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Deforestation in the MERCOSUR Countries

A Comparative Analysis of Trends, Policies, and Governance (2000–2024)

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CGIAR POLICY INNOVATIONS

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INTRODUCTION

The countries of MERCOSUR—Argentina, Brazil, Paraguay, and Uruguay (ABPU)—are home to some of South America's most vital and diverse forest ecosystems. These include the globally significant Amazon rainforest, the biodiversity-rich Cerrado savannah, and the expansive and carbon-dense Gran Chaco dry forests. Together, these ecosystems regulate hydrological cycles, support endemic biodiversity, store vast amounts of carbon, and provide critical ecosystem services to rural and urban populations alike.

The importance of these forests extends beyond their ecological functions. They are central to the region's climate commitments under the Paris Agreement, to global biodiversity targets under the Convention on Biological Diversity (CBD), and to the livelihoods and cultural heritage of indigenous and rural communities. Moreover, forests are increasingly linked with international trade and investment. The European Union Deforestation Regulation (EUDR), for example, imposes new traceability requirements on commodities linked to land-use change, and the EU-MERCOSUR partnership agreement with its trade and sustainable development chapter, further elevating the geopolitical and economic relevance of forest governance in the MERCOSUR countries.

However, although it shows a marked slowdown, the region has experienced notable levels of deforestation over the last two decades, particularly in areas where agricultural expansion and infrastructure development have accelerated land-use change. Agricultural expansion -driven by global demand for soy, beef, and other commodities- remains the primary engine of land conversion in all four countries, however at different scales and intensities. Limited infrastructure development, tenure insecurity, and weak enforcement have exacerbated these pressures. In response, countries have enacted a diverse array of policies, from total bans on forest clearing in Paraguay’s Eastern Region or in forests with high conservation relevance in Argentina and Brazil to incentive-based conservation finance in Uruguay.

The diversity of forest governance systems in MERCOSUR presents a valuable opportunity for comparative learning. While some countries have pioneered advanced monitoring systems and cross-sectoral policy instruments, others have struggled with implementation due to institutional fragmentation or decentralization. This article, based on deforestation reports for Argentina (Jorge, 2025), Brazil (Mingoti and Silveira, 2025), Paraguay (Elverdin and Illescas, 2025), and Uruguay (Papendieck, 2025), provides a comparative review of the evolution of deforestation and governance mechanisms from 2000 to 2024. It identifies country-specific trajectories, synthesizes shared challenges, and extracts policy lessons relevant to national and regional stakeholders.

ARGENTINA: FOREST LOSS SLOWED DOWN FOLLOWING DECENTRALIZED REGULATION

Argentina’s native forests cover approximately 46.3 million hectares, distributed across seven ecoregions. The largest is the Parque Chaqueño, a forest system shared with Bolivia, Brazil, and Paraguay, containing 31.6 million hectares, or about 67% of Argentina’s total native forest. This region has experienced some of the country's highest deforestation rates due to agricultural frontier expansion, extensive cattle grazing, and selective logging.

The main regulatory framework is the Forest Law (No. 26.331), enacted in 2007, which established the "Territorial Planning of Native Forests" (Ordenamiento Territorial de Bosques Nativos, OTBN). The OTBN classifies forested lands into three categories: Category I (Red) areas are strictly protected; Category II

(Yellow) areas permit sustainable use; and Category III (Green) areas allow for transformation under regulated conditions. Implementation of the law has been delegated to the provinces, resulting in uneven enforcement, variable timelines for zoning, and disparities in technical and institutional capacity. While many provinces adopted OTBN maps soon after the law's passage, others experienced delays due to challenges in public consultation or geographic complexity.

Argentina's national deforestation monitoring system is robust and includes a deforestation early warning system,[1] conducted fortnightly and openly accessible for public consultation. Additionally, other monitoring sources exist, including the Global Forest Change database and platforms such as Global Forest Watch and MapBiomas. The lack of a unified enforcement mechanism across jurisdictions can hinder the efficacy of forest governance, despite a robust national legal framework.

BRAZIL: INSTITUTIONAL COMPLEXITY AND MONITORING LEADERSHIP

Brazil’s forested biomes—particularly the Amazon and Cerrado—span almost two-thirds of the country and are critical to global ecological stability (IBGE, 2019). Historically, the Amazon region remained largely unchanged during the Brazil's colonial period (Becker, 2005). Between 1964 and 1985, the National Integration Program (PIN) was launched, promoting settlement projects along a 10-kilometer strip on both sides of highways in the Amazon (Brazil, 1970). Due to the region’s isolation and naturally poor soils, this expansion favored extensive, low-productivity cattle ranching, which relied on the continuous incorporation of newly cleared areas through logging. Since the 1980s, large-scale agricultural expansion in the Cerrado and cattle ranching in the Amazon have been major drivers of land use change (INPE, 2023).

Deforestation is permitted up to legal limits that vary by region. However, some deforestation occurs illegally, and to monitor and control it, Brazil has implemented some of the most advanced official programs for monitoring and controlling deforestation in the world. The PRODES system, developed in the late 1980s, uses satellite imagery to monitor annual deforestation in the Legal Amazon. In 2004, the government launched the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm) (Brazil, 2004), which contributed to a gradual reduction in deforestation rates from nearly 28,000 km² in 2004 to below 10,000 km² by 2009 (INPE, 2023). Although deforestation rates began to rise again after 2018—peaking at over 13,000 km² in 2021—they have remained lower than the extremely high levels observed in the early 2000s. In 2010, PPCDAm was expanded to include the Cerrado Biome (Brazil, 2010).

The Forest Code (Law 12,651/2012) (Brazil, 2012) introduced requirements for Permanent Preservation Areas (APPs), Legal Reserves, and the Rural Environmental Registry (CAR), a digital database consolidating information regarding land use and forest protection obligations on private properties. The Forest Code also created financial mechanisms to promote conservation and regulate land use more effectively. In parallel, Brazil's National Program for the Conversion of Degraded Pastures into Sustainable Agricultural and Forestry Systems, launched in 2023 and later renamed the Brazilian Green Way, promotes the sustainable use of low productivity areas through systems such as integrated crop-livestock and agroforestry, aiming to reduce pressure on forest frontiers. It is one of the key initiatives under the Ministry of Agriculture and Livestock’s Strategy for Sustainable and Low-Carbon Development.

International supply chain pressure has also played a role. The Soy Moratorium, adopted in 2006 through a strong commitment from the private production and export sectors, prohibits the commercial trade of

[1] See https://www.argentina.gob.ar/ambiente/bosques/alerta-deforestacion

soy grown on Amazon lands deforested after July 2008. Although soy production in the Amazon has increased by over 300% since then, 95% of this expansion has occurred on land deforested prior to 2008, often replacing degraded pastures.

In practice, however, the implementation of environmental regulations has at times been influenced by political and institutional pressures. One example is the use of a *de facto ban* by environmental agencies – driven by efforts to reduce deforestation – whereby deforestation permits are delayed or withheld, even when projects comply with all legal requirements. In response to concerns over such administrative bottlenecks, new legislative proposals have emerged. One such initiative is Bill No. 2,159/2021, approved by Congress and submitted for presidential sanction, which amends environmental licensing regulations. The original text of the bill exempts several agrosilvopastoral activities from prior licensing requirements, allowing them to proceed based on self-declaration, without the need for preliminary review by environmental authorities.

Despite a recent increase in deforestation, since the beginning of 2000, the deforestation rate has fallen by more than 60% in the Cerrado and just below that figure in the Amazon.

PARAGUAY: LEGAL PROHIBITIONS AMIDST GEOGRAPHIC CONTRASTS

Paraguay's forest cover was estimated at 17.7 million hectares in 2022, accounting for 44.3% of its national territory. The vast majority of this forest is located in the sparsely populated Western Region (Chaco), which contains 82.8% of the country's forest cover, while the more densely populated Eastern Region holds just 17.2%. These two regions differ sharply in terms of land tenure, forest type, and regulatory approach.

The Eastern Region is governed by strict deforestation prohibitions, beginning with Law 2524/04, known as the "Zero Deforestation Law." This law banned the conversion of native forests into agricultural land or human settlements. Originally scheduled to expire in 2018, it was renewed and strengthened through Law 6676/20, which extended the moratorium for another ten years and authorized INFONA (National Forestry Institute) to operate the National Forest Monitoring System.

In contrast, the Western Region remains subject to regulated deforestation. Landowners are legally required to retain at least 25% of native forest on their property, with buffer zones along rivers and between pasturelands. These requirements are based on Forestry Law 422/73 and the Environmental Impact Assessment Law 294/93. Despite the regulatory structure, enforcement remains a challenge, particularly in areas with poor institutional presence and high land concentration.

Paraguay's monitoring infrastructure has improved since 2018, when the National Forest Monitoring System was formalized. This monitoring made it possible to produce, on a regular basis, reports on forest areas through satellite mapping and a series of annual maps starting in 2017, which allow determining with spatial precision the forest cover and the change in land use. The public consultation tool is available online in the Forest and Land Use Portal/Forest-Uses Viewer[2].

Since the implementation of the Zero Deforestation Law for the Eastern Region in 2004, a loss of forest cover of 5,373,558.7 hectares has been recorded, but 88.2% occurred in the Western Region (where logging is partially legal) and only 11.8% in the Eastern Region. The highest percentage of land-use change occurred between 2005 and 2011. Since then, the annual deforestation rate has continued to

[2] See https://infona.gov.py/portal-de-bosques-y-usos-de-la-tierra-nueva-plataforma-del-infona-para-la-gestion-forestal-sostenible/

trend downward, and although it is one-third of what it was a decade ago, it remains high. According to official and international reports, among the main causes of deforestation in the Eastern Region are the areas used for agriculture, especially corporate agriculture.[3] In the Western Region, the expansion of livestock activities is the main reason for deforestation (GFW, 2024; INFONA, 2023; MADES/UNDP, 2019).

Paraguay's energy matrix is also relevant in explaining the causes of deforestation and forest degradation. To date, it is estimated that 46% of energy consumption is still based on the use of firewood and charcoal. The production of charcoal is of great economic importance, being the main export product of the wood value chain in the country. Nearly 90% of annual wood production is used for the use of firewood and charcoal, with productions estimated at 15 million m3 and 2.5 million m3, respectively (MADES/UNDP, 2019).

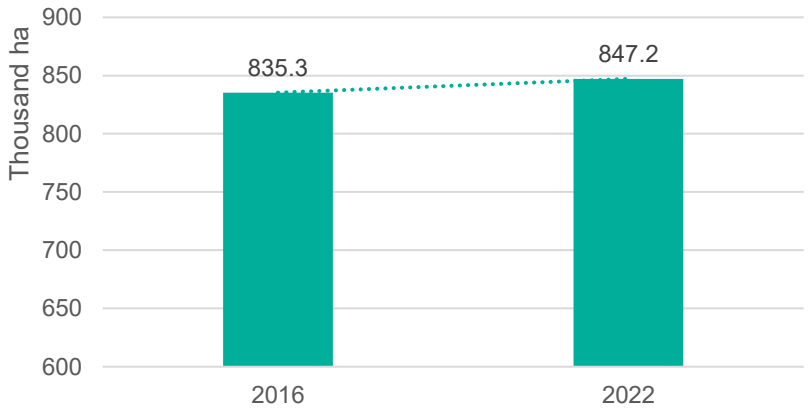
What is significant is that while all forest loss in the Eastern Region is illegal, more than 76% of deforestation in the Chaco Region was legal, since the national legal framework allows for the change in the use of native forests in this region through Territorial Planning Plans granted by INFONA.

Legislation for the protection and monitoring of native forests in Paraguay has been strengthened over the last decade. However, despite improvements in legislation, incentives, and enforcement mechanisms, these have not been sufficient to guarantee greater forest conservation. To achieve this, it is not only imperative to improve instruments to prevent illegal deforestation, but also to generate sufficient incentives to prevent legally permitted deforestation.

URUGUAY: CONTROLLED USE AND POLICY INNOVATION

Uruguay presents a markedly different trajectory from its neighbors. It is among the few countries in the region where native forest area has increased in recent decades. As of 2022, Uruguay had approximately 2 million hectares of forested land, of which 57% are planted forests and 43% are native forests. These forests account for 12% of the country's territory. The increase in native forest cover is attributed to strong regulatory protections, minimal population pressure in forested areas, and active state management.

Figure 1. Uruguay Native Forest Area (ha)



Source: Uruguay Native Forest National Cartography (2024)

[3] The implementation of illegal crops accounts for 18.5% of deforestation in the eastern region.

Uruguay's forestry governance is grounded in the Forestry Law, No. 15.939 of 1987, which prohibits the destruction of native forests unless authorized by the Directorate General of Forestry (DGF). Landowners must register their forests and submit a "Use and Management Plan" (PMUS), supported by technical assessments. Logging without a PMUS is considered illegal. The Native Forest Registry and PMUS database together form the core of the National Forest Information System.

While Uruguay does not yet operate a real-time early alert system, its capacity for monitoring has improved through the development of two national cartographies of native forest—one for 2016/2018 and one for 2022—using Sentinel-2 satellite imagery. Although 95% of Uruguay's forests are located on private land, the state provides incentives for conservation, including tax exemptions and technical assistance.

A notable innovation is Uruguay's issuance of a Climate Change Indicator-Indexed Bond (BIICC) in 2022, linking sovereign debt performance to environmental indicators, including a key performance indicator (KPI) based on native forest area. The $1.5 billion bond received high demand from investors and has become a pioneering model of sustainability-linked finance.

SHARED CHALLENGES AND DIVERGENT APPROACHES

Despite their divergent historical, geographic, and institutional contexts, the MERCOSUR countries face several common challenges in tackling deforestation and promoting sustainable forest governance.

Agricultural expansion as a dominant driver

Across all four countries, agricultural expansion- whether for soy cultivation, pasture, or mixed cropping systems- remains the primary driver of deforestation. In Argentina, the advance of the agricultural frontier in the Gran Chaco has led to extensive clearing of dry forests. In Brazil, large-scale cattle ranching in the Amazon and intensive soy cultivation in the Cerrado continue to pressure remaining native vegetation. Paraguay's Western Chaco faces similar pressures, particularly from livestock expansion. Even Uruguay, where net forest gain is reported, recognizes the competition between forest regeneration and pasture-based livestock systems in some areas.

Persistent gaps between legal frameworks and enforcement

While national laws regulating forest use are in place- such as Argentina's Forest Law, Paraguay's Zero Deforestation Laws, Brazil's Forest Code, and Uruguay's Forestry Law- enforcement remains uneven. In Argentina implementation is complicated by decentralization and overlaps among institutional mandates. Argentina's forest zoning (OTBN) is executed at the provincial level, leading to wide variations in capacity, technical standards, and enforcement. In Paraguay, the involvement of numerous entities in forest management undermines coordinated action. Even Brazil, despite its advanced systems, has experienced governance setbacks due to shifting political priorities and regional disparities in law enforcement. Moreover, Brazil continues to face the significant challenge of completing the analysis of 85% of its more than 7 million rural properties registered in the Rural Environmental Registry (CAR). This process involves assessing each property's land use configuration against the minimum conservation thresholds established by the Forest Code, including requirements for Legal Reserves and Permanent Preservation Areas (APPs). An exception is Uruguay, where non-compliance with the regulatory framework is almost non-existent.

Limitations in monitoring infrastructure

Although satellite systems have increased their capabilities and information transparency has improved, not all countries maintain continuous or publicly available forest monitoring platforms. Uruguay, for example, lacks a deforestation early warning system and only has two national maps (2016-2018 and 2022). Paraguay relies on periodic mapping and complements its monitoring efforts through a partnership with the University of Maryland (GLAD) to detect early signs of forest cover disturbances. Argentina and Brazil, on the other hand, have developed their own deforestation monitoring and early warning capabilities.

Although some areas still need to be strengthened, most countries in the region have developed robust monitoring systems. However, international comparisons rarely rely on national sources for deforestation reporting. Given the significant discrepancies with other sources, it would be advisable to enhance the international visibility and credibility of these national platforms so that they can be taken into account when assessing the evolution of forest cover in the region.

Pressures on subnational institutions and rural actors

Forest management often requires coordination between central agencies and local governments or producers. However, local authorities frequently do not have the technical and financial resources to enforce regulations, process land-use plans, or monitor compliance. In Paraguay, municipal governments are legally responsible for environmental stewardship but lack the operational capacity. Furthermore, smallholders — despite comprising most rural establishments in regions like Brazil's Amazon — often lack access to technical assistance, financing, or incentives for forest conservation.

Challenges of data harmonization and forest definitions

Differences among ecosystems lead to divergences in forest definitions and mapping criteria across countries, hampering comparability. These discrepancies hinder the development of cohesive regional baselines for carbon accounting, biodiversity monitoring, or trade compliance.

Therefore, although these discrepancies are duly justified, national forest inventories are not directly comparable, which in many cases leads external actors to rely on estimates from other sources (FAO, Forest Watch, MapBiomas, etc.), where differences in the definition of "forest" and the satellite source used for image analysis (Copernicus, Landsat, Sentinel, ALOS, etc.) lead to significant divergences.

While these shared challenges demonstrate the systemic pressures facing forest governance in MERCOSUR, the diverse strategies adopted by each country also reflect their distinct priorities, institutional arrangements, and political economies. The following section highlights these contrasts and draws lessons from their comparative experience.

Planted Forest Inventory Systems in MERCOSUR

Forestry for industrial purposes is an important activity in the MERCOSUR countries, especially in Brazil, where the planted area exceeds 10 million hectares (Brazil. Serviço Florestal Brasileiro, 2023), generating more than US$ 14.29 billion annually and supporting 2.6 million jobs (Indústria Brasileira de Árvores-IBÁ, 2023).

In Uruguay, forestry activity is of significant economic importance; the processing of its 1.1 million planted hectares contributes 4.2 percentage points to the country's GDP. Argentina has 1.3 million planted hectares, although its relative economic importance is lower than in Uruguay. In Paraguay, the activity is just beginning, accounting for just over 200,000 hectares of planted forests.

Despite its importance, Uruguay remains the only MERCOSUR country with a digitized and publicly accessible inventory, which strengthens its monitoring capacity and international credibility. In Brazil, relevant sources include the Produção da Extração Vegetal e da Silvicultura (Production of Plant Extraction and Silviculture – PEVS) from the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics – IBGE) (IBGE, 2023), as well as Florestas do Brasil – dados e estatísticas (Forests of Brazil – Data and Statistics) and the Sistema Nacional de Informações Florestais (National Forest Information System), both from the Serviço Florestal Brasileiro (Brazilian Forest Service) (Brazil, 2022; 2023).

Improving planted forest data systems across the region is essential for enhancing transparency, enabling afforestation policies, and supporting the integration into global bioeconomy and sustainable forest product markets. The lack of records can lead to conflicts when monitoring deforestation in native forests.

INSTITUTIONAL AND POLICY DIVERGENCE ACROSS COUNTRIES

While the MERCOSUR countries share many deforestation drivers and policy challenges, their responses have diverged significantly in terms of legal design, institutional architecture, monitoring systems, and outcomes. These differences reflect variations in ecological contexts, political economies, and state capacity.

Legal and regulatory approaches

Uruguay has adopted a strictly protectionist legal regime since 1987, with Law 15,939 prohibiting native forest destruction except in specific, authorized circumstances. The law is reinforced by compulsory registration in the Native Forest Registry and a requirement for a Use and Management Plan (PMUS). Logging is permitted only with technical justification and inspection by the Directorate General of Forestry (DGF). The emphasis is on conservation through control and incentives, and the result has been a net increase in the native forest area.

In contrast, Paraguay’s approach has been more reactive. The “Zero Deforestation” laws (Law 2,524/04 and Law 6,676/20) impose a blanket prohibition on forest clearing in the Eastern Region, while allowing regulated deforestation in the Western Chaco, subject to legal reserve requirements (25%), buffer zones, and Environmental Impact Assessments. While the laws are ambitious in scope, especially for the East, enforcement has lagged, and high deforestation continues in the West.

Brazil employs a multifaceted regulatory system combining legal restrictions, economic incentives, and spatially explicit data. The Forest Code (Law 12,651/2012) (Brazil, 2012) mandates Legal Reserves and Permanent Preservation Areas (APPs) on private lands, with enforcement enabled through the Rural Environmental Registry (CAR). This law also includes provisions for ecological compensation and sustainable production. Brazil stands out for its long-term integration of forest policy with climate commitments, land-use planning, and agricultural policy. Despite maintaining approximately 66% of its territory under native vegetation cover, the country still faces the challenge of validating 85% of individual CAR

submissions. This process is critical for ensuring legal compliance and effective implementation of the Forest Code and requires improved coordination across federal and state levels.

Argentina's Forest Law (No. 26,331) introduces the OTBN (Territorial Planning of Native Forests) and assigns zoning authority to the provinces. This decentralized system creates variability in implementation, with some provinces enforcing strict forest protection (Category I zones) and others allowing economic use or conversion. The national government provides funding through a forest conservation fund, but political and fiscal asymmetries have resulted in uneven application and monitoring across jurisdictions.

Monitoring and data infrastructure

Argentina has developed a forest monitoring and deforestation early warning system that reports detailed events to provincial enforcement authorities every two weeks. A Geographic Information System (GIS) environment is used to cross-reference information with the National Forest Management Plans (OTBN) and the National Registry of Management Plans. Public early warning information is systematized in annual reports.

Brazil leads the region in forest monitoring. The PRODES and DETER systems generate high-frequency satellite-based deforestation alerts and annual maps with institutional continuity and public access. Besides providing early warnings, these systems are increasingly used by financial institutions to support the provision of credit conditional on legal compliance. Complementary initiatives such as TerraClass provide land-use classifications of deforested areas.

Paraguay has developed a national monitoring system operated by INFONA and publishes annual land-use maps. In partnership with the University of Maryland, INFONA has developed a deforestation early warning system through image analysis. Early warning reports are generated at INFONA's headquarters and sent weekly to the country's various regional offices for verification and on-site intervention. The system is being gradually digitized and integrated, but data is still not fully open for public consultation.

Uruguay has implemented two national forest cartographies (2016/2018 and 2022) using Sentinel-2 satellite imagery, yet it does not maintain an early alert system. Monitoring relies on ex-post assessments to record and enforce land-use policies, not on real-time deforestation detection.

Forest outcomes and trends

Uruguay is the only country in the region reporting net native forest gains, due to effective legal restrictions, controlled use, and minimal conversion pressures in forest-rich areas. According to FAO and national sources, forest areas have grown due to sustained prohibitions on logging and deforestation since the 1980s, and the alignment of forestry with national environmental and fiscal policy.

Brazil has seen significant fluctuations in deforestation, peaking in 2004 (~30,000 km²), dropping sharply after PPCDAm implementation, and rising again in the 2010s (INPE, 2023). However, thanks to its monitoring and policy infrastructure, Brazil retains the capacity to measure and respond to deforestation trends in a timely manner.

Paraguay continues to face high rates of deforestation, especially in the Chaco. While the Eastern Region has seen forest stabilization due to the Zero Deforestation laws, the Western Region has become a new deforestation frontier, driven by extensive cattle ranching, poor enforcement, and infrastructural expansion.

Although the national deforestation rate fell from more than 1% annually to around 0.3%, Argentina exhibits persistent deforestation in the Gran Chaco, particularly in provinces like Santiago del Estero and Salta. Despite the establishment of protected zones, forest conversion continues under pressure from soy cultivation, pasture expansion, and legal inconsistencies between national and provincial regulations.

Table 1:

Feature	Argentina	Brazil	Paraguay	Uruguay
Deforestation Trend	Reductions post 2011	Fluctuating, major reductions post-2004	High in Chaco, lower in East	Net forest gain
Key Regulation	Forest Law 26,331	Forest Code 12.651/ 2012 (Brazil, 2012)	Zero Deforestation Laws (East)	Law 15,939 + Native Forest Strategy
Monitoring Tools	SINIA, INBN2, GFW, MapBiomas	PRODES, TerraClass, CAR	INFONA + GFW alerts	Cartography + KPI-based finance
Land Ownership	Mixed, decentralized	Concentrated in large estates	Mostly large estates in Chaco	95% private
Early Warning System	Yes (Environment Secretary)	Yes (INPE)	Yes (Maryland University)	No
Incentive Mechanisms for sustainable forest management	Some provincial payments for ecosystem services (PES)	Preferential credit for sustainable practices; ABC+ Plan	Environmental Services Law (limited application)	Climate-linked sovereign bond (BIICC), tied to native forest conservation indicators

Source: Authors based on the four reports

LESSONS LEARNED

The comparative experience of the four MERCOSUR countries yields several strategic and operational lessons for forest governance, particularly in contexts where agriculture, trade, and environmental policy intersect.

Legal frameworks must be accompanied by institutional capacity

Robust legal provisions are not sufficient in themselves. Paraguay's Zero Deforestation legislation illustrate that even well-crafted laws can fall short without enforcement mechanisms, data systems, and stable institutional mandates. Conversely, Uruguay's combination of prohibition, registry, and technical control demonstrates how a modestly resourced state can achieve effective compliance. The country's scale and limited presence of native forests contribute to the success of its implementation.

Integrated monitoring enhances governance responsiveness

Brazil's experience with PRODES, DETER, and CAR demonstrates the value of real-time, high-resolution, institutionalized forest monitoring. These systems have enabled the state to not only track deforestation but also respond with targeted enforcement and land-use policy.

Financial instruments can reinforce environmental policy

Uruguay's Climate Change Indicator-Indexed Bond (BIICC) illustrates a pioneering use of sovereign finance to reinforce environmental performance. By linking bond interest rates to forest conservation indicators (KPI-2), the country has aligned fiscal and ecological incentives in a novel way. This model provides a blueprint for embedding environmental metrics in debt instruments.

In the case of Brazil, the implementation of preferential interest rates for borrowing by producers has shown high effectiveness in promoting the adoption of better agricultural practices and the recovery of degraded lands (Brazil, 2024)[4].

Decentralization requires coordinated support structures

Argentina's decentralized OTBN model demonstrates the importance of harmonization mechanisms between national and subnational governments. The lack of standardized enforcement, variable technical capacity, and political asymmetries have led to patchy results. Without coordinated support from federal agencies, decentralized implementation may exacerbate disparities rather than improve governance.

Forest protection must address both legal and illegal drivers

In Paraguay, illegal deforestation persists despite legal prohibitions, especially in the Western Region. Although to a lesser extent, Argentina also experiences deforestation in areas of high conservation value. Legal land-use plans, if not properly digitized, monitored, or enforced, may offer limited deterrence. In Brazil, while most soy expansion in the Amazon occurred on pre-cleared land, indirect land-use change (e.g., pasture-to-soy conversion) still contributes to ecosystem degradation. Forest governance must therefore account for indirect drivers, leakage effects, and market incentives.

Regional cooperation is needed for transboundary biomes

The Gran Chaco and Atlantic Forests span multiple MERCOSUR countries, yet each nation operates under its own definitions, data protocols, and legal systems. This undermines coordinated conservation efforts and complicates carbon accounting. Shared biomes require harmonized data systems, legal frameworks, and cooperative enforcement mechanisms, particularly in the face of global trade pressures and climate change obligations**.**

CONCLUSION

The experience of MERCOSUR countries between 2000 and 2024 reveals a region dealing with the complex intersection of environmental stewardship, agricultural development, and institutional capacity. While Argentina, Brazil, Paraguay, and Uruguay face similar drivers of deforestation, the expansion of

[4] See https://www.gov.br/secom/es/ultimas-noticias/2024/12/el-gobierno-federal-lanza-la-plataforma-agro-brasil-sostenible-1#:~:text=%C2%B0%205152%20del%20Consejo%20Monetario%20Nacional%20(CMN).,la%20participaci%C3%B3n%20de%2030%20certificadoras%2C%20y%20su

agricultural frontiers and land-use change, their governance responses have been shaped by different legal instruments, state capacities, and ecological priorities.

Uruguay stands out for its consistently protectionist legal framework and demonstrated success in increasing native forest cover through strict regulation, institutional control, and innovative financial mechanisms such as the KPI-linked sovereign bond. Brazil, despite fluctuations in deforestation rates, has institutionalized one of the most sophisticated forest monitoring and regulatory regimes in the world, combining legal reserves, remote sensing, and supply-chain interventions. Paraguay, while notable for the ambitious Zero Deforestation Law in its Eastern Region, continues to face high rates of forest loss in the Chaco due to enforcement limitations and institutional fragmentation. Argentina's decentralized zoning model has enabled local adaptation but has also resulted in uneven implementation and continued forest degradation in regions like the Gran Chaco.

These different trajectories demonstrate that policy design alone is insufficient; outcomes depend equally on sustained monitoring, institutional alignment, financial incentives, and the capacity to enforce regulations effectively at both national and subnational levels. Moreover, as forests span ecological boundaries and political borders, there is a growing need for coordinated regional strategies. Harmonizing definitions, improving data comparability, and aligning environmental governance with trade and climate commitments will be essential for advancing conservation goals across the MERCOSUR bloc.

Ultimately, the forest governance experiences of these four countries offer a valuable comparative lens through which to examine the political, technical, and institutional dimensions of sustainable land-use policy. As international pressure mounts to link deforestation outcomes to market access and financial flows, the MERCOSUR region will be increasingly called upon to demonstrate that it can protect its forests while pursuing inclusive and sustainable development.

Since the beginning of the millennium (earlier in the case of Uruguay), the four countries have made significant efforts to integrate their development models with forest conservation. The wealth of regulations and the development of robust forest monitoring and deforestation early warning systems are proof of this. Promoting these instruments in international forums should be a priority for the region.

However, these efforts have not been enough to eradicate deforestation. It is necessary to create adequate economic incentives to reduce reliance on legally authorized land conversion as well as to adapt and strengthen enforcement mechanisms to effectively sanction and eliminate illegal deforestation.

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