurally reduces land grabbing and speculative deforestation by clarifying tenure and allocating undesignated lands; high climate and biodiversity relevance.	Medium-Low (2)	Strong legal basis but weak operational governance; limited progress in public land designation
Green Finances (GreenFina)	Medium-High (4)	Potential to shift production towards degraded lands and low-carbon systems; aligns financial incentives with conservation.	Medium-Low (2)	Limited scale relative to conventional credit; weak conditionality and poor territorial targeting
Agricultural support (AgriSupp)	Medium-High (4)	Influences production patterns and competitiveness; could support Agri+ transition if coherently aligned.	Medium (3)	Policy incoherence persists: conventional incentives outweigh low-carbon instruments; infrastructure gaps increase traceability costs
Due Dilligence and Traceability (DueDilliTrace)	Medium-High (4)	Enhances transparency and accountability in supply chains, particularly soy; strategic for EU market access and compliance.	Medium-Low (2)	Technically feasible but constrained by land registry weaknesses and logistical/segregation limitations
Restoration (Resto)	Medium-High (4)	Long-term structural potential for reducing expansion pressure and meeting climate targets; integrates	Medium-Low (2)	Limited scale compared to national targets; weak integration with land tenure clarification and enforcement. Lack of scientific basis.

Group of operational policy instrument	Effectiveness Level (1–5)	Summary of qualitative comments justifying the scores for stakeholders' preferences	Implementation Status (1–5)	Summary of qualitative comments justifying the scores for Implementation Status
		mitigation and adaptation goals.		
Support to Traditional communities and smallhoders (TradComSmallSup)	Medium-High (4)	Strong correlation with conservation outcomes; socially and environmentally strategic in principle.	Medium-Low (2)	Underfunded, slow demarcation processes, limited integration into broader climate and land-use governance
Timber Production and Trade (TimbProdTrade)	Medium (3)	Legal timber and forest concessions can reconcile production and conservation, but remain marginal compared to non-native forestry plantations.	Medium (3)	Institutional framework exists, but limited investment in sustainable native forest management and diversification
Carbon market and payment for ecosystem service (CarbPES)	Medium (3)	Potential to internalize conservation opportunity costs, but dependent on strong governance and additionality.	Medium-Low (2)	Weak regulation, limited scale, low producer incentives, critical credibility debates
Certification and Roundtables (CertrRoundTab)	Medium-Low (2)	Operates as a signaling tool in niche markets; limited influence on macro land-use dynamics due to low coverage.	Medium-Low (2)	Operational in specific sectors but fragmented standards and the lack of a premium price reduce the transformative impact

Source: Author's compilation

For each of the top five operational policy groups identified by stakeholders as effective in promoting a balance between forest conservation and agricultural production, as well as for agricultural support a synthesis is presented in the following subsections. The analysis relies on the perceived effectiveness and implementation of each group, as well as the differences between stakeholder categories. Appendix 4 also contains a summary table with the results for all operational policy instruments groups including a differentiation by stakeholder categories.

3.3.1 Land register, monitoring and private land regularization (PrLandRegMon)

The results reinforce that land registers and data monitoring, particularly the Environmental Rural Register (CAR), are widely perceived as structurally effective, yet unevenly implemented. In terms of potential effectiveness, perceptions are predominantly high across stakeholder groups, only Industry and NGO`s assessments were moderate, with roughly 45.5% rating effectiveness as high respectively, suggesting recognition of the system's

potential, yet with awareness of operational constraints. According all stakeholders, CAR, combined with INPE/PRODES satellite monitoring, is broadly viewed as a robust institutional architecture capable of supporting due diligence and traceability, legality, restoration, and carbon markets, if properly operationalized.

However, the gap between potential effectiveness and implementation is evident across all stakeholder categories, but especially for Academia, for which only 14.4% rate implementation as high, while 36.4% classify it as medium-low, and another 25.3% as medium, reflecting concerns about slow CAR validation, PRA delays, and legal uncertainty. NGOs similarly report implementation concentrated in medium and low categories, with nearly half of responses below high, underscoring skepticism regarding verification, transparency, and enforcement. These percentages highlight a consistent structural pattern: while stakeholders recognize the institutional design as sound, implementation bottlenecks, particularly low CAR validation rates, incomplete integration with Land Management System (SIGEF), and weak Environmental Regularization Program (PRA) operationalization, undermine practical effectiveness.

Across categories, respondents identify land tenure regularization and CAR validation as more decisive for reducing deforestation than productivity improvements alone. Without validated registries, access to sustainable credit, PES schemes, carbon markets, and EUDR-compliant traceability systems remains constrained. The predominance of medium implementation ratings, especially among Government (45.5%) and Industry (33.3%), signals institutional capacity and coordination gaps rather than conceptual disagreement. Political shifts towards higher prioritized agendas, bureaucratic delays and fragmented governance persist as limiting factors.

At the same time, stakeholders widely agree that Brazil's satellite monitoring systems are internationally credible and that strengthening the CAR-monitoring could unlock scaling of restoration, green finance, and PES or even carbon markets. In sum, the perception confirms a central diagnosis: Brazil possesses a comparatively advanced legal and monitoring framework, but implementation, particularly CAR validation and land regularization, remains the critical structural constraint for achieving transparency, climate resilience, and deforestation control at scale. A summary of the policy instruments included in this group is presented in Table 4.

Table 4: Policy instruments encompassed by PrLandRegMon group

Policy instrument	Laws, regulations and rules specifying the respective instrument
LR-APP	Private forest protection Legal Reserve (RL) and Area of Permanent Preservation (APP) (Forest Code, Law 12.651/2012, Art 4 and 12)
CAR-SICAR	Rural Environmental Registry (CAR) (Forest Code, Law 12.651/2012, Art 29)
	National Rural Environmental Registry System (SICAR) (Decree 7.830/2012)
	Extinguishes the CAR deadline (Provisional Measure 884/2019)
CRA	Environmental Reserve Quota (CRA) (Forest Code, Law 12.651/2012, Art 44)
PRA	Environmental Regularization Programs (PRA) (Forest Code, Law 12.651/2012, Art. 59)
	Complemented rules for PRA (Decree 8235/2014)
LAND REGULARIZATION	Land Management System (SIGEF) (Law 10.267/2001)
	Agrarian Reform (Law nº 8.629/1993)
	Terra Legal program (Land Tile) Law 11,952/2009 (modified by Law 13,465/2017) or use right concession
	Selection, permanence and titling of families benefiting from the National Agrarian Reform Program (Decree nº 9.311_2018)
	Rural Property Registration Certificate (CCIR) (Law 4.947/1966, Law 5.868/1972 and Law 10.267/2001)

Policy instrument	Laws, regulations and rules specifying the respective instrument
	National Rural Real Estate Cadastre (SNCR) (Law 5.868/1972 and Law 10.267/2001)
PRIVATE LAND TAX	Rules for land rental (Lei n.º 76/77)
	Land Bank and Land Mobilization Fund (Law 49/2023)
	Rural Land Tax (ITR) (Law 9.393/1996)
DATA-MONITORING	Govermment Satellite monitoring systems (DETER; DEGRAD;PRODES. Terra Class)
	Non-Govermment Satellite monitoring systems (Mapbiomas, SAD-Imazon, SEEG)

Source: Author's compilation

3.3.2 Combat illegality (CombIlleg)

Combatting illegality was widely perceived as one of the most structurally effective instruments for reconciling production and conservation, especially by stakeholders from Academia (62.5%) and Industry (66.7%) and less by Government and NGOs (both 45.5%). These distributions demonstrate a clear convergence: command-and-control instruments, such as embargoes, fines, dirty lists (e.g., labor blacklists), and supply-chain blocking, are considered more immediately impactful than purely market-based or voluntary mechanisms. Interview data reinforce this interpretation, highlighting that those sanctions have strong signaling effects for the markets and can rapidly change risk perceptions.

However, implementation capacity is perceived predominantly as medium-low by Academia (50%) and Government (36.4%), although Industry demonstrates greater optimism, with 44.4% of the answers in the medium-high category. Government and industry actors justified the low scores by deficits in enforcement capacity, particularly regarding staffing, policing, and the territorial presence of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), the agency responsible for enforcement. They also mentioned a fragmented and unequal application of enforcement measures that undermines legal certainty. NGOs argue that illegality persists due to weak land governance, incomplete land designation, and continued real estate speculation in border regions, which links to the group of PubLandRegForCons instruments which was also mentioned among the top 5 groups in effectiveness. Across interviews, stakeholders stressed that enforcement should go beyond targeting operational actors ("the chainsaw operator") and focus on the financial and logistical command chains that orchestrate illegal operations.

There is broad agreement that illegality distorts competition and penalizes compliant producers. Industry actors emphasize that illegal production undercuts market prices and creates asymmetric costs for those in compliance to environmental standards. Industry stakeholders thus support stronger blacklists and origin-based controls, which again links to traceability tools needed for EUDR. NGOs and Academia argue that sanctions remain the most effective balancing instrument between production and conservation, particularly when integrated with CAR validation and land regularization. Government respondents highlight that validating CAR, operationalizing land tenure regularization, and strengthening territorial intelligence are prerequisites for scaling enforcement impact. The predominance of high potential effectiveness ratings combined with predominantly medium implementation scores confirms a structural diagnosis also observed for other instrument groups: Brazil possesses the legal instruments to combat illegality effectively, but enforcement remains constrained by institutional capacity, fragmented governance, and political economy dynamics. Strengthening command-and-control, while targeting upstream financiers and land speculators, emerges as a central condition for reducing deforestation and restoring market credibility. A summary of the policy instruments included in this group is presented in Table 5.

Table 5: Policy instruments encompassed by CombIlleg group

Policy instrument	Laws, regulations and rules specifying the respective instrument
SANCTION	Environmental Crimes Law (Law 9.605/1998)
	Property embargo (Forest Code, Law 12.651/2012, Art 51)
	Penalities and sanctions for environmental crimes (Decree 6514/2008)
BLACK LIST	"Union with Municipalities" or Black list of municipalities (since 2008). Program to Reduce Deforestation and Forest Fires (Decree 11,687/2023, Art 3)
DIRTY LIST	Register of Employers (Cadastro de Empregadores), also known as the "Dirty List" (Lista Suja), who have been found by government inspectors to be subjecting workers to "conditions analogous to slavery."

Source: Author's compilation

3.3.3 Public Forest, Conservation, Public Land regularization (PubLandRegForCons)

Public forests and conservation, particularly land designation and public land registration, emerge as structurally effective but operationally constrained policy instruments. Effectiveness perceptions are high across stakeholder groups, especially among Academia (62.5%) and NGOs and multi-platform actors (63.6%). In all categories, stakeholder responses converge on the fact that designating undesignated public lands, especially public forests, for conservation units or indigenous territories, or even for private purposes such as forest concessions, is one of the most effective instruments for curbing deforestation, particularly in deforestation frontier regions. As repeatedly noted in the interviews, the dynamics of deforestation in these regions are directly linked to land grabbing and land speculation, and stakeholders mentioned that clear territorial organization constitutes the legal and structural basis for law enforcement.

Despite this high perceived effectiveness, implementation remains uneven and low. NGOs highlight that many protected areas remain "on paper," lacking management councils, staff, or enforcement. The Industry (22.2%) and also to a higher percentage the Government (45.5%) mention a medium-low and medium implementation status respectively, recognizing the last advances related to implementation of these instruments. One of the examples is the creation of Technical Chamber for the Allocation and Regularization of Federal Rural Public Lands (CTD) by the Ministry of the Environment (MMA) and Ministry of Agrarian Development (MDA) in 2013 (Interministerial Decree MDA/MMA No. 369/2013). Initially, the geographic scope was limited to the Legal Amazon region, but in 2019, the Ministry of Agriculture, Livestock and Supply (MAPA) assumed some of the responsibilities of the MDA, taking over the CTD and expanding its operations to the entire country, that is, all federal land parcels. The CTD also benefits from the participation of the Chico Mendes Institute for Biodiversity Conservation (ICMBIO) and National Foundation for Indigenous Peoples (FUNAI), and collaboration with the Brazilian Forest Service (SFB) in the area of forest concessions.

The designation of public forest to forest concessions is viewed positively, particularly by Government and Industry, as concessions are viewed as instrument that combine conservation with productive use, but only when governance, monitoring, and transparency are robust. Without these safeguards, concessions risk reproducing credibility gaps in timber legality. Industry actors also mentioned the still persistent market skepticism toward legally harvested Brazilian timber, even when monitoring systems are in place. This skepticism limits the economic viability of sustainable forest management and underutilizes the potential of native forest production. Across interviews, stakeholders repeatedly underline that land tenure regularization and public land designation are preconditions for scaling green finance, PES, and carbon markets. The predominance of medium implementation scores across all groups confirms that the main constraint is not conceptual disagreement but governance capacity: insufficient cadastral integration, incomplete demarcation of public lands, weak enforcement against illegal occupation, and limited territorial planning. A summary of the policy instruments included in this group is presented in Table 6.

Table 6: Policy instruments encompassed by PubLandRegForCons group

Policy instrument	Laws, regulations and rules specifying the respective instrument
PUBLIC FOREST- REGISTER	National registry of public forests (CNFP) (Law 11,284/2006)
	National Forest Information System (SNIF) (Law 11,284/2006)
PUBLIC FOREST - INTEGRAL PROTECTION	National System of Conservation Units (SNUC) (Law 9.985/2000, Art 8)
PUBLIC FOREST – REGULARIZATION	National System of Conservation Units (SNUC) (Law 9.985/2000, Art 7)
	Amazon Region Protected Areas Program (ARPA) (Decree 8.505, De 20/08/2015)
PUBLIC FOREST MANAG AND CONCESSION	Forest concessions in public forest (Law 14.590/2023)
	Management of public forests for sustainable production (Law 11.284/2006)
PUBLIC LAND REGULARIZATION	Land regularization in public lands (Law 11952/2009 revoked by Law 13465/2017)
	Public land regularization in Legal Amazon (Law 10.592/2020)
	Public land regularization in Legal Amazon (Law 11688/2023 that change Law 10592/2020)
	Creation of the Technical Chamber for the Allocation and Land Regularization of Federal Rural Public Lands (CTD) (Decree 9.309/2018)
ENVIRONMENTAL ECONOMIC ZONING (ZEE)	Environmental Economic Zoning (ZEE) (Decree 4297/2002 and Law 6.938/1981, Art 9, item II)
	Ecological-Economic Macrozoning of the Legal Amazon (Macro ZEE) (Decree 7.378/ 2010)
DIRECT SUPPORT SOCIO- BIOECONOMY	Federal Program for Community and Family Forest Management (PMCF), linked to the National Plan for the Promotion of Socio-Biodiversity Product Chains (Decree - 6874/2009)
	National Plan for the Promotion of Sociobiodiversity Product Chains (PNPSB) (Interministerial Ordinance MDA/MDS/MMA No. 239, of 07/21/09)
	Minimum price for Sociobiodiversity Products (National Plan for the Promotion of Sociobiodiversity Products- Interministerial Ordinance nº. 239/2009)
	National Plan for Strengthening Extractive and Riverine Communities (PLANAFE) (Decree 9.334/2018)
	Social BioFuel Seal (Decree 10,527/2020)
	National Program for Productive Forests (Law 12.087/2024)

Source: Author's compilation

3.3.4 Green finance (GreeFina)

Green funds, fiscal instruments, and sustainability-oriented credit lines are widely perceived as promising but structurally underperforming tools for advancing conservation-compatible production. The quantitative data indicate that perceptions of effectiveness are mostly medium-high across all stakeholder groups, with higher values for NGOs with 27.3% in high and 54.5% in medium-high, followed by the government group with 27.3% in

high and 45.5% in medium-high ranges. Industry and Academia mentioned a certain skepticism about the incentive strength of green finance. Across interviews, stakeholders agree on the fact that green finance, such as “Plano ABC”, “Eco-Invest”, green bonds, and blended finance, can play a catalytic role, but only if territorialized and explicitly conditioned on land regularization, CAR validation, and measurable sustainability outcomes.

Implementation perceptions, however, are considerably weaker and more polarized. Almost 50% of Academia and Government stakeholders mentioned medium-low implementation, with a quarter of low scores in the case of Government actors (27.3%). Government actors also recognize that the scale of green credit remains insufficient relative to conventional agricultural finance. While instruments such as “Plano ABC” and “Eco-Invest” exist, their scale is small compared to conventional instruments like “Plano Safra”. Also, rural credit is rarely fully conditioned on sustainability or CAR validation. Academic actors mentioned dissatisfaction with practical implementation and fiscal conditionalities; this statement is similar to that made by NGOs, who emphasized that funds often do not reach those actively involved in forest conservation. NGOs was the only group with percentages for high implementation, 9.1%. NGOs and Academia stress fiscal misalignment, as receipts do not consistently translate international climate funds into territorial investment or support for smallholders and forest-dependent communities. Government stakeholders also mentioned that funding volumes remain small compared to conventional credit (“Plano Safra”). Academia emphasizes that the allocation often rewards already compliant producers instead of stimulating actors with deforestation risk to improve the situation. Despite the rate for medium-high implementation (33.3%), the industry repeatedly notes that sustainability requirements increase costs without guaranteed remuneration, reducing uptake incentives.

Across stakeholders, two structural concerns recur. First, green finance lacks strong economic signals in the absence of price premiums or tax differentiation, limiting its capacity to shift producer behavior. Solutions to increase the effectiveness and implementation of green funds would mean to include land taxation to curb speculative landholding, conditioning credit on validated CAR and compliance, and redirecting fiscal incentives from conventional expansion toward degraded land recovery and soil restoration. Second, a coordination between financial institutions and stakeholders from the government and also industry was also mentioned in terms of data and systems share, technical staff etc. The predominance of medium-high effectiveness ratings combined with predominantly low-to-medium implementation scores indicates that green funds are perceived as conceptually sound but structurally under-scaled and insufficiently conditional. Strengthening fiscal coherence, enhancing territorial targeting, and ensuring economic compensation for sustainable practices emerge as central prerequisites for these instruments to contribute meaningfully to deforestation reduction and climate resilience. A summary of the policy instruments included in this group is presented in Table 7.

Table 7: Policy instruments encompassed by GreeFina group

Policy instrument	Laws, regulations and rules specifying the respective instrument
GREEN FUNDS	Tropical Forest Forever Facility (TFFF)
	Amazon Fund (Decree 6.527/ 2008)
	National Forest Development Fund (FNDF) (Law 11,284/2006)
	Climate Change National Fund (FNMC) (Decree 9578/2018, linked to National Climate Change Policy-NCCP; Law 12.114/2009)
GREEN FISCAL TAX	Green Tax on Operations Relating to the Circulation of Goods and the Provision of Services (ICMS-Verde) (Lei 7.638/2012)
GREEN AGRIC CREDITS	Green Rural Producer Note (CPR Verde) (Law 10.828/2021)
	Eco-Invest (Law 14.995/2024).
	Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Economy in Agriculture (ABC and ABC+ Plan)
GREEN TAXONOMY	Green Taxonomy (Decree 12.705/2025)

Source: Author’s compilation

3.3.5 Agricultural support (AgriSupp)

This group is dedicated to operational policy instruments linked to the structural development of agriculture, such as infrastructure, rural credit, subsidies, and market instruments, regardless of whether or not they are connected to a more sustainable agriculture. Across categories, medium to high perceptions of effectiveness dominate, particularly among Government (45.5% of stakeholders chose a medium-high level of effectiveness) and Industry (55.6% of stakeholders chose a high level of effectiveness) while the implementation gaps remain significant. Government actors mention that the support to agriculture is necessary for a transition to specifically sustainable agriculture as a national strategy, yet acknowledge that it remains underfunded and weakly implemented. One example is the incoherence of investments destinated as “Plano Safra” (largely oriented toward conventional expansion) and “Plano ABC” (low-carbon agriculture). Responses of Academia and NGOs show more balanced distributions, with noticeable shares in medium-high and high effectiveness ranges, while Industry responses stand out for relatively higher shares in the high effectiveness category (55.6%). Yet implementation scores in general are more strongly clustered in the medium range.

Overall, stakeholders converge on the perception that policy frameworks exist, but operationalization remains uneven and constrained by structural bottlenecks. Academia emphasizes that beyond monoculture systems the recovery of degraded lands, improved soil management, genetic improvement, and diversification need to be the core components for support measures. The group of “Others”, which includes actors from the financial sector (banks etc.), reinforces that agricultural credit is the main lever for transformation, calling for green and blended finance mechanisms (e.g., soil recovery related and “Eco-Invest”-type programs) to condition capital flows on sustainability criteria. However, implementation perceptions suggest that while potential effectiveness is recognized as moderate, the translation into consistent, high-quality implementation remains limited, reflecting fragmented incentives and insufficient conditionality in rural credit systems.

At the same time, across all stakeholder categories, infrastructure and commercial governance emerge as structural and challenging topics that require greater attention within this group. Severe infrastructure deficits, roads, ports, railways, silos, logistics, and storage, are repeatedly cited by Government and Industry as bottlenecks limiting segregation, traceability, and market access. Industry highlights that compliance with trade rules such as the EUDR raises segregation costs and reduces volumes, while sustainability premiums are largely absent, undermining economic incentives. NGOs warn that infrastructure expansion, if not paired with safeguards and territorial planning, can stimulate deforestation and land speculation. There is concern that trade rules risk misalignment with territorial realities and climate adaptation priorities, particularly where fragmented certification schemes and regulatory requirements multiply transaction costs. The higher shares of answers in medium implementation categories, especially for Government and Industry, reinforce this narrative: regulatory ambition is acknowledged, but infrastructural deficits, incoherent incentives, and inequitable trade arrangements constrain effective delivery of resilience-oriented agricultural transformation. A summary of the policy instruments included in this group is presented in Table 8.

Table 8: Policy instruments encompassed by AgriSupp group

Policy instrument	Laws, regulations and rules specifying the respective instrument
CATTLE TRADE	Normative Instructions (MAPA)
	Industrial and Sanitary Inspection of Animal Products (RIISPOA) (Decree No. 9.013/2017)
SOYBEAN TRADE	IN MAPA No. 09/2009 (with updates): Governs the issuance of phytosanitary certificates (CFO/PC) required for soybean export.
WATER CONCESSION	Law nº. 9,433/1997 (Art. 12)
ENVIRONMENTAL LICENSE - ATIVIDADES AGRÍCOLAS	General Law on Environmental Licensing (Law No. 15.190/2025) and the National Environmental Policy (Law No. 6.938/1981). The rule requires full compliance with the Forest Code (Law No. 12.651/2012).
ENVIRONMENTAL LICENSE - BIG INFRA	General Law on Environmental Licensing (Law No. 15.190/2025) and the National Environmental Policy (Law No. 6.938/1981). CONAMA Resolution nº 237/1997.
AGRIC CREDIT	Rural Credit law (Law 4.829/1965)
	National Rural Credit System (SNCR) (Law 4.829/1965)
	Rural Producer Note (CPR) (Law 8.929/1994)
	Safra Plan (Agriculture Policy, Law 8.171/1991, Art. 8)
SPECIAL TERRITORIES (AGRIC)	MATOPIBA Agricultural and Livestock Development Plan (Decreee 8.447/2015)
	Creation of AMACRO zone
	National Agricultural Reserve (RAN) (Decree-Law 199/2015)

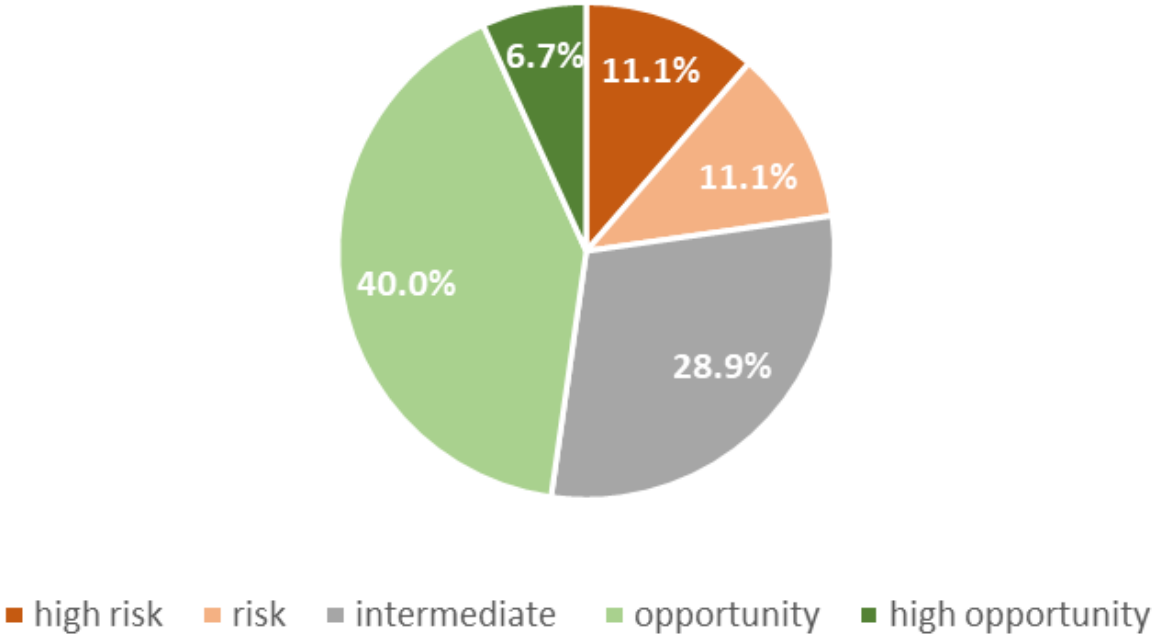
Source: Author's compilation

3.4 EUDR regulation perceptions and anticipated effects

3.4.1 Is EUDR perceived rather as a risk or opportunity?

The largest share of Brazilian stakeholders perceives EUDR as an opportunity, although important concerns remain (Figure 10). 48.9% of the respondents perceive the EUDR largely as an opportunity (sum of opportunity and high opportunity). In contrast, only one-fifth of the stakeholders perceive the regulation primarily as a risk (11.1% attributed risk and 11.1% high risk). The qualitative responses show that Academia and NGOs see the EUDR as a political and institutional "push factor," capable of accelerating CAR validation, traceability, and enforcement debates". However, they also warn about leakage effects (e.g., to China or to the domestic market) and the risk of 'regulatory dilution' due to postponements. Industry actors more frequently emphasize risks associated with segregation costs, logistical bottlenecks (silos, ports), and the absence of premium prices, arguing that without compensation mechanisms the regulation may create exclusion and market concentration. Government representatives largely describe the EUDR as an opportunity, but stress that its effectiveness depends on resolving structural bottlenecks such as land tenure regularization and CAR validation.

Figure 10: Percentage distribution of stakeholders' perceptions of EDUR being a risk or an opportunity

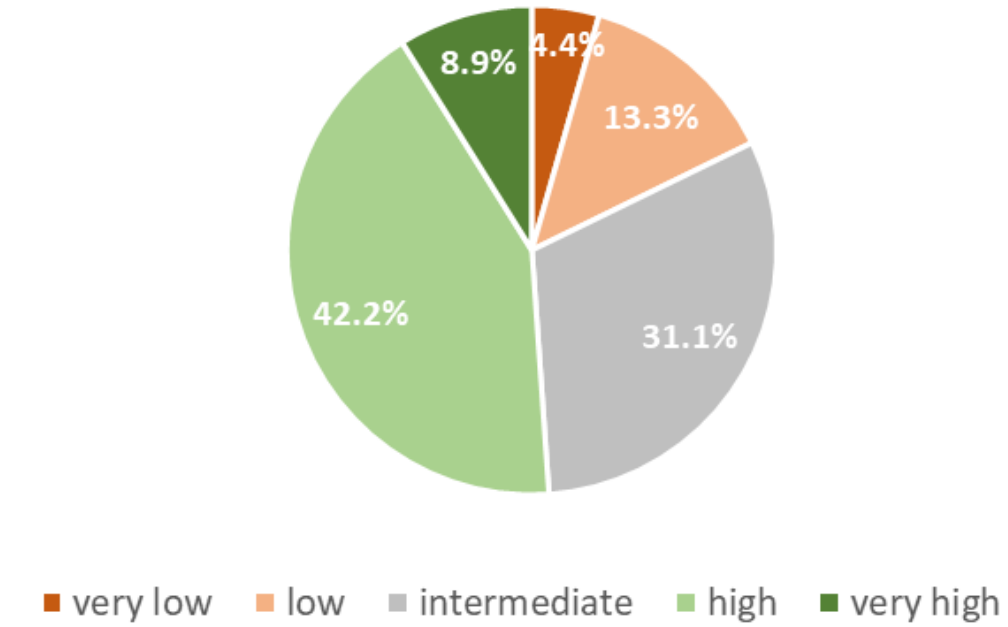


Source: Author's compilation

3.4.2 Is Brazil prepared for EUDR implementation?

Regarding Brazil's level of preparedness (**Figure** 11), perceptions are more positive than negative, but not unequivocal. A combined 51.1% of respondents assigned high preparedness scores (42.2% to well and 8.9% to very well), while 31.1% selected intermediate, reflecting a perception of partial readiness. Only 13.3% and approximately 4.4% attributed scores of 2 and 1 respectively, indicating that only a minority of the respondents considers Brazil as poorly prepared. Across stakeholder categories, qualitative answers show that concurring views exist on Brazil's comparative advantage in monitoring systems (e.g., INPE/PRODES), CAR coverage, and mapped Indigenous Lands and Conservation Units that provide an information basis for EUDR implementation. Nevertheless, Academia and NGOs stress that CAR validation remains a critical bottleneck and that implementation gaps undermine credibility. Government actors frequently argue that Brazil is institutionally advanced relative to competitors but missing staff and budgets in governmental institutions are challenging and inter-institutional coordination can be a constraint. Industry representatives, particularly from the soy sector, tend to report higher preparedness due to existing traceability protocols, moratorium experience, and pilot segregation initiatives, whereas beef sector actors underline persistent challenges related to indirect suppliers and domestic-market orientation.

Figure 11: Percentage distribution of stakeholders' perception about how far Brazil is prepared for EUDR



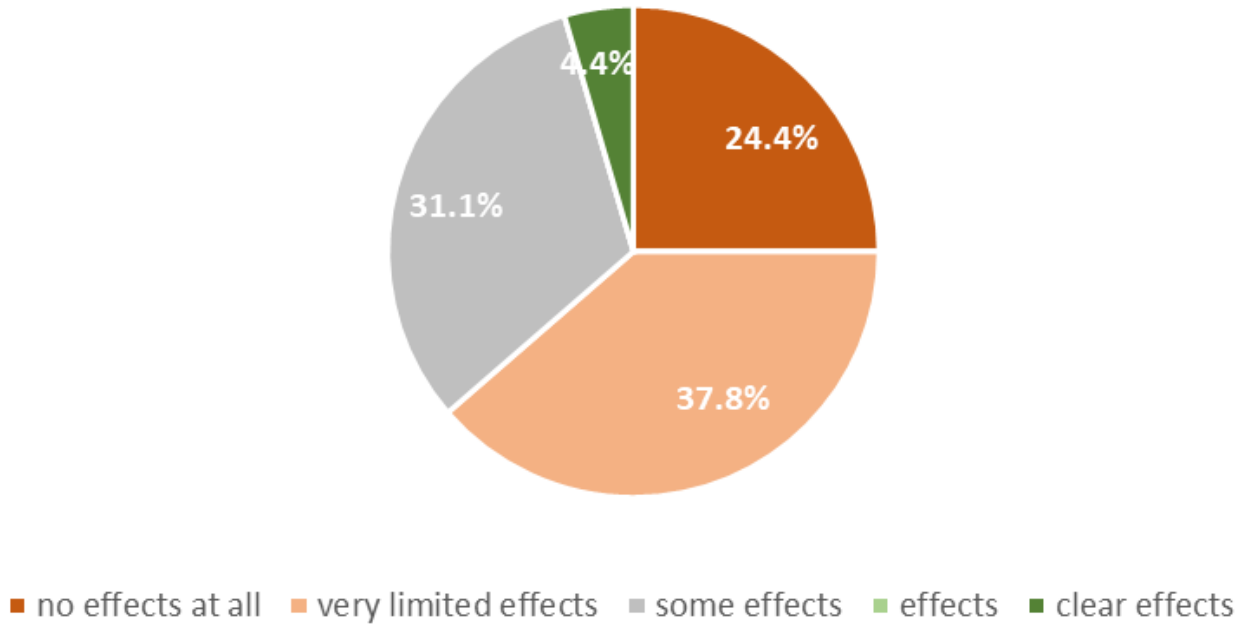
Source: Author's compilation

Differences between stakeholder groups become particularly visible when connecting risk/opportunity and preparedness perceptions with sectoral realities. Soy stakeholders (industry and parts of government) emphasize that the sector is structurally more organized and export-oriented, which facilitates compliance but increases sensitivity to segregation costs (estimated at additional costs per ton in pilot projects). In contrast, beef-sector stakeholders and several NGOs highlight the structural difficulty of monitoring indirect suppliers and the strong domestic and Chinese market orientation, reinforcing concerns about leakage and limited deforestation impact. Academia consistently underscores contradictions between formal legal robustness (e.g., Forest Code) and weak enforcement, warning that repeated postponements may undermine both EUDR credibility and domestic governance reforms. Overall, while nearly half of respondents regard the EUDR as an opportunity and a slight majority considers Brazil prepared, stakeholder narratives reveal that this optimism is conditional upon improvements in land governance, CAR validation, territorial capacity building, and fair cost-sharing mechanisms across global supply chains.

3.4.3 Will EUDR be an important instrument to curb deforestation in Brazil?

The perception of the effects EUDR on deforestation reduction is predominantly moderate to low (Figure 12). 37.8% of respondents assigned very limited effects and 24.4% no effects at all, meaning that 62.2% perceive the EUDR as having limited or low direct impact on deforestation reduction. A further 31.1% selected intermediate, indicating a conditional or moderate effect, while none of the respondents attributed effects (0.0%) and only a small share (4.4%) assigned clear effects. This distribution suggests that, although the regulation is widely debated, most stakeholders do not expect it to substantially reduce deforestation in Brazil on its own.

Figure 12: Percentage distribution of stakeholders' perception of the potential of EUDR to curb deforestation



Source: Author's compilation

The qualitative data from the interviews reinforce this interpretation, as there is consensus that EUDR alone will not curb deforestation. Stakeholders also mention that the difference between the deforestation cutoff date, December 31 of 2020, does not align with that indicated by the Environmental Crimes Law, for environmental penalties, and consequently adopted in the Brazilian Forest Code (Law 12651 /2012), July 22 of 2008 for illegal deforestation. Besides, the actors also stress that the FAO's Forest definition which also underlies the EUDR excludes one of Brazil's most threatened biomes, the Cerrado, creating a potential spillover into this region. In general, stakeholders state that without parallel investment in internal governance, enforcement, and inclusion of small farmers, EUDR rather than driving structural change, may increase land and market/industry concentration, meaning that smallholders might sell land to bigger and better prepared producers, generating so-called "perverse effects", and leakage effects.

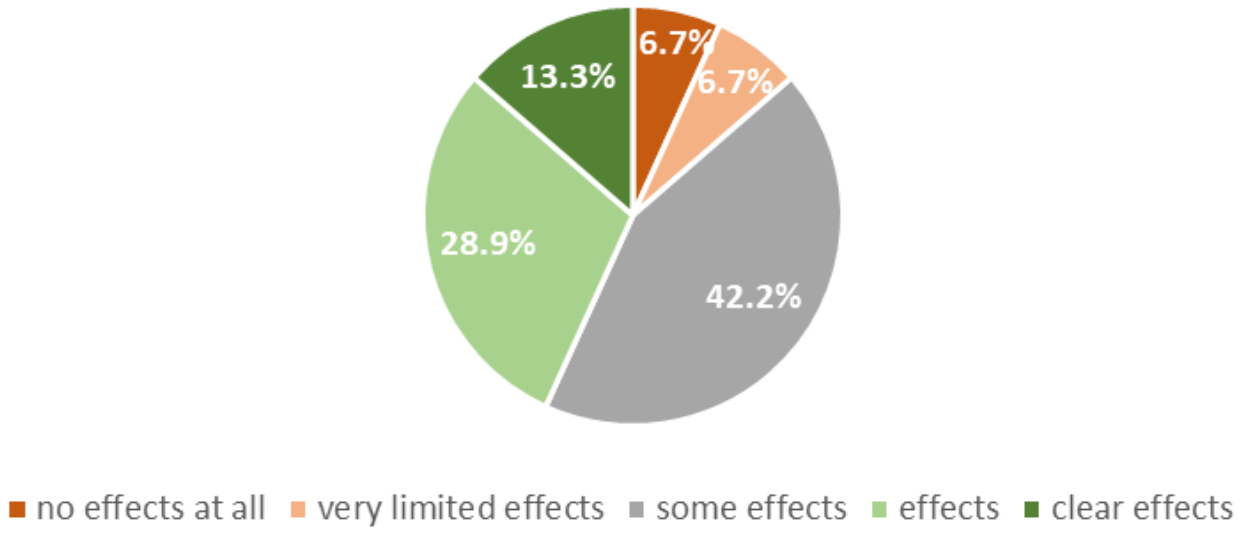
Differences across stakeholder categories help explain this characterization. Industry representatives, especially from the soy sector, often argue that EUDR compliance will mainly lead to reorganization of export logistics through segregation and concentration of flows, without fundamentally altering land-use dynamics, and stress that without premium prices the regulation will not generate structural incentives to reduce deforestation. In the beef sector, actors emphasize the difficulty of monitoring indirect suppliers and the dominance of the domestic and Chinese markets, further limiting expected impact. Government stakeholders tend to describe the EUDR as an important signal or opportunity to strengthen monitoring and traceability systems, but underline that deforestation control depends primarily on domestic land governance, CAR validation, and enforcement capacity. NGOs and academic actors similarly stress that command-and-control measures, territorial governance, and the destination of public lands are more decisive than external market regulation alone, warning that postponements or weak implementation could even trigger rebound effects. Overall, while the EUDR is recognized as a relevant political and reputational driver for reduced deforestation, stakeholders largely converge in their opinion that its standalone effect on deforestation is likely to be limited without complementary domestic reforms and strengthening of directly linked national policy instruments.

3.4.4 Potential effects on soy and beef trade

The perceived effects of the EUDR on soy trade are predominantly moderate to high. 42.2% of respondents attributed some effects, 28.9% indicated effects, and 13.3% indicated clear effects, meaning that 84.4% of the respondents expect medium to very significant trade effects in the soy sector (Figure 13). Only 8.9% and 6.7% assigned scores of very limited effects and no effects at all, respectively (totaling 15.6%), suggesting skepticism regarding changes in trade. Qualitative comments explain this strong expected effect: the soy chain is described as structurally organized, export-oriented, and already in compliance to environmental conditionalities (e.g., through the Soy Moratorium, certification schemes, and pilot segregation initiatives).

Industry representatives emphasize that companies have invested in full physical segregation pilot activities which suggests that the sector is largely prepared. The estimated additional costs are around USD 30 per ton (approximately 6-7% of the product price). Yet, there remain risks as respondents repeatedly stress the absence of premium prices and the risk of market concentration into a few compliant terminals for export. NGOs and academic actors acknowledge that EUDR has accelerated traceability debates but warn about “soy washing,” leakage to other markets (notably China), and the potential expansion of production into the Cerrado which does not account as forest under the EUDR and is thus less regulated.

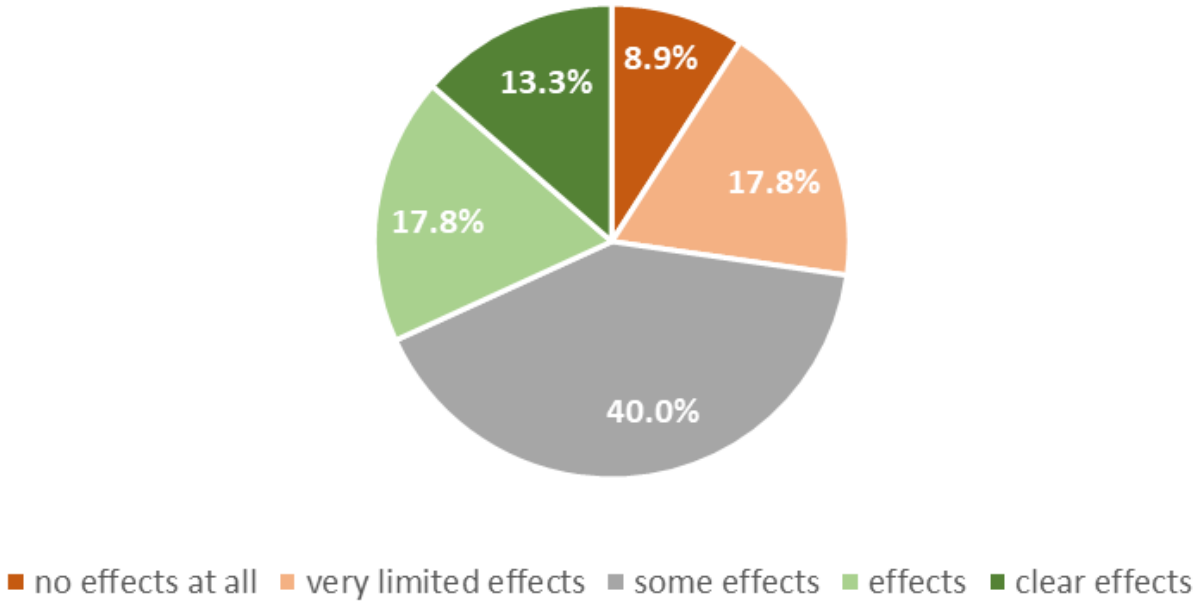
Figure 13: Percentage distribution of stakeholders' perception of the potential effects of EDUR on soy trade



Source: Author’s compilation

In contrast, the expected effects on beef trade are more moderate and differentiated. While 40.2% of the interviewed experts also selected some effects, only 17.8% indicated effects and 13.3% indicated clear effects (71.1% combined medium-to-high), which is 11 percentage points lower than for soy (Figure 14). At the same time, 17.8% of them assigned very limited effects and 8.9% indicated no effects at all (26.7% combined), indicating greater skepticism regarding transformative trade impacts. Interviewees consistently highlight structural differences: roughly 80% of Brazilian beef is directed to the domestic market, and China represents a dominant external buyer, reducing EU leverage. Industry actors frame EUDR more as a niche market requirement that may lead to selective segregation of export flows rather than systemic restructuring, especially given the persistent challenge of monitoring indirect suppliers and informal slaughter channels. Government and NGO stakeholders reinforce that traceability in cattle, particularly individual animal tracking and the control of indirect suppliers, remains the principal bottleneck, limiting the depth of expected trade transformation.

Figure 14: Percentage distribution of stakeholders' perception of the potential effects of EDUR on beef trade



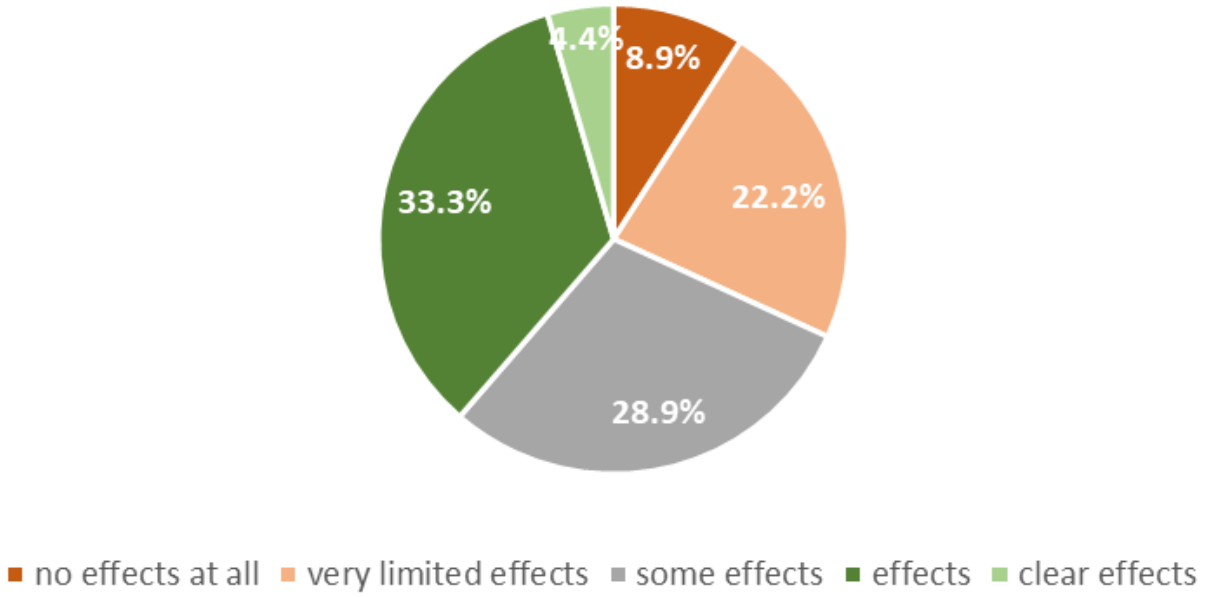
Source: Author's compilation

Across stakeholder categories, a clear divergence emerges between a sectoral "reorganization effect" and a broader governance effect. Industry representatives tend to interpret EUDR impacts mainly in terms of logistics, segregation costs, infrastructure deficits (silos, ports), and market concentration, arguing that without continuous premium prices or shared cost mechanisms, compliance will not alter land-use incentives. Conversely, NGOs and academic actors emphasize risks of market leakage, geopolitical tensions, and rebound effects, but also recognize that EUDR has already functioned as a catalyst for greater transparency and traceability demands. Government stakeholders adopt an intermediate position, describing the regulation as an opportunity to demonstrate Brazil's monitoring capacity (CAR, INPE/PRODES) while acknowledging that trade effects alone will not reduce deforestation without resolving fundamental land-tenure and implementation gaps. Overall, the quantitative results confirm that soy trade is perceived as more directly and structurally affected by EUDR requirements than beef trade, where impacts are expected to be more selective, geographically concentrated, and conditioned by domestic and Asian market dynamics.

3.4.5 Brussels effect

Stakeholders mostly expect international spillover effects on policies of other trade partners that follow the positive EU example, which has been called a "Brussels effect". As shown in Figure 15, 33.3% of respondents attributed effects and 4.4% to clear effects, totaling 34.7% in the effect range. A further 28.9% assigned score 3, suggesting moderate influence. In contrast, 22.2% selected very limited effects and 8.9% no effects at all (31.1% combined), reflecting doubts regarding the EU's capacity to shape global standards. Overall, nearly 69% of stakeholders perceive at least a moderate Brussels effect, indicating that, despite implementation uncertainties, the EUDR is expected to influence regulatory debates and market requirements beyond the EU. Interviewees frequently mentioned China as the most relevant case, describing the EUDR as having triggered initial discussions on sustainability guidelines in Chinese commodity chains.

Figure 15: Percentage distribution of stakeholders' perception of EUDR "Brussels effect"



Source: Author's compilation

Differences across stakeholder categories, however, reveal contrasting interpretations of the nature and durability of this effect. Industry representatives tend to recognize that the EU "sets trends," but emphasize that market share matters: given the predominance of China and the domestic market in beef and the growing weight of Asian markets in soy, they question whether EU standards alone can structurally transform global trade flows. Several industry actors perceive the Brussels effect as conditional upon premium prices and stable implementation, warning that repeated postponements undermine EU credibility and may weaken its normative power. By contrast, NGOs and academic stakeholders interpret the EUDR as a broader paradigm shift, redefining legality, traceability, and consumer responsibility in global value chains, even if leakage to non-EU markets remains a risk. Government actors adopt an intermediate position: they acknowledge the EU's potential to "raise the bar" internationally but stress that geopolitical dynamics (e.g., U.S.-China competition, food security priorities in China, and diplomatic tensions) will shape how far such standards are replicated. Thus, while the quantitative data point to a significant expected Brussels effect, qualitative evidence underscores that its magnitude will depend on coherence, credibility, and alignment with domestic governance reforms.

4 Discussion

4.1 Policy coherence for a sustainable land use governance framework: the effectiveness and implementation of land use policies in Brazil

One of the main focuses of the working paper is to examine how coherent Brazil's land-use governance framework is in balancing agricultural production and forest conservation, and how the EUDR interacts within this policy mix. The results indicate that Brazil possesses a comparatively extensive and sophisticated governance architecture, composed of a large number of public and hybrid policy instruments addressing land tenure, monitoring, enforcement, and market regulation. However, the analysis shows that policy coherence remains partial: although conservation and climate objectives are formally strongly embedded in high-level policies and widely prioritized by stakeholders, their translation into operational instruments that form the basis for effective implementation is uneven. At the same time, instruments associated with agricultural production and economic development continue to exert strong influence over land-use outcomes in practice as indicated by the perceived

predominant role of agricultural instruments in practice. Overall, the findings suggest that Brazil's land-use governance system contains the institutional foundations required to reconcile conservation and production, yet persistent implementation gaps and sectoral asymmetries limit the realization of these objectives.

In the desk study network analysis, there is a clear centrality of certain groups of policy instruments that are even conditional for the implementation of others. One of these is the group of Land registers, monitoring and private land regularization (PrLandRegMon). Brazil already possesses a strong framework with different systems contributing to a land register repository, such as the National Rural Environmental Registry System (SICAR), the Land Management System (SIGEF), the National Rural Land Registry System (SNCR). In addition, the Rural Environmental Registry (CAR) is a nationwide land cadaster created to enforce the Brazilian Forest Code, requiring landholders to maintain a percentage of native vegetation, called Legal Reserve (LR), and surrounding areas for water recharge, as well as Permanent Preservation Areas (PPA), inside their properties. Since 2012, registration has been mandatory. Landholders' self-declared property boundaries are linked to their taxpayer IDs and rural credits, making CAR a key tool for traceability and supply chain governance (Furumo et al., 2024). Although there were advances of recent years, there are still challenges with the self-declaration tool regarding validation due to the complex integration between different registers (Leme et al., 2025).

A strong connection of PrLandRegMon with Restoration instruments (Resto) was identified in the network analysis; yet there is an ineffectiveness of the restoration instrument according to the stakeholders. Brazil has recently made progress on the restoration agenda with the launch of the "new" National Plan for the Recovery of Native Vegetation (Planaveg) in 2025, a key implementation instrument that has repeatedly been updated since 2017 when the first version was institutionalized by the Decree 8.972/2017. However, stakeholders are calling for more science-based restoration, especially through initiatives from the private sector. Lamont et al., 2023, investigated over 100 sustainability reports from private companies, and despite several restoration projects that go beyond legal obligations, there are numerous associated risks. A lack of transparency in practices and in the disclosure of results leads to "greenwashing". Interviewees also complain about the lack of scale in many initiatives. Brazil has set an ambitious target of restoring 12 million hectares of land by 2030; however, the high costs associated with restoration remain a major constraint to scaling up efforts (Pedro H.S. Brancalion et al., 2019). In this context, identifying priority landscapes where interventions can deliver the greatest ecological benefits alongside cost-effective outcomes is essential (Pedro H. S. Brancalion et al., 2019). Therefore, the creation of economic instruments to stimulate restoration, along with the work of joint initiatives, is considered a solution for this progress (Toto et al., 2025).

In contrast to these suggestions, the network analysis locates the policy instrument group that supports green finance policies (GreenFinan) far from Resto, and also in a peripheral position, suggesting that green finance is currently not mainly targeted towards restoration. Stakeholders mentioned that green financial policies are still incipient, in a pilot scale and poorly adapted to the needs for a transition to a sustainable land use. In Brazil, there is a growing importance of capital markets related to the land use sector and private actors, through instruments such as green bonds and investments aligned with environmental, social and governance (ESG) criteria. These are capable to redirect financial flows towards sustainability, but need to be supported by regulatory improvements that align the Brazilian financial system with climate goals (Knoch, 2020). On the other hand, funds such as the Amazon Fund demonstrate that well-structured financial interventions can contribute to reducing deforestation, although the impacts depend on the quality of governance, additionality, and overall policy coherence (André and Ramos-Tallada, 2025). The Tropical Forest Forever Facility (TFFF) launched during the COP30 in 2025 can follow the same path, and already received pledges for financial support from among others Norway, Germany, Brazil, Indonesia, and France (COP30, 2025).

Climate finance for land use has experienced a huge increase in the last 5 years, yet it remains predominantly domestic (97%) and largely driven by private resources mobilized rather than through public instruments and more directed towards agriculture and other economic activities and less towards conservation, as is the case for rural credits and biofuel policies (Chiavari et al., 2024). Given this scenario, the Brazilian government launched the Eco-Invest (Law 14.995/2024) in 2024. This program was mentioned by the vast majority of stakeholders

interviewed. Eco-Invest has the support from the InterAmerican Development Bank (IDB) and the United Kingdom's Foreign, Commonwealth & Development Office (FCDO), is a foreign capital mobilization and currency hedging program housed within Brazil's national climate fund, Fundo Clima (OCDE, 2025).

Timber Production and Trade instruGments (TimbProdTrade) also appear in a very central position in the network analysis, yet stakeholders perceived them to be of medium effectiveness for the balance between agricultural production and forest conservation. The timber sector accounts for more than 5,8% of exports in Brazil, mainly to the United States (35%) and the EU (44%) (IBAMA 2019), with planted (non-native) forests being dominant, representing 85-90% of total timber production in Brazil. Stakeholders mentioned the need for the development of an industry more focused on the cultivation of native species. There are severe "knowledge gaps" regarding the genetic improvement, germination, and cultivation techniques for native species, in contrast to the knowledge that has been generated in the decades of research and development invested in pine and eucalyptus cultivation techniques (Rolim et al., 2019). Other barriers relate to illegal logging, "timber laundering," unclear regulations for the exploitation of native species, and weak integration of monitoring systems (Franca et al., 2023). Despite this fact, many stakeholders mentioned that the timber industry is recently much more advanced in traceability systems than the meat industry, for example, and already receives a lot of public investment for due diligence and traceability, which was also mentioned by Franca et al., (2023). There are also advances in the forest concession law (see next paragraph).

Another central policy group that was ranked among the five perceived as most effective by stakeholders, is Public Forest, Conservation, Public Land regularization (PubLandRegForCons). Public lands encompass designated public lands, such as Conservation Units, Indigenous Lands and others (Quilombola Territories, military areas, rural settlements), and so-called Undesignated Public Lands, which include public forests, which have not yet been designated for public or even private use. These lands are the target of criminal land grabbing schemes, mainly using pastureland as a means of operation (Azevedo-Ramos et al., 2020). In recent years there have also been attempts to legitimize these schemes through draft laws, such as Federal Decree 9309/2018 and Federal Decree 10.165/2019, which considered different cut-off dates for deforestation and consequently for proving ownership of these lands (Salomao et al., 2021). The designation of these lands provides greater legal security not only for public lands, but also for private properties, especially concerning the use and management of forests. Many small rural landowners have been waiting for years for the regularization of their lands, an objective that has been pursued through programs such as Terra Legal (established by Law No. 11,952/2009 and updated by Law No. 13,465/2017). It is important to highlight that, according the Law 11,284/2006, the use and management of public forest is limited to Traditional Communities or can be designated to forest concessions. Since 2025, the Decree 12,679/2025, brings more advances and legal security for forest concessions in this area.

Despite the strong policy relation with PubLandRegForCons, the policy instrument group of Support to Traditional communities and smallhoders (TradComSmallSup) shows a peripheral position in the network analysis and a predominant medium potential effectiveness for decreasing deforestation according to stakeholders. In contrast to these perceptions, Salomão et al., 2021 have shown the importance of indigenous territories, together with Conservation Units, for maintaining the forest standing. In the last few years, the indigenous territory underwent several debates regarding policy implementation, one of them was the "Temporal Framework Thesis", consolidated by the Law 14.701/2023. According to this thesis, indigenous peoples are only entitled to lands they already occupied before October 5, 1988, the date of the promulgation of the Constitution. According to FUNAI (2025), the law represents a setback in guaranteeing constitutional rights and the legal security of the demarcation of indigenous lands in Brazil. Despite the request from FUNAI, and the Supreme Court's confirmation of its unconstitutionality, the law remains in effect. Despite this scenario, at COP30 Brazil announced the demarcation of 10 territories, with a total 7 million of hectares (COP30, 2025). Regarding smallholders, studies show that investments in Technical Assistance and Rural Extension (ATER), combined with access to markets and sustainable production practices, are associated with significant reductions in deforestation (Souza et al., 2022). However, currently, the implementation of such policies is mostly limited to

actions of NGOs or private consulting firms. Programs from government agencies such as INCRA date back to 2017.

Market-based and voluntary mechanisms included in the policy instrument groups of Carbon Market and Payment for Ecosystem Services (CarbPES) and Certification and Roundtables (CertrRoundTab), appear comparatively peripheral within the governance structure and also received lower effectiveness scores from stakeholders. Despite the Law 15.042/2024, that formalizes the Brazilian Greenhouse Gas Emissions Trading System (SBCE) and jurisdictional programs such as REDD+ for Early Movers (REM) program, LEAF Coalitions and Floresta+ Carbono, or even the legal framework defined by states such as Acre (Law 2.308/2010, Law 3.880/2021, Decree 11.732/2025) and Mato Grosso (Law 9.878/2013), the Brazilian carbon market is still rife with legal uncertainties related to issues such as accountability, additionality, and social safeguards. Currently, the market is dominated by voluntary initiatives that show uncertainties regarding effectiveness, especially due to certain criteria such as location and time-frame. West et al., (2025, 2024, 2020) showed that baseline calculations tend to overestimate deforestation, partly reflecting declining deforestation trends during the initial REDD+ implementation phase. Regarding location, studies found that there is a location bias towards areas with lower opportunity costs, but that this does not necessarily exclude additionality (Delacote et al., 2022). For PES, uncertainties also remain especially regarding additionality, leakage prevention, and permanence (Engel et al., 2008; Sommerville et al., 2009) and effectiveness (Lima et al., 2019). Charoud et al., 2023 suggest that improved spatial targeting and longer-term enrollment are key enabling factors to improve forest conservation outcomes of these instruments in deforestation frontiers.

Agriculture support group was also found to be central and was ranked among the top five policy instruments regarding effectiveness as perceived by the actors. Increasing productivity on existing agricultural land, in other words, intensification, can reduce pressure to clear new forests, particularly when combined with effective land-use governance and enforcement (Angelsen et al., 2001; TEEB, 2018). However, intensification alone is not sufficient because of the "rebound effect", which means that higher profitability can stimulate expansion if governance is weak (Lambin et al., 2018). Another challenge will be how to include smallholders in this process (Jain et al., 2023), given that it is a costly undertaking, particularly regarding inputs and technical assistance. Capacity-building tools aimed at smallholders, such as Technical Assistance and Rural Extension (ATER), were included in the TradComSmallSup group and occupied a peripheral position in the network analysis. Another instrument included in this group was the rural credit. In Brazil, rural credit linked to environmental compliance (e.g., CAR registration, Forest Code compliance) has been associated with lower deforestation in several regions. Restricting subsidized credit in municipalities with high deforestation contributed to declining forest loss in the Amazon (Assunção et al., 2013).

Instruments to Combat illegality (CombIlleg) constitute another group with high perceived effectiveness, despite the peripheral position and low connectedness degree in the network analysis. Despite their perceived potential effectiveness, stakeholders stressed the low implementation of these policy instruments. Yet, Coelho-Junior et al., (2022), highlight how the increase in deforestation is closely linked to the weakening of environmental institutions, showing that only about 1.3% of detected illegal deforestation cases resulted in enforcement actions, which compromises the effectiveness of this group of policies, despite advanced monitoring systems. Nunes et al., (2024) found that despite the considerable number of embargoes and fines issued over the past 20 years, enforcement has become weaker and more spatially limited, signaling a growing lack of commitment from the state to upholding the law. These authors also found that these changes have been accompanied by a sharp increase in enforcement spending, suggesting a significant loss of efficiency (Miranda et al., 2026).

In the case, of the RouTabCert group, stakeholders mentioned a lack of harmonization given the large number of certificates, an argument that was also reported by Von Dorrien & Efken 2022, despite the recent progress in certain supply chains such as timber. But overall, these authors together with Taylor et al., 2026, agreed in a lower impact of these instruments for avoiding forest loss and to balance of forest conservation and agricultural production (Edwards and Laurance, 2012). For soybean certificates, such as the Round Table on Responsible Soybeans (RTRS), problems with additionally were also explored by Garrett et al., 2016.

Last but not least, the group of Due Dilligence and Traceability instruments (DueDilliTrace) has an almost central position in the network analysis but was perceived by the stakeholders to be of medium effectiveness. These instruments gained attention in the last years due to the European regulation on deforestation free supply chains (EUDR) and related commitments of the private sector to achieve related goals and requirements. For certain supply chains, Brazil already possesses a consolidated system to track origin. This is the case for the timber sector. For the soy and beef supply chains there are already systems operated by the private sector. In November 2025, during COP30, Brazil announced the National Voluntary Traceability Program (PNRV), which promises to create a national traceability model, guaranteeing greater protection, efficiency, security, speed and productivity for agribusiness supply chains (GOVBR, 2025). Some states are also making progress on this agenda, such as Pará with the Decree 3.533/2023 which establishes the Sustainable Livestock Program of Pará and creates the Official Individual Bovine Traceability System of Pará (SRBIPA). A conflict of responsibilities, including between the private and public sectors, is perceived in the interviews, although not only for this group of policies. Public-private partnerships are mentioned as the most effective approach to advance the better implementation of due diligence and traceability instruments, a topic also explored in Partiti, (2022). External markets, such as the European market, now regulated by EUDR, are seen by stakeholders as major drivers for the creation of these systems as was already explored in some studies (Ruviaro et al., 2014; Santos et al., 2026). Due diligence and traceability instruments with specific respect to EUDR are explored in more detail in the Section 4.2.

Taken together, these findings suggest that sustainable land-use governance in Brazil depends less on the creation of new policy instruments than on improving coherence and implementation within the existing policy mix. Brazil already possesses sufficient institutional infrastructure capable of supporting sustainable land use in general and deforestation-free supply chains and international due-diligence requirements specifically.

This working paper aligns with existing literature emphasizing that sustainable land-use governance depends not only on the existence of policy instruments but also on their coherence and implementation across sectors. Studies on policy coherence and environmental governance (Coscieme et al., 2021; Fischer et al., 2023; Nilsson et al., 2012) argue that fragmented policy mixes often undermine sustainability outcomes when agricultural, environmental, and economic policies pursue partially conflicting objectives. The findings presented here support this argument, as Brazil's governance framework contains a wide array of regulatory instruments but still exhibits inconsistencies between strategic objectives and operational implementation (Azevedo-Ramos et al., 2026). In Brazil, the persistent implementation gap points to structural governance challenges, including fragmented institutional coordination, incomplete land-tenure regularization, and political constraints affecting enforcement. Strengthening policy coherence, particularly through better alignment between agricultural incentives, enforcement mechanisms, and sustainability objectives, therefore emerges as a central condition for ensuring that Brazil's governance framework can effectively reconcile agricultural competitiveness with long-term forest conservation.

An unexpected finding emerging from this study concerns the relatively high degree of convergence among stakeholder groups' perceptions regarding both policy priorities and instrument effectiveness. Despite the diversity of actors involved, including government agencies, industry representatives, academia, and civil society, no major divergences were observed in the overall assessment of the most important policy instruments or sustainability objectives. This result contrasts with parts of the literature that emphasize strong conflicts between environmental and production-oriented actors in tropical land-use governance (Miccolis et al., 2014). Several factors may explain this outcome. First, the stakeholder sample primarily consisted of national-level experts who are already engaged in policy debates and may therefore share similar knowledge bases and normative frameworks regarding sustainability transitions. Second, the consolidation of monitoring systems and international trade pressures, including the EUDR, may be fostering greater alignment among actors around the need for transparent and legally compliant supply chains. Finally, the convergence may also reflect the maturity of Brazil's governance architecture, where key regulatory instruments have become widely accepted as fundamental elements of land-use governance. Although further research at regional and local levels is needed to verify whether such convergence persists among actors operating closer to deforestation frontiers, these

findings suggest that consensus on the importance of core governance instruments may represent an important opportunity for advancing policy coherence and strengthening implementation.

4.2 Risks, opportunities and potential effects of the EUDR regulation on the implementation of sustainable land use policies

Besides the analysis of overall policy coherence in Brazil, the working paper evaluates how the EUDR is embedded into the national policy mix (see above) and whether it is perceived as a risk or an opportunity for strengthening sustainable land-use policies. Another focus is on its potential effects on land use and trade. The results indicate that most stakeholders consider EUDR as an opportunity, specifically as an external driver capable of accelerating domestic debates on compliance with environmental legislation. They perceive a potential to contribute to the balance between agricultural production and forest conservation, and even a "push" for the development of tools for traceability and monitoring. Existing studies already highlight that market-driven regulations, such as EUDR, can influence land-use governance primarily through indirect mechanisms, including transparency requirements, traceability systems, and regulatory diffusion across global value chains (Garrett et al., 2021; Lambin et al., 2018; Rajão et al., 2020). In Brazil, many examples of recently launched traceability tools and platforms can be mentioned, such as the “Green Seal” developed by the Federal University of Minas Gerais (UFMG), “Beef on Track” from the Institute for Forest and Agricultural Management and Certification (Imaflora), and more recently an official government platform developed by MAPA called “AgroBrasil Mais Sustentável” (MAPA Ordinance No. 745, of December 20, 2024), which even integrates a module specifically to meet EUDR standards by the end of 2025. Industry stakeholders also mentioned in interviews the development of internal tools that already internalize EUDR standards.

Although the regulation is widely discussed and perceived rather as an opportunity than a risk, an important and widespread perception is that the EUDR alone will have limited direct effects on deforestation reduction in Brazil. Several explanations may account for this result. First, the EU represents only a portion of global demand for Brazilian agricultural commodities, specifically 8% of soy and 3% of beef flows from Brazil to Europe, meaning that non-compliant production could potentially be redirected to alternative markets such as China, that already accounts for 32% of the market exports (ComexStat, 2025), or they might be absorbed by the domestic market, especially in the case of beef. Secondly, differences between the EUDR's regulatory parameters and the Brazilian national legal framework, such as the deadline for illegal deforestation compared to that defined in the Brazilian Forest Code and the missing coverage of biomes such as the Cerrado, can create regulatory inconsistencies that limit the influence of the regulation on land use decisions or just provoke a leakage effect (Pinho et al., 2025). The possibility of legal deforestation in contrast to a zero-deforestation requirement in the EUDR also complicates the situation. Third, stakeholders repeatedly emphasized that domestic enforcement instruments and command-and-control measures, remain the most effective drivers of deforestation control regarding beef and soy supply chains (Nepstad et al., 2014). These findings suggest that the EUDR may exert its greatest influence not through direct land-use change but through indirect effects, such as accelerating domestic policy debates and existing policy instruments, strengthening traceability systems, and contributing to broader regulatory diffusion through the so-called “Brussels effect” (Bradford, 2019).

The expected “Brussels effect” further indicates that EU regulatory standards may influence sustainability requirements in other markets, potentially contributing to broader changes in global commodity governance. Vasconcelos et al., 2024 already discussed that the combination of market-driven dynamics and cooperative mechanisms triggered by the EU regulation may reduce transaction costs and entry barriers for companies to extend zero-deforestation compliance to additional markets, such as China, thereby making a certain degree of de facto regulatory convergence plausible. These authors also emphasize that it is essential to go beyond a purely unilateral perspective of the “Brussels Effect” and take into account the role of diplomacy, international cooperation, and broader geopolitical conditions that can facilitate or hinder such convergence processes, which was also observed in the results of this working paper. Other market mechanisms, such as the “China-Cattle”, which, according to the interviewees, was implemented with less public debate and less “alarm” than the EUDR,

despite its potential effects (USDA, 2025), have already proven environmental benefits (Scot Consultoria, 2021). In addition, the magnitude of these effects will depend on the credibility and stability of the regulation's implementation. Respondents complain about the two years of delay, which was also found by Fischer et al. (2025) in a perspective beyond Brazil, and also about the changes in the regulation text that "loosened the rules" according to stakeholders interviewed.

Regarding trade, the expected impacts might differ considerably between commodity sectors. The soy supply chain is generally considered better prepared due to its export orientation, experience with monitoring initiatives such as the Soy Moratorium (SM), and existing traceability practices. The SM was signed in 2006 by the main actors of the soy trade to prohibit the purchase of soy grown on recently deforested land, establishing the timeframe for legality as July of 2008 following the Environmental Crime Law and the Brazilian forest Code Environmental Crimes Law (Law 9.605/1998) and the Brazilian Forest Code (Law 12.651/2012). This instrument was already capable to prevent 18,000 ± 9,000 km^2 of deforestation in the Amazon within a decade (Heilmayr et al., 2020), even though it has de facto been terminated in 2025 (see below). In contrast, the beef sector faces structural constraints related to indirect suppliers monitoring (Skidmore et al., 2021), and the strong orientation toward domestic and Asian markets. For beef there are as well some traceability initiatives and deforestation free commitments, yet they have not reached the spread and impact as the soy initiatives. Beef initiatives include the "Terms of Adjustment of Conduct" ("MPF-TAC") agreements. The first TAC was created by the Federal Public Prosecutors' Office (MPF) of Pará state in 2009, and it is currently implemented in other states of the Amazon. These agreements are signed with meat companies to stop them from buying from properties where deforestation exceeds legal limits (Gibbs et al., 2016). Later in the same year of 2009 the largest meatpacking companies in Brazil, Marfrig, Minerva, JBS, and Bertin (subsequently bought by JBS) additionally signed the "G4" zero-deforestation agreement with Greenpeace (Greenpeace International, 2009). These structural differences help explain why stakeholders anticipate more significant trade adjustments in soy than in beef and why the regulation is expected to affect logistics and supply-chain organization more than land-use decisions themselves.

Stakeholders anticipate that the regulation may lead to changes in trade logistics and supply-chain organization, including segregation of compliant products and concentration of export flows in specific terminals. At the same time, concerns remain regarding increased compliance costs, the absence of premium prices, and potential leakage of non-compliant production to alternative markets. There is no scientific or even quantitative evidence of these "perverse effects" of EUDR, so-called by the interviewed, despite robust papers and reports produced recently (Proforest, 2025; Schulz et al., 2026). Trase, 2023 also explored the diversity and advancements in due diligence across different supply chains and regions within Brazil, as well as its significant presence in the global commodities market, leading to greater exposure to land-use and social risks.

In addition to the impacts on the industry, segregation, concentration and leakage also affect producers, who are unable to pass on the adaptation costs (Melati et al., 2024; Zhunusova et al., 2022), thus excluding smallholders from the process, a subject already highlighted in many papers and reports (Garrett et al., 2019; Melati et al., 2024). On the other hand, Lachaux, (2025), highlights that EUDR can unlock opportunities for action regarding smallholders: funding and promoting innovative low-cost traceability, ensuring finance flows directly to smallholders, accelerate land tenure reform, support for rural development strategies that prioritize women, indigenous peoples, and vulnerable groups, and also the unique opportunity of industry to demonstrate that sustainability and profitability go hand in hand.

Another critical issue is a so- called "rebound effect", i.e., the termination of the Soy Moratorium in 2025, despite that none of the stakeholders attributed the end of the Moratorium directly to the EUDR. There is no scientific evidence of this process, but in December 2025, COFCO and Bunge, two of the largest players in the soy sector, updated their policies and changed the cut-off date for deforestation-free soy for their suppliers to December 31, 2021, which is the cut-off date of the EUDR, instead of the previous one established by SM, which was July 22, 2008. In the same year, more than a dozen major European supermarket chains, including Lidl, Aldi and Tesco, publicly reaffirmed their commitment to the SM by writing to retailers and complaining that this change would

set a precedent and weaken the fight against deforestation in Brazil. Yet, the original, stricter cut-off date of the SM has to date not been re-installed.

Overall, results highlight that international trade regulations can support sustainable land-use governance, but their effectiveness ultimately depends on the strength and coherence of domestic policy frameworks. Stakeholders emphasize that the regulation's impact on deforestation and policy implementation will depend largely on resolving long-standing governance challenges such as land and environmental register validation, land-tenure regularization, and coordination between institutions responsible for environmental enforcement and agricultural governance, as explored in Carvalho et al., (2019). This finding also aligns with recent literature indicating that international demand-side measures often function as complementary or catalyst governance tools rather than substitutes for domestic enforcement (Bager and Lambin, 2022; Pendrill et al., 2022). At the same time, the relatively moderate expectations regarding the regulation's direct environmental impact echo concerns raised in recent analyses that the effectiveness of the EUDR will depend strongly on the governance capacity of producing countries and the structure of global commodity markets (Delacote et al., 2022; Garrett et al., 2021).

Finally, this working paper contributes to the broader theoretical debate on how international demand-side environmental regulations interact with domestic governance systems in commodity-producing countries. In the Brazilian case, the regulation is perceived as capable of strengthening transparency, traceability, and monitoring systems already embedded in the national governance architecture. This supports theoretical arguments in the literature on policy coherence and telecoupling (Dürr et al., 2026; Fischer et al., 2023), which emphasize that sustainability outcomes emerge from the interaction between domestic governance capacity and external market signals rather than from isolated regulatory interventions. The legality requirement that is included in Art. 3 of the EUDR is thus a well justified and necessary component of the regulation. In practical terms, the results suggest that the EUDR may reinforce existing policy instruments by increasing incentives for policy implementation, strengthening supply-chain traceability, and encouraging improved institutional coordination among environmental and agricultural agencies. For policymakers, this indicates that international trade regulations can support sustainable land-use governance when they are aligned with domestic monitoring infrastructures and regulatory frameworks.

5 Limitations and future research

Some limitations need to be acknowledged in this working paper. First, the empirical component of the study relies on a relatively limited number of semi-structured interviews conducted primarily with national-level stakeholders, which may not fully capture the diversity of perceptions and implementation realities at sub-national or local levels, particularly in deforestation frontier regions where land tenure conflicts, infrastructure expansion, and agricultural dynamics interact differently from national policy frameworks. A related extension of the research to sub-national level is currently ongoing. Second, the assessment of policy coherence through content analysis and scoring inevitably involves interpretative judgement, even when systematic frameworks are applied. Third, although the network analysis provides valuable insights into structural relationships between policy instruments, it reflects formal regulatory linkages rather than real-time governance dynamics or enforcement outcomes. Fourth, the analysis focuses mainly on stakeholder perceptions and expected impacts of the EUDR. Yet, this is currently the only option to evaluate effects, as the regulation has not yet been fully implemented, meaning that the results reflect strategic expectations rather than observed post-implementation changes in land-use outcomes or trade patterns. Consequently, the findings should be interpreted primarily as an institutional and governance assessment that highlights potential interactions between international regulations and domestic policy frameworks rather than as a direct measurement of policy performance or causal effects on land-use change.

At the same time, these limitations point to several important avenues for future research. Additional empirical studies at regional and municipal levels are needed to understand how policy coherence and implementation

gaps manifest in specific deforestation frontiers, where local governance conditions may differ substantially from national policy frameworks. Quantitative analyses integrating remote sensing data, supply-chain traceability information, spatial economic indicators, and trade statistics will also be essential to evaluate how specific policy instruments and international regulations such as the EUDR influence actual land-use outcomes over time. Furthermore, comparative studies across major commodity-producing countries could provide valuable insights into whether demand-side regulations generate similar governance effects across different institutional contexts. Finally, further research should examine potential leakage effects, shifts in trade flows toward non-EU markets, and the role of emerging actors such as China in shaping global sustainability standards. Such analyses would contribute to a more comprehensive understanding of how international trade policies interact with domestic governance systems and influence land-use dynamics in interconnected global commodity markets.

6 Conclusions

This working paper demonstrates that Brazil's land-use governance system possesses a comparatively advanced and diversified institutional architecture capable of supporting sustainable land-use transitions and deforestation-free supply chains. However, the findings also reveal a persistent gap between the policies, policy instruments and their operational implementation. The effectiveness of governance therefore depends less on introducing new instruments and more on strengthening the integration, enforcement, and territorial implementation of existing ones. In this context, international initiatives such as the EUDR may act as catalysts that reinforce domestic policy debates and institutional improvements, but they cannot substitute for strong internal governance structures. Nevertheless, due diligence and traceability tools have been shown to be already well integrated in the policy mix network, despite the relatively recent focus which is on them. The study provides a comprehensive analysis of the land use governance framework far beyond the specific geolocalization and traceability tools that are needed for EUDR implementation. It thus shows for specific policy instruments how integration and further improvement can foster not only EUDR implementation but a balanced and sustainable land use approach that takes into account economic and production needs but at the same time conservation requirements and development opportunities for indigenous peoples. Yet, achieving sustainable land use in Brazil will require greater alignment between conservation objectives, agricultural development strategies, and enforcement mechanisms, ensuring that the institutional foundations already in place can effectively translate into measurable environmental and socio-economic outcomes.

Regarding EUDR, the study shows that Brazilian stakeholders rather perceive the regulation as an opportunity to reinforce existing governance mechanisms rather than as a direct driver of deforestation reduction. Its effectiveness will depend largely on addressing persistent domestic governance bottlenecks, particularly CAR validation, land-tenure regularization, and enforcement capacity and treatment of illegal land use activities. The findings therefore highlight a central message: international trade regulations can support sustainable land-use governance, but their impact ultimately depends on the strength, coherence, and implementation of national policy frameworks. In the Brazilian context, the EUDR has the potential to act as an external catalyst for strengthening transparency and accountability in supply chains, yet meaningful environmental outcomes will require continued progress in domestic governance reforms and policy coherence across the land-use system. Further support for development and implementation of specific EUDR related tools of traceability and geolocalization is needed to increase the instrument's effectiveness and implementation that have both been perceived as being on medium levels. Network analysis shows that such support may as well have indirect effects specifically on instruments that are linked to EUDR, including (Sustainable) Agricultural Support, Combatting Illegality, Certification and Round Tables. Alternatively, or in addition, EUDR related support could directly consider these closely interlinked policy instrument groups. The policy instrument group of Land Registers, Monitoring and Private Land Regularization deserves general attention as it is the overall most interlinked group with effects on most of the other instruments.

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Appendices

Appendix 1: List of interviewees

Stakeholder position	Organization	Category
Director	Agropolitical Dialogue	Government
ESG Director	Amaggi	Industry
Senior Scientist	Amazon Environmental Research Institute (IPAM)	NGO
Executive Director	Amigos da Terra	NGO
Divison Manager	Banco do Brasil	Banks
Executive Director	Brazil Climate, Forests and Agriculture Coalition	Multistakeholder platform
Director Agribusiness Studies Institute	Brazilian Agribusiness Association (ABAG)	Industry
General Chief Embrapa Division	Brazilian Agricultural Research Corporation (Embrapa)	Government
Executive Director	Brazilian Association of Meat Exporting Industries (ABIEC)	Industry
Executive Director	Brazilian Association of Vegetable Oil Industries (ABIOVE)	Industry
Researcher	Brazilian Center for Analysis and Planning (CEBRAP)	Academia
Sustainability manager	Brazilian Federation of Banks (Febraban)	Banks
Coordinator	Brazilian Forest Service (SFB)	Government
Executive Director	Brazilian Roundtable on Sustainable Livestock	Multistakeholder platform
Senior ESG and Compliance Director	Carrefour	Industry
Head of ESG and Communication	CJ Seleta	Industry
Senior Manager	Climate Policy Initiative (CPI)	NGO
Professor	Dom Cabral Foudation	Academia
Director	ECOON	Private sector
Federal Prosecutor	Federal Public Prosecutor's Office (MPF)	Government
Professor	Federal University of Brasilia (UNB)	Academia
Professor	Federal University of Minas Gerais (UFMG)	Academia
Researcher	Freiburg University	Academia
Manager	German Cooperation Agency (GIZ)	International
Professor and Coordinator	Getulio Vargas Foundation (FGV)	Academia
Country Director	IDH	NGO
Director	Institute for Forest and Agricultural Management and Certification (Imaflora)	NGO

Stakeholder position	Organization	Category
Sustainability manager	JBS	Industry
Sustainability manager	Marfrig	Industry
President	Mato Grosso Meat Institute (Imac)	Government
General Coordinator	Ministry of Agrarian Development and Family Farming (MDA)	Government
Coordinator	Ministry of Agriculture and Livestock (MAPA)	Government
Forest Director	Ministry of the Environment and Climate Change (MMA)	Government
Specialist	Ministry of the Environment and Climate Change (MMA)	Government
Manager	National Association of Meat Exporters (ANEC)	Industry
Coordinator	National Confederation of Agriculture (CAN)	Government
Coordinator	National Institute for Space Research (INPE)	Government
Deputy Director	Proforest	NGO
Head of Sustainability	Rabobank	Banks
Executive Director	Round Table for Sustainable Soybean	Multistakeholder plattaform
Executive Director	Territorial Intelligence Center (CIT)	Academia
Researcher	UC Louvain	Academia
Senior Economist	World Bank	International - Bank
Specialist and Manager	World Resources Institute (WRI)	NGO
Coordinator	World Wide Fund for Nature Brazil (WWF)	NGO

Source: Author’s compilation

Appendix 2: Questionnaire

Questionnaire

1. Interviewee characteristics

1.2 Power indicators

Resources: How many employees does your organization have in Brazil 1: <5; 2: 6-15; 3: 16-50; 4: >50

Resources: For value chain actors: financial turn over

Informational power: On how many meetings that were presenting, discussing, aiming to design EUDR and related national instruments (and that involved at least participants from three other organizations) did you participate in presence in 2025 (1: none; 2: 1-3 meetings; 3: 4- 10 meetings; 4: more than 10 meetings)

Coercive power: Are you directly involved in drafting legislation (writing or commenting on legislative drafts in writing or at meetings, formal consultation) 1- no; 2: - very sporadically, on one occasion in 2025; 3- sometimes; 4- routinely

2. Details on Instruments

Landscapes in Brazil (as in all other countries) provide multiple services. The national policy architecture needs to coordinate this and ensure a balanced provision of goods and services.

2.1 We have identified seven main aims and targets for land use policies. Which of the following is most important for you and your organization? Please distribute 100 % across the aims (in 10% steps only).

And secondly which aims play the most important role in current national Brazilian land use policy

		your personal percentage for importance (sum to 100%)	Current role of aim in BRA land use policy (sum to 100%)
Forest Production	Production of wood products, timber, non timber, non wood (fibres, energy, seeds, food)		
Agri	Conventional agricultural production and food		
Infra/Dev	Infrastructure and development, roads, settlements, mining, water and wind energy		
Agri+	Agriculture with specific sustainability requirements with explicit aim to reduce deforestation and degradation, Agroforestry, sustainable intensification based on land tenure reform, or alternative livelihoods;		
Conservation	Biodiversity, Protected areas, species protection, restoration of degraded land		
Climate	Climate protection and control, adaptation and mitigation measures, beyond aims that are implicitly included in forest, agri and conservation aims		

Cultural	Spiritual, recreational, research, including explicit support and protection of traditional communities		

Source: Author's compilation

2.2 We have compiled all relevant existing operational policy instruments for land use management in Brazil. We found a list of 51 of them. They are too many to show here, if you are interested, we also have the complete list and would of course love to discuss in detail after the interview. Here are the groups of instruments – show them.

For each instrument group we have a few questions

(a) How **important** is each group to fulfil the set of targets that **YOU** described before, how much support would you give to each group? Assume you can distribute resources of 100% all together, how would you distribute them?

(b) What is the current **overall current effectiveness** of each group for a **theoretical balanced land use** that would ensure conservation of natural landscapes and forests and sustainable agricultural production at the same time (from 1 – very ineffective to 5 - very effective)

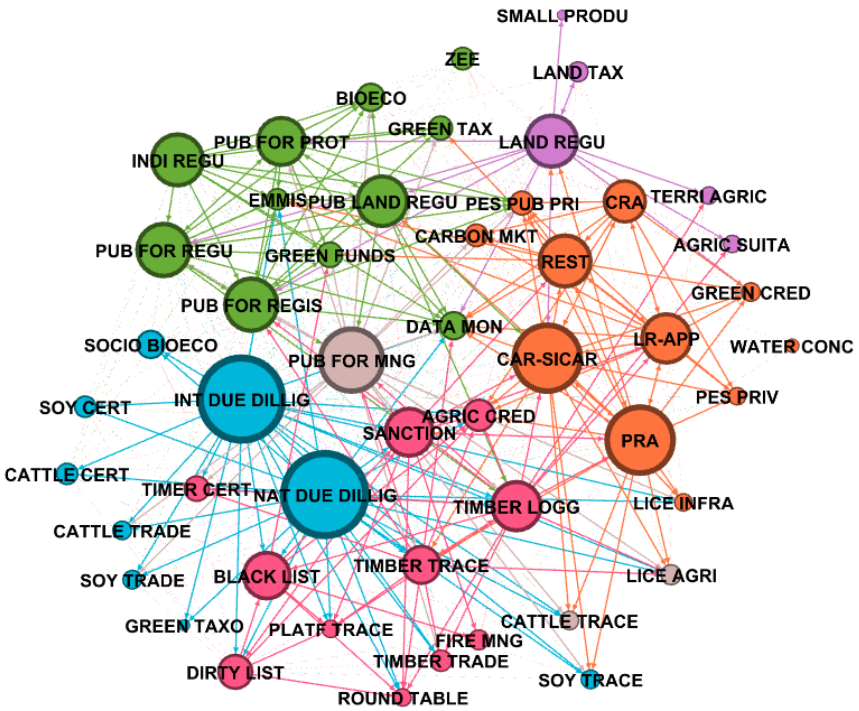
(c) To ensure such a balanced land use to which instruments would one need to give **highest priority** (just list and rank the top five



	Importance for your aim (sum to 100%, in 10% steps only)	Score (1-5) for current overall effectiveness for theoretical balanced use (1 – very ineffective to 5 - very effective)	Importance for balanced land use (rank the top 5)	Implementation (1 – low implementation to 5 - high implementation)
Public forest and conservation (public land reg.)				
Restoration				
CAR, SIGEF, and monitoring data (private land reg.)				
Due diligence, traceability				
Carbon Markets, PES				
Indigenous (trad.) peoples, smallholders support				
Timber production and trade				
Green funds, taxes, credits				
Certification, roundtable				
combat illegality (sanctions, blacklist, dirty list)				
Agriculture support finances, infrastructure, trade				

Source: Author's compilation

2.3 After having had a look on the general policy landscape we are specifically interested in EUDR. We did a network analysis that shows how all the instruments are linked to each other. The network analysis shows that it is among the instruments that relies to the biggest number of other instruments (implementation relies on many others). Do you perceive this rather as a **risk** (high complexity, many other instruments need to be functional and in place) or **opportunity** (push for EUDR and its implementation will have positive effects on other instruments that are also needed beyond EUDR)



Source: Author's compilation

Risk – opportunity score _____ (1 – strong risks prevail, 2 – clear risks, some small opportunities; 3- risks and opportunities; 4 clear opportunities but some risks; 5 – strong opportunity)

How well do you see Brazil prepared to comply with and implement the EUDR in 2026 assuming the preparations go on as currently planned (1 - not at all to 5 - fully prepared)?

Preparedness score _____ (1 to 5)

In case it is implemented

What effects do you expect for the soy and cattle sector in terms of deforestation and trade

Deforestation effects in general (1 to 5) _____ (1- no effects on changes in deforestation and/or reforestation to 5 - strong effects in terms of decreasing deforestation)

Trade effects **soy** (1 to 5) _____ (1 – no effects, soy trade will not be affected to 5 – clear effects and only deforestation free soy will be exported to EU)

Trade effects **beef** (1 to 5) _____ (1 – no effects, beef trade will not be affected to 5 – clear effects and only deforestation free beef will be exported to EU)

P.S.: In the explanation of the question regarding trade effects, stimulate a discussion on the "prime premium"

"Brussels" effect in general (1 to 5) _____ (1 – no effects, implementation of EUDR will not have effect on exports to non-EU countries to 5 – clear effects i.e. it will strongly encourage other countries to make use of the achievements and also require higher eco-standards that do not necessarily need to have the format of EUDR)

Appendix 3: Operational policy instruments

ID_OPERATIONAL POLICY INSTRUMENT	ABBREVIATION	INSIDE INSTRUMENTS (laws/decrees/programs to operationalize the laws, e.g plans, programs, systems/platforms, funds)
oper_pol_1	LR-APP	Private forest protection Legal Reserve (RL) and Area of Permanent Preservation (APP) (Forest Code, Law 12.651/2012, Art 4 and 12)
oper_pol_2	CAR-SICAR	Rural Environmental Registry (CAR) (Forest Code, Law 12.651/2012, Art 29)
		National Rural Environmental Registry System (SICAR) (Decree 7.830/2012)
		Extinguishes the CAR deadline (Provisional Measure 884/2019)
oper_pol_3	CRA	Environmental Reserve Quota (CRA) (Forest Code, Law 12.651/2012, Art 44)
oper_pol_4	PRA	Environmental Regularization Programs (PRA) (Forest Code, Law 12.651/2012, Art. 59)
		Complemented rules for PRA (Decree 8235/2014)
oper_pol_5	RESTORATION	National Plan for the Recovery of Native Vegetation (PLANAVEG) (Decree 8.972/2017)
		Resilient Agriculture Investment for Net Zero Land Degradation (RAIZ) (Decree 10.139/2019)
oper_pol_6	PUBLIC FOREST-REGISTER	National registry of public forests (CNFP) (Law 11,284/2006)
		National Forest Information System (SNIF) (Law 11,284/2006)
oper_pol_7	PUBLIC FOREST - INTEGRAL PROTECTION	National System of Conservation Units (SNUC) (Law 9.985/2000, Art 8)
oper_pol_8	PUBLIC FOREST - REGULARIZATION	National System of Conservation Units (SNUC) (Law 9.985/2000, Art 7)
		Amazon Region Protected Areas Program (ARPA) (Decree 8.505, De 20/08/2015)
oper_pol_9	PUBLIC FOREST MANAG AND CONCESSION	Forest concessions in public forest (Law 14.590/2023)
		Management of public forests for sustainable production (Law 11.284/2006)
oper_pol_10	PUBLIC LAND REGULARIZATION	Land regularization in public lands (Law 11952/2009 revoked by Law 13465/2017)
		Public land regularization in Legal Amazon (Law 10.592/2020)
		Public land regularization in Legal Amazon (Law 11688/2023 that change Law 10592/2020)
		Creation of the Technical Chamber for the Allocation and Land Regularization of Federal Rural Public Lands (CTD) (Decree 9.309/2018)
oper_pol_11	INDIGENOUS LAND REGULARIZATION	Recognition, demarcation and management of indigenous lands (Law 14.701/2023)
oper_pol_12	LAND REGULARIZATION	Land Management System (SIGEF) (Law 10.267/2001)
		Agrarian Reform (Law nº 8.629/1993)
		Terra Legal program (Land Tile) Law 11,952/2009 (modified by Law 13,465/2017) or use right concession
		Selection, permanence and titling of families benefiting from the National Agrarian Reform Program (Decree nº 9.311_2018)
		Rural Property Registration Certificate (CCIR) (Law 4.947/1966, Law 5.868/1972 and Law 10.267/2001)

ID_OPERATIONAL POLICY INSTRUMENT	ABBREVIATION	INSIDE INSTRUMENTS (laws/decrees/programs to operationalize the laws, e.g plans, programs, systems/platforms, funds)
		National Rural Real Estate Cadastre (SNCR) (Law 5.868/1972 and Law 10.267/2001)
oper_pol_13	PRIVATE LAND TAX	Rules for land rental (Lei n.º 76/77)
		Land Bank and Land Mobilization Fund (Law 49/2023)
		Rural Land Tax (ITR) (Law 9.393/1996)
oper_pol_14	SANCTION	Environmental Crimes Law (Law 9.605/1998)
		Property embargo (Forest Code, Law 12.651/2012, Art 51)
		Penalities and sanctions for environmental crimes (Decree 6514/2008)
oper_pol_15	BLACK LIST	"Union with Municipalities" or Black list of municipalities (since 2008). Program to Reduce Deforestation and Forest Fires (Decree 11,687/2023, Art 3)
oper_pol_16	DIRTY LIST	Register of Employers (Cadastro de Empregadores), also known as the "Dirty List" (Lista Suja), who have been found by government inspectors to be subjecting workers to "conditions analogous to slavery."
oper_pol_17	NATIONAL DUE DILLIGENCE	Soybean Moratorium (2006). Under this instrument, signatory companies commit not to purchase or finance soybeans grown in areas of the Amazon biome deforested after July 2008.
		Beef Terms of Adjustment of Conduct (TAC) (2009). Voluntary commitment that holds companies (slaughterhouses) accountable for environmental irregularities, such as deforestation occurring after July 2008, throughout their supply chains.
oper_pol_18	INTERNATIONAL DUE DILLIGENCE	Cattle-China (2015). Sanitary agreement signed between Brazil and China in 2015, which established a rigorous export protocol (Slaughter of young steers aged 30 months or less (up to four permanent incisors), traceable from birth, allowing for the identification of the farm of origin).
		European Union Deforestation Regulation (EUDR) (2026). Trade agreement between Brazil and European Comission potentially to be implemented 2026, which established a rigorous export protocol including: Products must originate from land that has not been deforested or degraded after December 31, 2020, Production must comply with all relevant legislation in the country of origin and Companies must provide a digital Due Diligence Statement (DDS) with geolocation.
oper_pol_19	TIMBER LOGGING	Multi-Year Forest Concession Plan (PPAOF) (Law 14.590/2023)
		Sustainable Forest Management Plan (Forest Code, Law 12.651/2012, Art 31, parag. 2 and MMA Normative Instruction 05/2006)
		Timber logging licenses (Forest Code, Law 12.651/2012, Art 26 and 31, and MMA Normative Instruction 05/2006)
oper_pol_20	TIMBER - TRACE	National Control System of Origin of Forest Products (DOF) (Forest Code, Law 12.651/2012 art. 36; MMA Ordinance 253; IBAMA Normative Instructions 21/2014; 09/2016; 01/2017)
		National System for Controlling the Origin of Forest Products (SINAFLOR) (Forest Code, Law 12.651/2012, Art. 35 and 36)
oper_pol_21	TIMBER TRADE	Timber exportation (Forest Code; art 37; Normative Instruction IBAMA 15/2011)
oper_pol_22	TIMBER CERTIFICATION	Brazilian Forest Certification Program (CERFLOR)/Programme for the Endorsement of Forest Certification (PEFC)

ID_OPERATIONAL POLICY INSTRUMENT	ABBREVIATION	INSIDE INSTRUMENTS (laws/decrees/programs to operationalize the laws, e.g plans, programs, systems/platforms, funds)
oper_pol_23	CATTLE-TRACE	Federal Agricultural and Livestock Defense System (Decree No. 5.741/2006)
		Brazilian System of Identification and Certification of Bovine and Buffalo Origin (SISBOV)
		Animal Transport Guide (GTA)
oper_pol_24	CATTLE TRADE	Normative Instructions (MAPA)
		Industrial and Sanitary Inspection of Animal Products (RIISPOA) (Decree No. 9.013/2017)
oper_pol_25	CATTLE CERTIFICATION	Beef on Track (boT)
oper_pol_26	SOYBEAN - TRACE	Brazilian Official System for Seed and Grain Certification (SISB). Normative Instruction RFB No. 1.702/2017 (Customs) of Ministry of Agriculture (MAPA).
		Foreign Trade Single Portal (SISCOMEX) guidelines
oper_pol_27	SOYBEAN TRADE	IN MAPA No. 09/2009 (with updates): Governs the issuance of phytosanitary certificates (CFO/PC) required for soybean export.
oper_pol_28	SOYBEAN CERTIFICATION	ISCC PLUS
		IBD
		Pro Terra
		Low-Carbon Soy Seal (SBC)
oper_pol_29	ROUND TABLE/WORKING GROUP INITIATIVES	Mesa Brasileira da Pecuária Sustentável
		Indirect Suppliers Working Group (GTFI)
		Round Table on Responsible Soy (RTRS)
		Global Roundtable for Sustainable Beef (GRSB)
oper_pol_30	PLATFORMS TRACE	Green Seal
		Agro Brasil Sustentável Seal
		Protocolo de Monitoramento Voluntário de Fornecedores de Gado do Cerrado
		Passaporte Verde (Green Passport) (IMAC/MT)
		Single Consent Platform - PAU Brasil (Ordinance IBAMA nº 8, 3/01/22)
oper_pol_31	WATER CONCESSION	Law nº. 9,433/1997 (Art. 12)
oper_pol_32	ENVIRONMENTAL LICENSE - ATIVIDADES AGRÍCOLAS	General Law on Environmental Licensing (Law No. 15.190/2025) and the National Environmental Policy (Law No. 6.938/1981). The rule requires full compliance with the Forest Code (Law No. 12.651/2012).
oper_pol_33	ENVIRONMENTAL LICENSE - BIG INFRA	General Law on Environmental Licensing (Law No. 15.190/2025) and the National Environmental Policy (Law No. 6.938/1981). CONAMA Resolution nº 237/1997.
oper_pol_34	ZEE	Environmental Economic Zoning (ZEE) (Decree 4297/2002 and Law 6.938/1981, Art 9, item II)
		Ecological-Economic Macrozoning of the Legal Amazon (Macro ZEE) (Decree 7.378/ 2010)
oper_pol_35	EMISSIONS	Brazilian Greenhouse Gas Emissions Trading System (SBCE) (Federal Law 15.042/2024)
		National System for GHG Emissions Reduction (SINARE) (Decree No. 11.075/2022)

ID_OPERATIONAL POLICY INSTRUMENT	ABBREVIATION	INSIDE INSTRUMENTS (laws/decrees/programs to operationalize the laws, e.g plans, programs, systems/platforms, funds)
		Sectoral Plan for Climate Change Adaptation and Low Carbon Emission in Agriculture (Law 12.187/ 2009)
oper_pol_36	VOLUNTARY CARBON MARKET	Voluntary market standards (Markit, Gold Standard, Verra, VCS, IHS, CCB, American Carbon Register - ACR)
oper_pol_37	GREEN FUNDS	Tropical Forest Forever Facility (TFFF)
		Amazon Fund (Decree 6.527/ 2008)
		National Forest Development Fund (FNDF) (Law 11,284/2006)
		Climate Change National Fund (FNMC) (Decree 9578/2018, linked to National Climate Change Policy-NCCP; Law 12.114/2009)
oper_pol_38	GREEN FISCAL TAX	Green Tax on Operations Relating to the Circulation of Goods and the Provision of Services (ICMS-Verde) (Lei 7.638/2012)
oper_pol_39	PES-PUBLIC AND PRIVATE AREAS	Floresta + Program (Portaria nº 288/2020)
		Floresta + Carbono Program (Portaria nº 288/2020)
		Bolsa Verde (Green fellowship) (Law 12512/2011; Decree 7572/2011)
oper_pol_40	PES-PRIVATE AREAS	ANA - PES - Programa Produtor de Águas
oper_pol_41	GREEN TAXONOMY	Green Taxonomy
oper_pol_42	GREEN AGRIC CREDITS	Green Rural Producer Note (CPR Verde) (Law 10.828/2021)
		Eco-Invest (Law 14.995/2024).
		Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Economy in Agriculture (ABC and ABC+ Plan)
oper_pol_43	DIRECT SUPPORT SOCIO-BIOECONOMY	Federal Program for Community and Family Forest Management (PMCF), linked to the National Plan for the Promotion of Socio-Biodiversity Product Chains (Decree - 6874/2009)
		National Plan for the Promotion of Sociobiodiversity Product Chains (PNPSB) (Interministerial Ordinance MDA/MDS/MMA No. 239, of 07/21/09)
		Minimum price for Sociobiodiversity Products (National Plan for the Promotion of Sociobiodiversity Products- Interministerial Ordinance nº. 239/2009)
		National Plan for Strengthening Extractive and Riverine Communities (PLANAFE) (Decree 9.334/2018)
		Social BioFuel Seal (Decree 10,527/2020)
		National Program for Productive Forests (Law 12.087/2024)
oper_pol_44	DIRECT SUPPORT BIOECONOMY	National Solar Photovoltaic Energy Policy (PRONASOLAR) (Law project 10.370/2018)
		National Policy on Genetic Resources for Food and Agriculture (PNRGAA) (Portaria SDI nº 1 de 06/01/2020)
		Access to genetic heritage, on the protection of and access to associated traditional knowledge and on the sharing of benefits for the conservation and sustainable use of biodiversity (Law 13.123/2015)
		National Biodiesel Production and Use Program (PNPB) Decree 10,527/2020 (revoked creation decree 5297/2004)

ID_OPERATIONAL POLICY INSTRUMENT	ABBREVIATION	INSIDE INSTRUMENTS (laws/decrees/programs to operationalize the laws, e.g plans, programs, systems/platforms, funds)
oper_pol_45	DATA-MONITORING	Government Satellite monitoring systems (DETER; DEGRAD;PRODES. Terra Class)
		Non-Government Satellite monitoring systems (Mapbiomas, SAD-Imazon, SEEG)
oper_pol_46	AGRIC CREDIT	Rural Credit law (Law 4.829/1965)
		National Rural Credit System (SNCR) (Law 4.829/1965)
		Rural Producer Note (CPR) (Law 8.929/1994)
		Safra Plan (Agriculture Policy, Law 8.171/1991, Art. 8)
oper_pol_47	SUPPORT SMALLHOLDERS PRODUCTION	Rural Productive Activities Promotion Program (Law 12512/2011; Decree 9221/2017)
		Food Acquisition Program (PAA) (Law 10.696/2003, Art. 19 and Decree 4.772/2003)
		National School Feeding Program (PNAE) (Law 11.947/2009)
		National Program for Strengthening Family Agriculture (PRONAF) (Decree 1.946/1996)
oper_pol_48	CAPACITY BUILDING	National Programme for Rural Family and Agrarian Reform (PRONATER) (Lei nº 12.188/2010)
		National Program for Education in Agrarian Reform (Pronera) (Law 7352, 2010)
		National Institute for Colonization and Agrarian Reform (INCRA) – Technical Assistance and Rural Extension (ATER) Contracts
oper_pol_49	SPECIAL TERRITORIES (AGRIC)	MATOPIBA Agricultural and Livestock Development Plan (Decree 8.447/2015)
		Creation of AMACRO zone
		National Agricultural Reserve (RAN) (Decree-Law 199/2015)
oper_pol_50	FIRE MANAG	National Fire Information System (Sisfogo) (Law 14.944/2024)
		Forest brigade programs
		Integrated fire management plans

Source: Author's compilation

Appendix 4: Summary of effectiveness and implementation of all policy groups and by stakeholder category

	Effectiveness				Implementation			
	Academia	Government	Industry	NGOs and multistakeholder platforms	Academia	Government	Industry	NGOs and multistakeholder platforms
Agricultural support (AgriSupp)	3	4	4	3	3	3	3	3
Land register, monitoring and private land regularization (PrLandRegMon)	5	5	4	5	2	2	2	2
Carbon market and payment for ecosystem service (CarbPES)	3	4	4	3	1	2	2	2
Certification and Roundtables (CertrRoundTab)	2	3	2	3	2	2	3	3
Combat illegality (CombIlleg)	5	4	5	5	2	3	3	3
Due Dilligence and Traceability (DueDilliTrace)	4	3	4	4	2	2	2	2
Green Finances (GreenFina)	4	4	4	5	2	2	3	3
Support to Traditional communities and smallhoders (TradComSmallSup)	4	4	4	4	2	2	2	2
Public Forest, Conservation, Public Land regularization (PubLandRegForCons)	5	4	4	5	3	3	2	3
Restoration (Resto)	3	4	4	4	1	2	2	2
Timber Production and Trade (TimbProdTrade)	2	3	3	2	3	3	3	3

Source: Author's compilation

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