In collaboration with
Tropical Forest Alliance
and REVER Consulting

WORLD ECONOMIC FORUM

The Gran Chaco: Pathways Towards a Sustainable Future

WHITE PAPER

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Foreword

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The Gran Chaco is at a crossroads. Spanning more than a million square kilometres across Argentina, Paraguay, Bolivia and Brazil, it is one of the largest remaining dry forest ecosystems in the world. It is also one increasingly at risk. While much attention has been focused on South America's other great forested landscapes, the Gran Chaco has quietly endured decades of deforestation and degradation, largely driven by unsustainable agricultural expansion. In the past two decades alone, more than 13 million hectares of forest – an area larger than England – have been lost.

But the story of the Gran Chaco is not just one of loss; it is also a story of potential. This vast and diverse region, home to more than 5.6 million Indigenous People, is a critical carbon sink, a biodiversity hotspot and a driver of economic opportunity. It is a place where sustainable production and protection do not have to be at odds. Instead, they can reinforce each other – if we get the incentives and governance right.

That is what makes this report so important. It provides a roadmap for how we can shift from a business-as-usual model to one that embeds sustainable development at its core. It builds on lessons learned from other regions – like the Amazon and the Cerrado – where sustainability efforts have demonstrated that economic growth, environmental protection and social development can go hand in hand.

The stakes could not be higher. Climate change is accelerating and the loss of the Gran Chaco's forests not only contributes to global carbon dioxide (CO_2) emissions but also threatens water security, food production and biodiversity across the region. The economic consequences are just as severe, with prolonged droughts, floods and wildfires increasingly disrupting livelihoods and national economies. If we fail to act, the consequences will be felt far beyond the region's borders.

Achieving a sustainable future for the Gran Chaco requires recognizing its plurality – a region of many Chacos within one. Across Argentina, Bolivia and Paraguay, the Chaco is shaped by distinct ecosystems, cultures and economic dynamics, yet it faces shared challenges and common opportunities. A harmonized yet context-specific approach is essential – one that respects the identity of each Chaco and the people who call it home, while fostering a coordinated tri-national agenda. By embracing this diversity, strengthening governance and ensuring that development strategies reflect local realities, we can unlock pathways for inclusive and sustainable growth.

What is needed now is action. Governments can strengthen land-use policies and enforcement, ensuring that nature remains a fundamental part of development strategies. Financial institutions can mobilize capital to reward conservation and sustainable production, leveraging tools such as carbon markets, green bonds and blended finance instruments to facilitate the transition of the agricultural production model. Companies involved in production and sourcing within the region can commit to transparent, deforestation-free supply chains that prioritize resilience over short-term profit. And Indigenous Peoples and local communities – who have stewarded this land for generations – should be at the centre of decision-making, with their rights and knowledge recognized and respected.

The Gran Chaco offers a rare opportunity to get this right. The solutions exist: regenerative agriculture, sustainable cattle ranching, jurisdictional approaches to land-use planning and management, and nature-based finance models. What we need now is scale, investment and alignment across sectors. The future of the Gran Chaco is not yet written. With the right investments, policies and partnerships, it can become a global model for how landscapes can be managed to benefit both people and nature. The work presented in this report lays out a compelling vision for how we can achieve that balance. Now, it is up to all of us to turn vision into reality.

Executive summary

A sustainable future for the Gran Chaco needs to balance production and protection to benefit people and nature.

33%

of Argentina's cattle are reared in the Gran Chaco.

16x

increase in soybean cultivation in Paraguayan Chaco (2012-2022).

As South America's second-largest forest, the Gran Chaco is crucial for biodiversity conservation, carbon sequestration, sustaining the livelihoods of traditional communities and supporting regional economies.

The Gran Chaco spans over 1 million square kilometres (100 million hectares/Mha) across Argentina, Paraguay, Bolivia and Brazil – an area larger than Spain and Germany combined or roughly equal to the size of Bolivia. This diverse biome – including dry forests, savannas and wetlands – supports over 3,400 plant species, 500 bird species, 150 mammal species and 220 reptile and amphibian species. It also serves as a vital carbon sink and water reservoir, sustaining the livelihoods of over 5.6 million Indigenous People from 27 distinct groups.

Over the past few decades, the Gran Chaco has become a regional hub for agricultural and livestock production, showing significant potential for economic growth in the region. The biome has undergone a dynamic and fluctuating transformation in land use. Soybean cultivation expanded significantly, with Argentina increasing production area by 30% between 2001 and 2022 and Paraguay achieving a 16-fold increase from 2012 to 2022. Livestock production also surged, particularly in Paraguay, where 67.4% of beef exports originate from the Gran Chaco. In Argentina, the region now hosts 33% of the national cattle stock, with over 5 million calves from the Gran Chaco marketed to key provinces such as Buenos Aires, Córdoba and Santa Fe.

Despite its significant socio-biodiversity importance, the Gran Chaco remains largely overlooked by international sustainability agendas compared to other South American biomes, such as the Amazon and the Cerrado. This neglect has left it highly vulnerable to deforestation, unsustainable practices, land degradation and climate change, which have inflicted a severe economic toll on the region.

Since 2000, the region has lost over 13 million hectares of forest cover – equivalent to roughly 13% of its total area and larger than the size of England. Unsustainable agricultural and livestock expansion, combined with lack of resources and inconsistent enforcement of environmental laws, are the primary drivers of this loss. The consequences are far-reaching: escalating greenhouse gas emissions, loss of ecosystem integrity and heightened vulnerability to climate extremes. This is even more critical in the current global climate context, where, according to a report published by the United Nations in October 2024, a continuation of current policies could lead to global warming of up to 3.1°C over the course of this century[1] – double the 1.5°C threshold established by the Paris Agreement a decade ago. To prevent this rise, coordinated actions across multiple sectors are essential, with the conservation and preservation of ecosystems being among the most effective and urgent measures.

The economic toll from climate impacts is significant and growing. Climate extremes such as prolonged droughts, floods, heatwaves and wildfires are disrupting agricultural production across the region. For example:

- The 2021-22 drought in Argentina caused $2.67 billion in export losses, $1.44 billion in tax revenue losses and reduced the country's GDP by 1%. If unaddressed, recurring droughts could reduce Argentina's GDP by 4% annually by 2050.
- In 2019, over 2,000 wildfires in Paraguay's Gran Chaco caused around $20.9 million in material losses (e.g. fencing, livestock), excluding reforestation costs and basic service disruptions.[2]
- Wildfires in Argentina's agricultural sector caused losses of $6 billion in 2020, with recovery costs equivalent to 5-17% of the national soybean production value.
- Furthermore, Indigenous Peoples and local communities, recognized as key stewards of the biome, remain largely excluded from decision-making processes. Studies show that respecting Indigenous land rights significantly curtails biodiversity loss, deforestation and degradation. For instance, in Brazil, Indigenous lands lost only 1.2% of native vegetation between 1991 and 2021, compared to 19.9% on private lands.

The Gran Chaco holds immense untapped potential to balance economic growth, environmental resilience and social equity. While promising initiatives are emerging, scaling-up innovative solutions and addressing critical gaps are essential to transform the region into a global model for sustainable development. By leveraging market-driven strategies, governance improvements and stakeholder collaboration, the Gran Chaco can secure its role as a key contributor to food security, biodiversity conservation and climate mitigation.

This report proposes four pathways to unlock the potential of sustainable development in the Gran Chaco:

1 International, regional and national policy-making pathways for a resilient Gran Chaco

- **Addressing the environmental and social challenges of the Gran Chaco** requires coordinated efforts across international, regional and local regulatory and policy-making agendas, with a focus on improving land-use practices and aligning production with conservation goals.
- **Promoting institutional stability and strengthening governance:** a clear and stable regulatory framework is essential for sustainable growth in the Gran Chaco. Key actions include enforcing environmental laws to reduce deforestation, expanding technical and monitoring capacities, fostering collaboration between governments, private sector actors and local communities and scaling-up financial incentives, such as tax concessions and conservation funding, to encourage sustainable practices.
- **Advancing policies for sustainable land management:** robust policies are essential for ensuring Gran Chaco's sustainable development. Initiatives that enhance the value of standing vegetation while maintaining productivity, such as the creation of the Indigenous Autonomous Government in Charagua (Santa Cruz) and Paraguay's Voluntary Green Taxonomy provide examples of effective governance for sustainable land management.

2 Leveraging innovative financial mechanisms to incentivize sustainability

- **To unlock funding for sustainable development, innovative financial tools must be expanded** to support producers and attract investments.
- **Payment for ecosystem services (PES):** programmes such as REDD+ (Reducing Emissions from Deforestation and forest Degradation) aim to support conservation in Gran Chaco countries by compensating efforts to reduce deforestation and enhance carbon capture, while ensuring adequate financing to sustain long-term conservation strategies and expand incentives for regenerative agriculture and livestock practices.
- **Carbon markets and green bonds:** Paraguay's Green Heart of the Chaco project conserves 32,000 hectares of native forest, generating verified carbon credits and fostering economic opportunities for local communities. Meanwhile, the Chaco Vivo Project, one of Paraguay's largest REDD+ initiatives, protects 187,000 hectares of high-value conservation areas in the Gran Chaco.
- **Sustainable finance protocols:** programmes such as Paraguay's Procampo Verde demonstrate how green loans can incentivize regenerative practices, offering scalable financial solutions.
- **Multi-source financing:** green and blended finance solutions, private sector investments and international funding can support infrastructure, sustainability projects and value chain improvements.
- **By aligning financial mechanisms with conservation goals**, the region can attract private investment and international funding, transforming sustainability into a viable business model.

3 From farm to industry: harnessing private sector opportunities for sustainable development

- **Sustainable agricultural and livestock systems are critical to reducing deforestation** while maintaining productivity. Initiatives highlighted below demonstrate that economic growth and conservation can co-exist.
- **Regenerative agriculture programmes:** initiatives by The Nature Conservancy, Solidaridad, WWF Paraguay and provincial governments in the Gran Chaco focus on restoring soil health, replenishing water resources and enhancing biodiversity, ensuring long-term yields while preventing deforestation.
- **Integrated Crop-Livestock-Forestry (ICLF) management:** Argentina's ICLF system promotes sustainable livestock production, conserves forests and addresses deforestation caused by unsustainable agricultural practices, with support from government agencies, NGOs and producers.
- **Traceability systems for market access:** platforms such as Argentina's VISEC ensure deforestation-free production and compliance with international regulations, enhancing transparency, market competitiveness and supply chain accountability.

- **Value-added products:** strengthening sustainable beef and soy value chains through regenerative practices and traceability systems improves competitiveness while mitigating environmental risks, particularly for small-scale producers.

- **Ecotourism and protected productive landscapes:** connecting conservation areas via ecological corridors can establish ecotourism routes, diversifying income sources for producers and supporting biodiversity conservation.

4 Building resilient, multi-stakeholder governance to navigate political shifts and drive sustainable development

- **Ensuring continuity in sustainability efforts amid political shifts** requires coordinated governance among stakeholders, supported by diversified funding and evidence-based advocacy. This approach fosters policy consistency, attracts long-term investments and strengthens resilience against political and economic disruptions.

- **Jurisdictional approaches**: inspired by Brazil's PCI (Produce, Conserve, Include) strategy, jurisdictional frameworks can harmonize land use across regions, ensuring measurable conservation outcomes alongside economic opportunities.

- **Tri-national cooperation:** enhancing collaboration among Argentina, Bolivia and Paraguay is essential to prevent environmental impacts from shifting across borders and to develop unified strategies for land-use planning and natural resource management. Successful transnational initiatives – such as Redes Chaco and MapBiomas Chaco – provide scalable models for coordinated governance and data-driven decision-making. Building on lessons from the Pan-Amazonian experience,[3,4] establishing a unified Pan-Chaco framework is essential to respect the region's socio-environmental diversity while leveraging shared opportunities and addressing common challenges, fostering integrated and effective cross-border approaches for sustainable development.

- **Multistakeholder approaches:** these are essential for driving sustainability in agricultural production, as they bring together diverse actors across the supply chain – including producers, processors, retailers, civil society organizations and governments – to develop collective solutions. These platforms foster collaboration, enabling the alignment of global sustainability goals with regional realities. For example, initiatives like the Global Roundtable for Sustainable Beef (GRSB)[5] work across multiple countries to address environmental, social and economic challenges in beef production, promoting best practices that reduce the sector's carbon footprint, improve animal welfare and ensure the livelihoods of producers.The GRSB works with 13 national roundtables, including those in Paraguay, Bolivia and Argentina, to tailor solutions to specific regional challenges while maintaining a global vision for sustainability.

- **Evidence-based advocacy:** partnerships between academia, NGOs and producers can generate data that highlights the economic benefits of sustainable practices and the costs of inaction, driving policy alignment with global sustainability goals.

Achieving sustainable development in the Gran Chaco requires decisive and coordinated action from all stakeholders. Each group – financial sector, private sector, governments and civil society – has a critical role to play in shaping a future that balances economic growth, ecological preservation and social equity:

Financial sector:

– Investors play a pivotal role by designing green financial products to finance ecosystem restoration, deforestation-free certification and regenerative agriculture projects that deliver long-term economic and environmental returns.

Private sector:

– Producers must adopt sustainable practices, implement traceability systems to meet market demands and collaborate with academia to enhance productivity while safeguarding ecosystems.

– Corporate actors must commit to deforestation-free practices within their supply chains, support fair compensation and incentives for producers adopting conservation practices and integrate sustainability into their core business strategies.

Governments:

– Governments must prioritize the enforcement of land conservation policies, provide economic incentives for sustainable practices and invest in strengthening monitoring and compliance systems to ensure accountability.

– Governments can accelerate change by strengthening green taxonomies in collaboration with the corporate and financial sectors to clearly define sustainable economic activities and mandate environmental risk assessments within lending practices to encourage sustainable production.

Civil society:

– NGOs and local communities are essential to implementing conservation initiatives, promoting sustainable livelihoods and securing philanthropic and technical support to empower local action.

– Researchers provide critical data-driven insights and adapt technologies to address the biome's unique challenges, aligning policies and production practices with conservation goals.

Transforming the Gran Chaco requires a unified coalition of these stakeholders. By pooling financial resources, technical expertise and innovation, collective action can unlock the Gran Chaco's full potential, creating a thriving, resilient biome that contributes to global food security, climate stability and biodiversity conservation while driving economic growth for its people and nations.

This white paper highlights the critical importance of the Gran Chaco and outlines proven pathways for sustainable development, presenting a clear vision for balancing production and protection within the region.

1 The Gran Chaco: a South American giant at a crossroads

The biome's environmental and cultural richness is at risk from unsustainable land use, limited international visibility, local misinformation and climate vulnerability.

The Gran Chaco is South America's second-largest forest ecoregion, spanning approximately 1.1 million km², an area larger than Spain and Germany combined or roughly equal to the size of Bolivia. It is distributed across Argentina (62.2%), Paraguay (25.4%), Bolivia[6] (11.6%) and Brazil (0.8%).

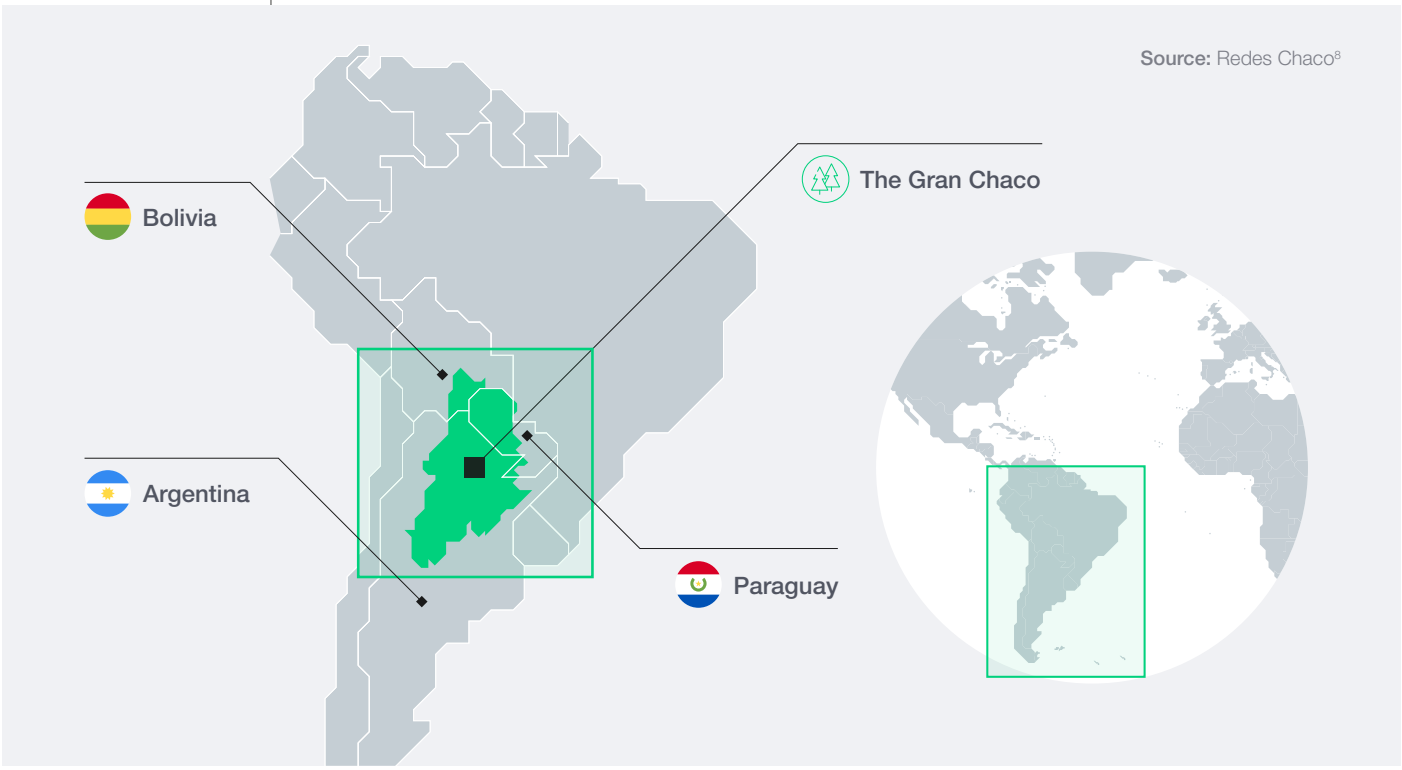
Table 1 shows the administrative divisions of the Gran Chaco. Map 1 shows the Gran Chaco's location in South America and Map 2 highlights the biome's political boundaries across the three principal countries it falls within.

TABLE 1 **Administrative jurisdictions of the Gran Chaco**

Country	Fully included	Partially included
Argentina	Chaco, Formosa and Santiago del Estero	Salta, Córdoba, Corrientes, Catamarca, Jujuy, La Rioja, San Juan, San Luis, Santa Fe and Tucumán
Bolivia	–	Chuquisaca, Santa Cruz de la Sierra and Tarija
Paraguay	Boquerón, Alto Paraguay and Presidente Hayes	–

Note: In Argentina, the report focuses on data from the provinces of Chaco, Formosa, Salta and Santiago del Estero, as they encompass 85% of Argentina's Gran Chaco region and account for 80% of the country's deforestation[7] – a critical challenge within the biome that underscores the need for action through the pathways proposed in this report.

MAP 1 | **Location of the Gran Chaco in South America**



Source: Redes Chaco[8]

MAP 2 | **Political organization of the Gran Chaco**

Source: Maldonado, P., Hohne, E. & Naumann, M. (2006).[9]

BOX 1 | **Key statistics for principal countries in the Gran Chaco**

Argentina

→ Political system	Federal republic and representative democracy
→ Total population	45.6 million
→ World Bank income level	Upper-middle income (UMC)
→ GDP (current $)	$640.6 billion
→ GDP per capita (current $)	$13,730
→ Land area	2,780,400 km²
→ Total forest area (% land area)	10.4%
→ Land area in the Gran Chaco	621,900 km²
→ CO_2 emissions per capita (2020)	3.54 tonnes per person

Bolivia

→ Political system	Unitary, decentralized republic and representative democracy
→ Total population	12.4 million
→ World Bank income level	Lower-middle income (LMC)
→ GDP (current $)	$45.8 billion
→ GDP per capita (current $)	$3,701
→ Land area	1,099,000 km²
→ Total forest area (% land area)	46.7%
→ Land area in the Gran Chaco	116,100 km²
→ CO_2 emissions per capita (2020)	1.83 tonnes per person

Paraguay

→ Political system	Unitary republic and representative democracy
→ Total population	6.9 million
→ World Bank income level	Upper-middle income (UMC)
→ GDP (current $)	$42.9 billion
→ GDP per capita (current $)	$6,260
→ Land area	406,752 km²
→ Total forest area (% land area)	39.8%
→ Land area in the Gran Chaco	254,300 km²
→ CO_2 emissions per capita (2020)	1.84 tonnes per person

Source: World Bank (2023).

The Gran Chaco's ecological diversity is reflected in its **four main zones** (see Map 3), each with distinct climatic and biological characteristics:

1

Humid and sub-humid Chaco

Located in the east, this zone receives 750-1,300 mm of annual precipitation. This subregion harbours greater biological diversity, with a mosaic of forests, savannas and wetland areas. It includes parts of Argentina, Bolivia and Paraguay.

2

Semi-arid Chaco

This zone encompasses the west of Paraguay and much of Argentina and Bolivia, with annual precipitation ranging from 500-700 mm. It is characterized by forests adapted to drought and extreme temperatures.

3

Arid Chaco

This area, in the south-west, is the driest, with annual precipitation ranging from 300-500 mm. It features xerophytic forests and harsh conditions for vegetation. It includes parts of Argentina.

4

Serrano Chaco

Extending over the sub-Andean and Pampas hills, this zone has a more humid climate with annual precipitation between 450 and 900 mm. It is home to subtropical species and high-altitude grasslands.[10] It includes parts of Argentina and Bolivia.

MAP 3 **Ecozones in the Gran Chaco**

Source: Maldonado, P., Hohne, E. & Naumann, M. (2006).[11]

BOX 2 | Diversity within the Gran Chaco: climate, ecology and agricultural potential

The Gran Chaco's diverse climate and geography shape its land use and development patterns, influencing both opportunities and challenges. Despite shared environmental and economic pressures, its internal diversity demands tailored strategies.

The region is mostly flat (100-500 metres altitude) and subtropical, with temperatures ranging from 16°C to 29°C. Its most defining factor is precipitation, which follows an east-west gradient, dividing the Chaco into two major ecoregions:

- **Humid Chaco** (including sub-humid and Serrano Chaco): receives 900-1,200 mm of annual rainfall, supporting wetlands, floodplains and grasslands. Higher soil moisture allows for intensive agriculture and cattle ranching, particularly in Paraguay and north-east Argentina. However, agricultural expansion has also driven deforestation and habitat loss.
- **Dry Chaco** (semi-arid and arid Chaco): receives 450-900 mm of annual rainfall, creating a semi-arid landscape dominated by thorny forests and shrubs. Agriculture is more challenging due to limited water availability, with livestock grazing as the predominant activity. While Mennonite agro-industrial hubs have developed, much of the Dry Chaco still faces infrastructure gaps, unreliable water supply and lower soil fertility, requiring adapted farming techniques.[12,13]

A comprehensive, cross-border strategy is needed to balance growth and conservation. Strengthening sustainable cattle ranching, regenerative agriculture and conservation finance can boost productivity without driving further deforestation. At the same time, investments in infrastructure, water management and climate resilience will be crucial to unlocking the Chaco's full agricultural potential while preserving its ecosystems and cultural heritage.

The Gran Chaco lost over 13 million hectares of forest between 2001 and 2023 – an area equivalent to more than 18 million football fields.

Beyond its environmental richness, historically, the Gran Chaco has held deep cultural significance for over 27 Indigenous Peoples, including the Wichí, Toba Qom and Guarani, whose deep connection to the land has endured for centuries. This legacy of resilience and adaptation has shaped Indigenous culture and resource management in the region, underscoring the vital role of these communities in conservation and sustainability.[14]

While small-scale agricultural and livestock practices by Indigenous and peasant communities have traditionally upheld ecosystem sustainability, recent decades have brought significant shifts. The late 20th and early 21st centuries witnessed the rapid expansion of commercial crops, such as soybeans and extensive livestock farming[15,16] across the Gran Chaco. Although this agricultural modernization has generated significant economic benefits for regional economies and nation states, it has also exacerbated deforestation, land conversion,[17] environmental degradation and pressures over local communities.

BOX 3 | Deforestation trends and impacts on the Gran Chaco biome

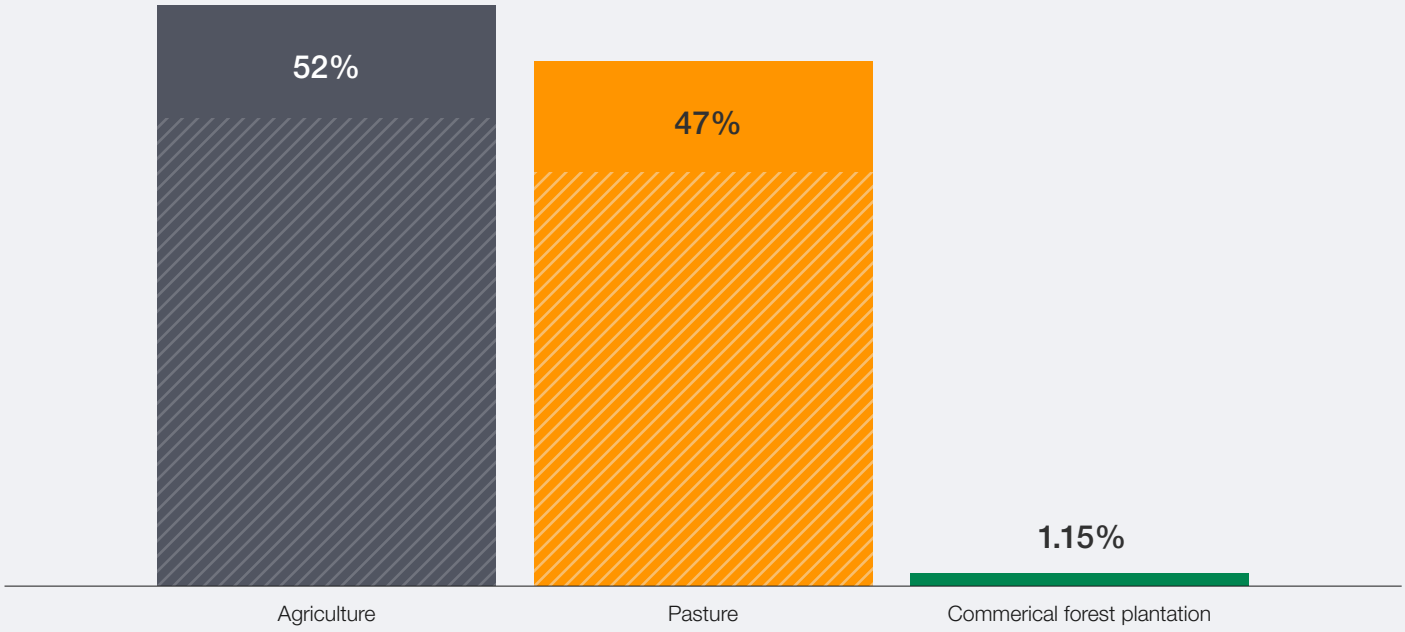
The Gran Chaco is facing significant environmental challenges as deforestation and land conversion accelerate, driven largely by the expansion of unsustainable agricultural production. This underscores the urgent need to balance economic growth with environmental stewardship and to reinforce the region's social resilience.

According to analysis by REVER, based on data from Global Forest Watch, the Gran Chaco lost over 13 million hectares of forest between 2001 and 2023 – an area equivalent to more than 18 million football fields. These deforestation trends, further analysed in Chapter 3, highlight the scale and urgency of the challenges threatening the integrity of this critical biome.

A sustainable development model is essential – one that integrates production with conservation and social equity to ensure that economic progress does not compromise the biome's natural resilience, biodiversity or the livelihoods of its communities.

Agriculture and livestock expanding into deforested areas have remained the dominant economic activities in the Gran Chaco, with significant growth over the past decades. According to data from MapBiomas Chaco, agricultural land cover increased by 110% from 10 million hectares in 2001 to around 21 million hectares by 2023. Figure 1 illustrates the distribution of agricultural lands within the biome in 2023, with crops (primarily soybeans, corn and cotton) accounting for 52% of the total agricultural area, while pasture comprises the remaining 47%.

FIGURE 1 **Distribution of agricultural lands in Gran Chaco, 2023**



Source: MapBiomas.[18]

The expansion of the agricultural frontier in the Argentinian, Bolivian and Paraguayan Gran Chaco is driven by global demand for grains and beef, combined with the availability of relatively affordable lands with high production potential. While this trend bolsters global supply chains, it also presents a significant opportunity to stimulate local economic development. With the adoption of sustainable development practices, minimization of deforestation and prioritization of environmental conservation, the Gran Chaco has the potential to become a vital supplier of grains, beef and other products for both local and regional markets.

This potential must be considered in the broader context of regional agricultural trends, including Brazil's efforts to address the critical challenges faced by the Cerrado biome. While the Cerrado continues to grapple with significant issues such as deforestation and land conversion, it has seen the introduction of promising initiatives supported by multiple stakeholders and public-private partnerships. These efforts aim to balance agricultural productivity with environmental protection, offering valuable examples that could inform and inspire sustainable development approaches in the Gran Chaco.

BOX 4 **Climate change and environmental degradation in the Gran Chaco**

In addition to unsustainable agricultural expansion – the primary driver of deforestation and land conversion – the Gran Chaco is increasingly affected by climate change.

Prolonged droughts, extreme heat waves, floods and wildfires have accelerated the degradation of ecosystem services across the region.[19] These climate impacts are exacerbated by the region's ongoing environmental degradation, creating a feedback loop: degradation heightens the biome's vulnerability, increasing the frequency and severity of these phenomena, which in turn further degrade the environment. Additionally, these extreme events disrupt water availability and access, affecting both human consumption and agricultural production.[20]

This cycle is compounded by forest loss and resulting carbon emissions. As forested areas shrink, their capacity for carbon sequestration diminishes, while rising emissions drive global warming, amplifying climate change effects.

Considering these dynamics, a sustainable development framework for the Gran Chaco must address four core challenges:

1. **Limited international visibility:** The Gran Chaco faces significant challenges due to limited visibility in conservation and sustainable land-use efforts, which hampers the attention and funding required to implement effective policies across all levels. Internationally, this lack of visibility reduces engagement from demand-driven markets and global cooperation, with fewer efforts and resources allocated to the Gran Chaco compared to other biomes in the region. Regionally, it obscures the interconnected risks across biomes, potentially shifting deforestation pressures to less-regulated areas.

2. **Local misinformation:** At the local level, misinformation about the causes of and solutions to climate change and environmental impacts diminishes efforts, hindering the implementation of effective and sustainable measures to address the challenges facing the biome.

3. **Climate vulnerability:** Climate change and human activities intensify threats to the Gran Chaco, resulting in heat spikes, prolonged droughts and wildfires that degrade ecosystems, reduce agricultural productivity, threaten biodiversity in the biome and endanger local communities.

4. **Institutional instability:** Institutional fragility and a lack of resources hinder the effective enforcement of environmental regulations. Frequent institutional changes erode confidence in the political system, leaving the region vulnerable to unsustainable practices and hindering progress toward sustainable development.

Addressing these core challenges is key to establishing a framework that fosters the resilience of the Gran Chaco, creates enabling conditions to tackle unsustainable agriculture and land-use change, balances economic development with conservation and empowers local communities in the region.

Throughout the following chapters, this white paper will explore the Gran Chaco's regional and global economic significance, examine the environmental and social challenges within the biome, highlight opportunities for various stakeholders to drive its sustainable development and conclude with a call to action outlining the critical roles each stakeholder should play in this transition.

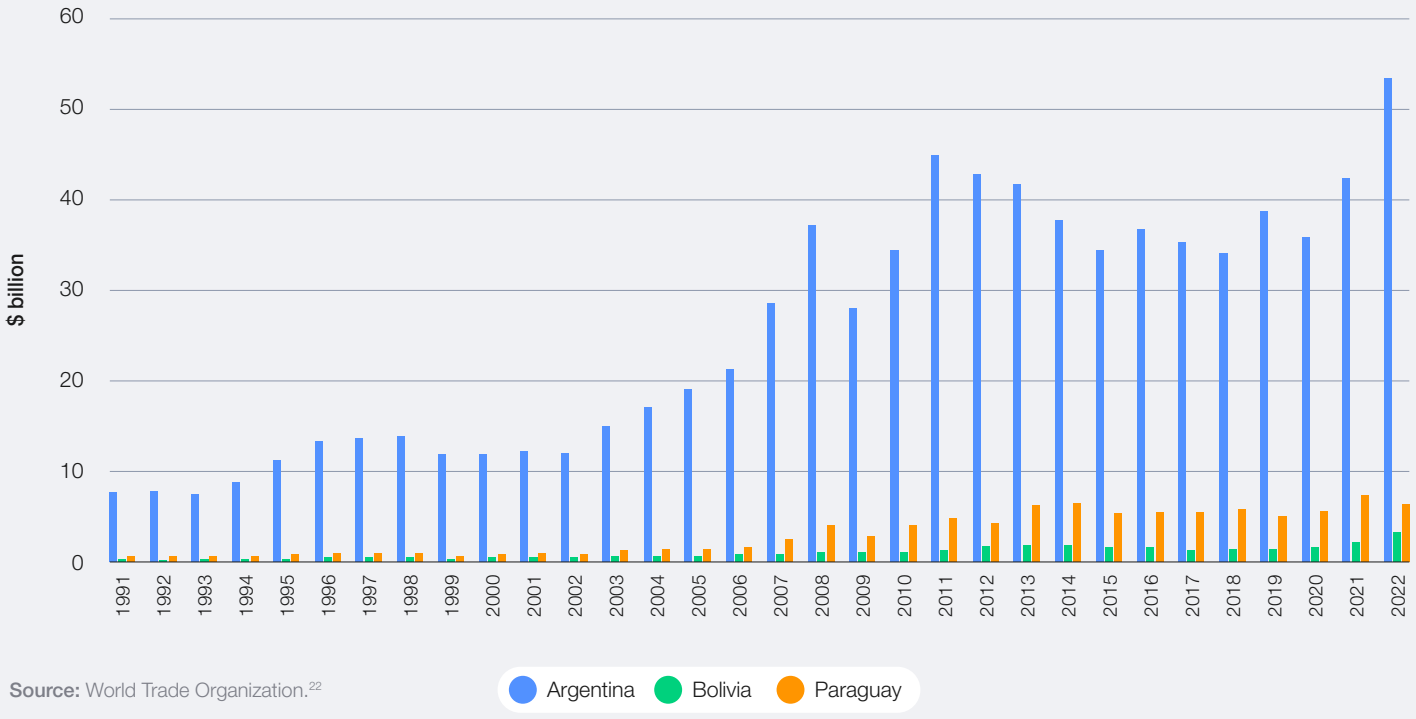
2 From local farms to global markets: the Chaco's role in food supply chains

Agriculture in the Gran Chaco is shaped by Argentina, with 5.6 million hectares of crop production, and Paraguay, which plays a key role in livestock production and beef exports.

What happens in Latin America and Caribbean (LAC) agriculture and food systems is crucial not only for the region's economies but also globally, as LAC is the world's largest net food-exporting region, helping to stabilize food supplies and reduce food price volatility worldwide.[21]

Within Latin America, Argentina, Bolivia and Paraguay play a key role in contributing to global food security, due to their significance in agricultural and livestock production and exports. Argentina is the third largest soybean producer globally, accounting for 12% of global production, while Paraguay ranks sixth with 3% and Bolivia 10th with 1%, according to the US Department of Agriculture (USDA). In terms of beef production, Argentina is the sixth largest producer, representing 5.5% of global supply, followed by Paraguay in 16th place with 0.9% and Bolivia, which ranks 22nd, representing approximately 0.4% of global production. Figure 2 shows the evolution of agriculture exports from Argentina, Bolivia and Paraguay between 1991 and 2021.

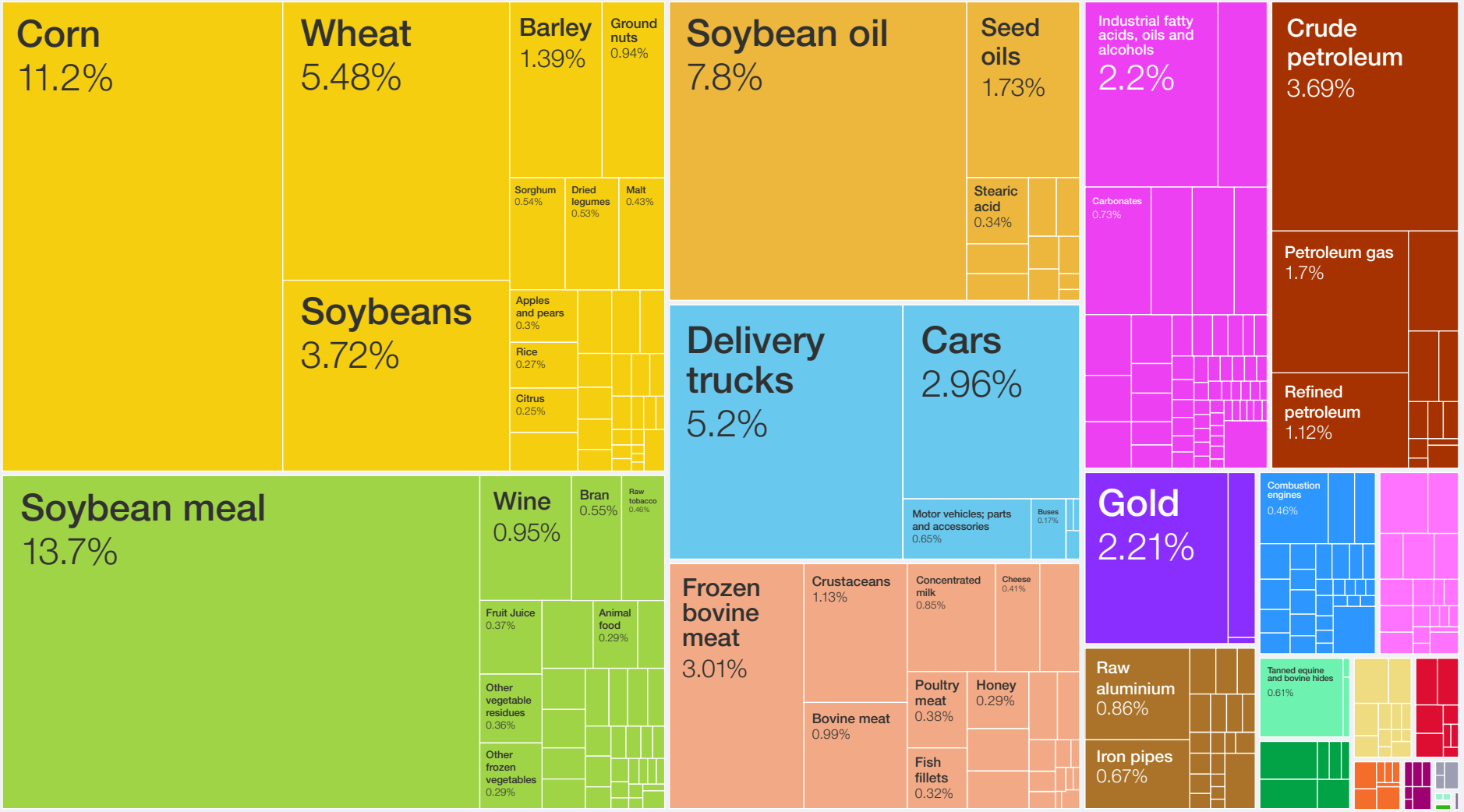
FIGURE 2 **Evolution of agriculture exports from Argentina, Bolivia and Paraguay, 1991-2022** ($ billion)



Source: World Trade Organization.[22]

The data from Figure 2 indicates a significant increase in agricultural exports across all countries, with Argentina leading the three Chaco countries in exports during this period. The following three figures sourced from the Observatory of Economic Complexity (OEC)[23] provide insights into the range of products exported by each country, with a focus on agricultural and beef exports.[24]

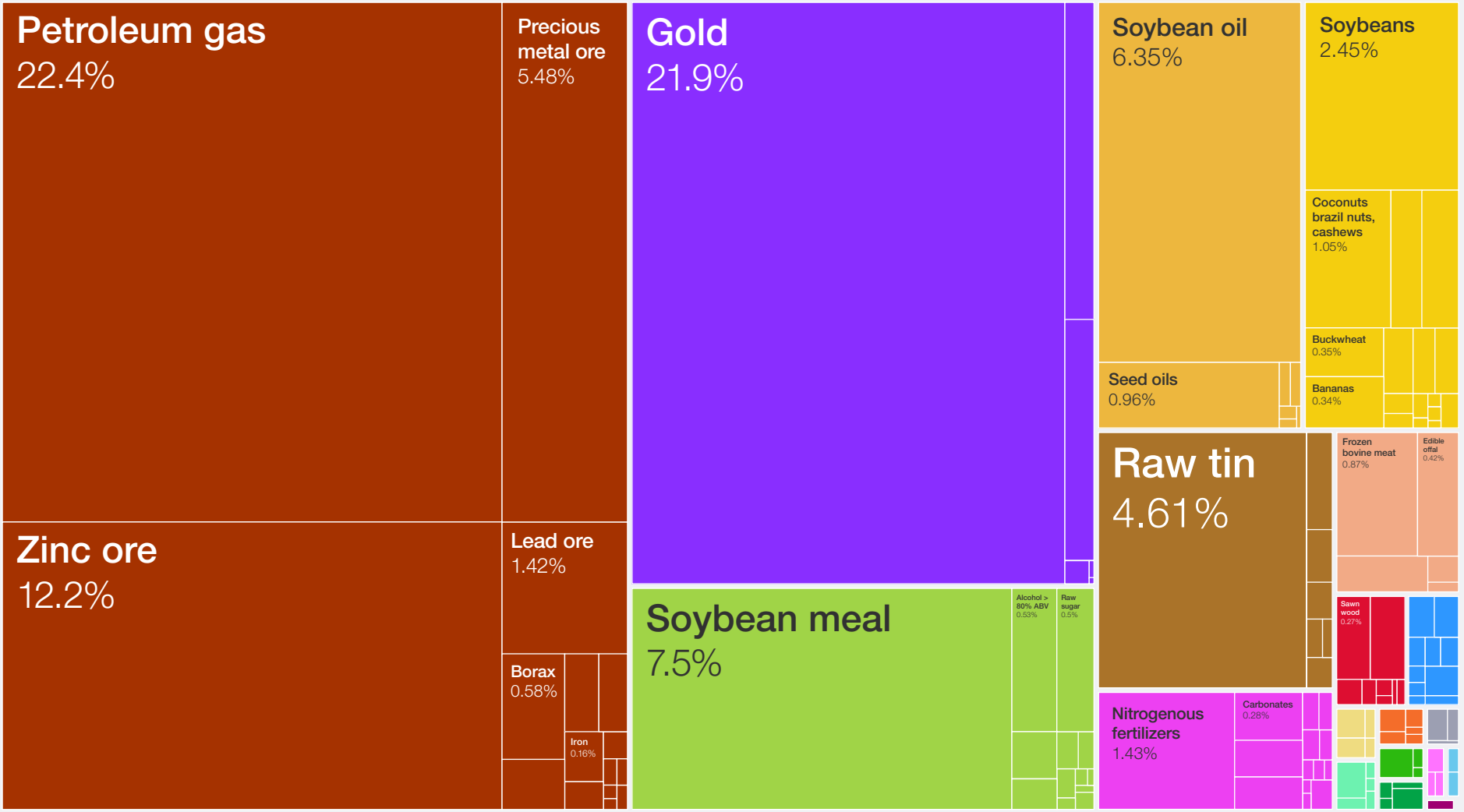
Argentina exports – total value: $87.2 billion



Source: Observatory of Economic Complexity (OEC).

FIGURE 4 | **Products exported by Bolivia, 2022**

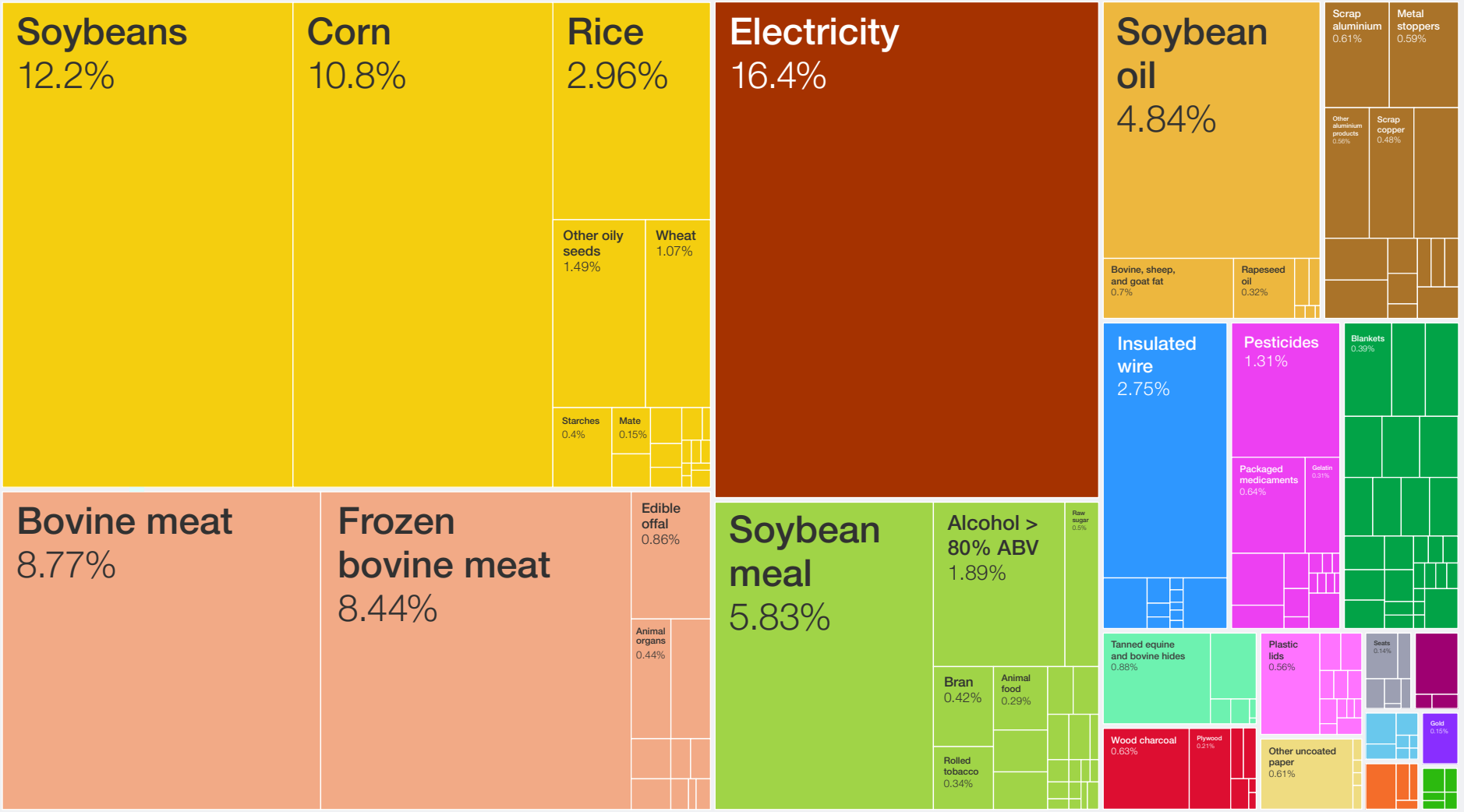
Bolivia exports – total value: $13.8 billion



Source: Observatory of Economic Complexity (OEC).

FIGURE 5 | **Products exported by Paraguay, 2022**

Paraguay exports – total value: $10.1 billion



Source: Observatory of Economic Complexity (OEC).

Most of the soybean exports from Argentina, Bolivia and Paraguay head to the EU, China and South-East Asia, as well as to countries within the region. Most beef exports head to China, Chile, the EU, Russia and Israel. Notably, intra-regional trade plays a significant role in the region. For example, Bolivia and Paraguay export soy to Argentina and Brazil, even though both are major soy producers. This dynamic can be attributed to the greater industrial capacity of Brazil and Argentina and their ability to export higher-value processed goods.

Soy and beef are the largest agricultural commodities produced and exported in South America and production of both commodities has expanded recently within the Gran Chaco. Table 2 illustrates the main export destinations and values (in $) for beef products, while Table 3 presents the main export destinations and values (in $) for soybeans and their by-products from Gran Chaco countries in 2022.

TABLE 2 **Beef export data for Argentina, Bolivia and Paraguay, 2022**

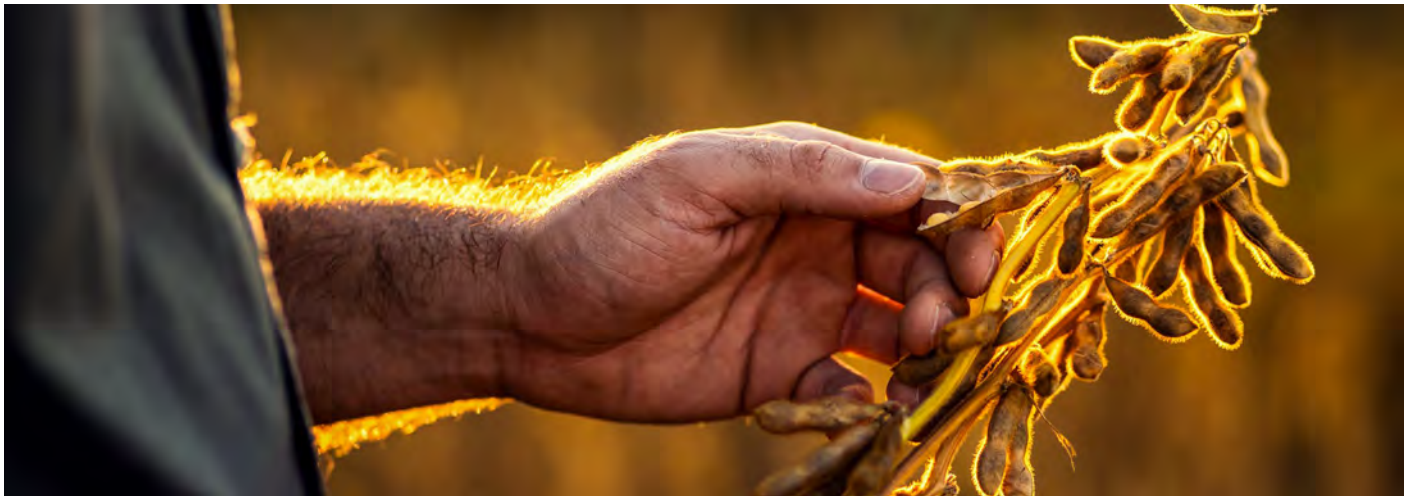
Country	**Beef –** main destinations	**Beef –** export value ($)
Argentina	China	2.28 billion
	EU	530 million
	Israel	235 million
Bolivia	China	104 million
Paraguay	Chile	723 million
	Russia	262 million

Source: Observatory of Economic Complexity (OEC).

TABLE 3 **Soy export data for Argentina, Bolivia and Paraguay, 2022**

Country	**Soybean** – main destinations	**Soybean** – export value ($)	**Soybean meal** – main destinations	**Soybean meal** – export value ($)	**Soybean oil** – main destinations	**Soybean oil** – export value ($)
Argentina	China	2.98 billion	Vietnam	1.53 billion	India	3.1 billion
	United States	42.2 million	EU	1.4 billion	Bangladesh	513 million
	Indonesia	37.2 million	Indonesia	1.3 billion	Peru	404 million
Bolivia	Argentina	250 million	Colombia	554 million	Colombia	343 million
	Peru	53 million	Peru	307 million	Ecuador	290 million
	Colombia	21 million	Chile	98 million	Peru	180 million
Paraguay	Argentina	938 million	EU	242 million	Argentina	142 million
	Brazil	181 million	Argentina	85 million	India	141 million
	Russia	46 million	Peru	37 million	Pakistan	54 million

Source: Observatory of Economic Complexity (OEC).



BOX 5 | Exports to EU countries raising bar for sustainability commitments

Data analysis highlights the European Union (EU) as an important export market, particularly for Argentina and Paraguay in the soybean sector. In Argentina, the EU is one of the largest buyers of soybean meal, with soybean meal exports valued at $1.4 billion, underscoring the bloc's strategic importance. For Paraguay, while the EU plays a smaller role, it remains a significant destination, accounting for $242 million in soybean meal exports.

In the beef sector, the EU's involvement is more modest, buying $530 million of Argentina's exports. However, given the higher prices the EU pays for beef, it remains an important export market. Meanwhile, China continues to dominate as the primary destination for beef exports from Argentina and Bolivia.

Beyond its role as a key trading partner, the EU is a global trendsetter in sustainable trade practices. The European Union Deforestation Regulation (EUDR) – explored in later chapters – exemplifies this influence by setting high standards for traceability and zero-deforestation commodities. This regulation amplifies pressure on global supply chains to meet stricter environmental standards and highlights the urgency for producers to align with its requirements.

67%

of Paraguay's beef exports originated from the Gran Chaco in 2019, with 24% headed to Russia and 21% to Chile.

Soy exports originating specifically from the Gran Chaco are relatively low. According to Trase data, in 2019, Argentina exported only 2.8% of its total soy production from the Gran Chaco, with the main destinations being China (21%) and Vietnam (10%). In the same year, Bolivia exported 2.5% of its total soy production from the region, primarily to Colombia (47%) and Chile (10%). Paraguay exported just 1.7% of its total soy production from the Gran Chaco, mainly destined for Chile (13%) and India (9%).[25]

This limited export share is likely due to insufficient processing infrastructure in the provinces and departments within the Gran Chaco. As a result, soybeans produced in the region are often processed in other areas. For example, the Argentinian province of Santiago del Estero has limited soybean milling capacity, so most of its production is processed outside its territory. The Port of Rosario serves as the primary export hub for the province's grain production, facilitating the flow of soy to international markets.[26]

BOX 6 | Dynamics of livestock production and beef exports from the Gran Chaco region

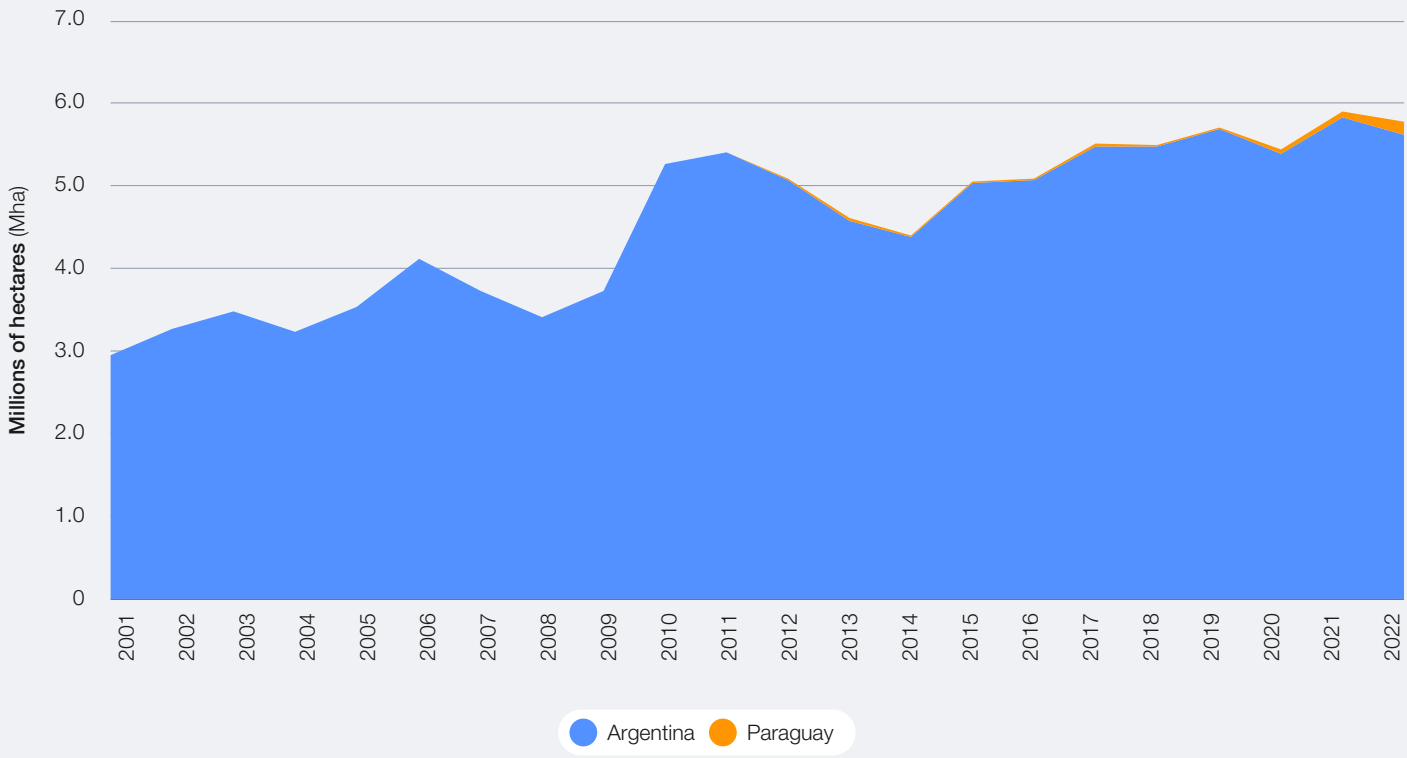
While specific data on beef exports from the region is unavailable for all three countries, some export destinations include nations with a growing demand for beef and soy, such as China and India. This demand, driven by projected economic growth, could intensify pressure to expand production into new areas within the biome.

Paraguay stands out as a unique case. Based on data from Trase, in 2019, 67.4% of the country's beef exports originated from the Gran Chaco. The primary destinations for these exports coming from the Gran Chaco were Russia (24%) and Chile (21%), highlighting the biome's strategic importance to Paraguay's beef industry.

In contrast, Argentina's beef production is largely focused on domestic consumption. However, the Gran Chaco has gained increasing relevance over the past 30 years, hosting 33% of the national cattle stock, primarily distributed across the provinces of Chaco, Salta, Formosa and Santiago del Estero. The region is central to calf breeding and marketing, which represent the first stage of the livestock production cycle before cattle are transferred to provinces with better forage availability. In 2022, over 5 million calves from the Gran Chaco were marketed to provinces such as Buenos Aires, Córdoba, Santa Fe and Entre Ríos.

Agriculture in Gran Chaco plays a vital economic role, as reflected in the expansion of cultivated land and livestock numbers across the biome. Between 2001 and 2022, crops such as soybeans, corn, wheat, sorghum and beans saw substantial growth, though with variation among countries (see Figure 6). Argentina leads agricultural activity in the Gran Chaco, followed by Bolivia, while Paraguay's Chaco region has minimal crop cultivation – 97% of Paraguay's agricultural production occurs in the eastern region outside the biome. Figure 7 shows the evolution of cultivated areas for soybeans between 2001 and 2022 in the Gran Chaco.

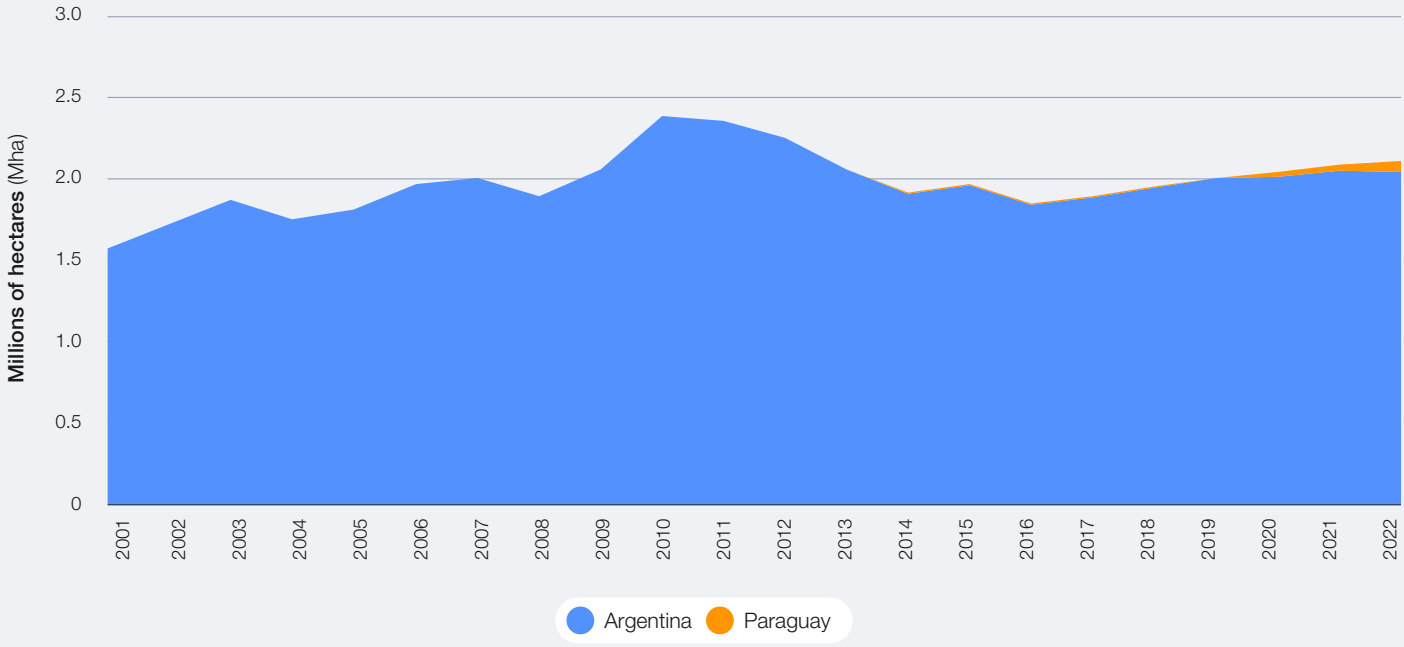
FIGURE 6 **Evolution of cultivated agricultural area in the Gran Chaco, 2001-2022** (Mha)



Sources: Analysis based on data from Secretaría de Agricultura, Ganadería y Pesca de Argentina and Instituto Nacional de Estadísticas de Paraguay.

Note: Disaggregated data by cities or provinces within the Gran Chaco biome in Bolivia was not found. Therefore, Bolivia was excluded to avoid potential misinterpretation of biome-specific data. Among relevant crops in Gran Chaco, soybeans are crucial.

FIGURE 7 | **Evolution of cultivated agricultural area for soybeans in the Gran Chaco, 2001-2022** (Mha)



Sources: Analysis based on data from Secretaría de Agricultura, Ganadería y Pesca de Argentina and Instituto Nacional de Estadísticas de Paraguay.

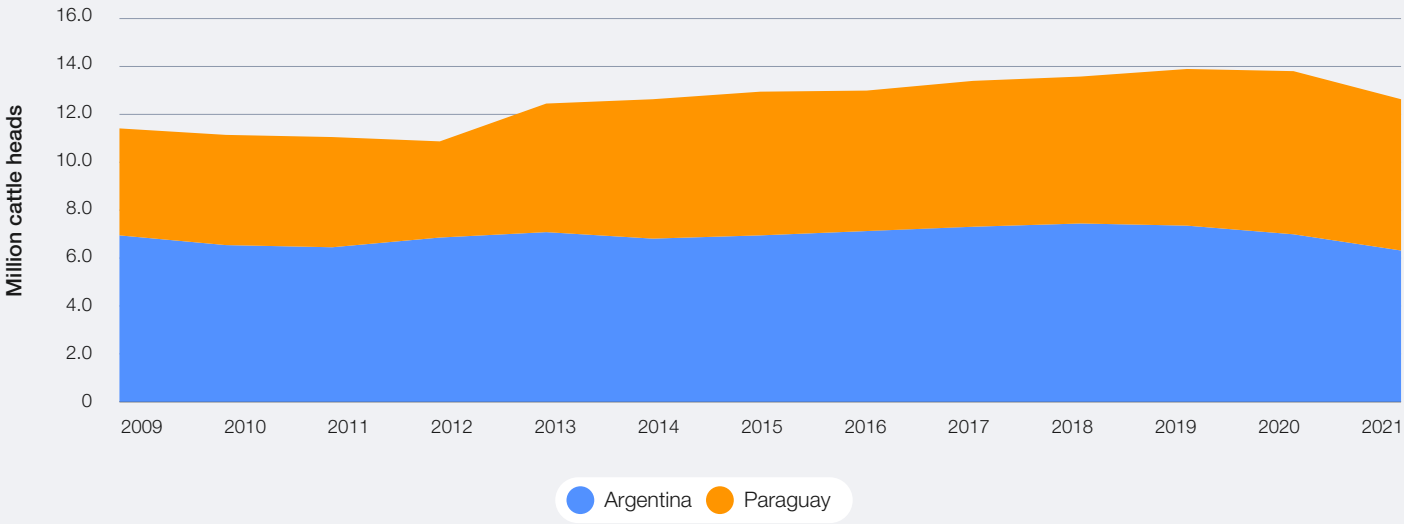
Note: Disaggregated data by cities or provinces within the Gran Chaco biome in Bolivia was not found. Therefore, Bolivia was excluded to avoid potential misinterpretation of biome-specific data.

“ Paraguay expanded its soybean cultivated area 16-fold, from 4,000 hectares in 2012 to 64,000 hectares in 2022.

The evolution of soybean cultivation in the Gran Chaco varies significantly across Argentina and Paraguay. Argentina leads the region, with a steady increase in production area of 30% from 1,584,000 hectares in 2001 to 2,058,000 hectares in 2022. Meanwhile, Paraguay expanded its soybean cultivated area 16-fold, from 4,000 hectares in 2012 to 64,000 hectares in 2022 – although given its smaller land area within the Gran Chaco, it contributes less to overall soybean production. These trends underscore Argentina’s dominance in soybean production in the Gran Chaco while highlighting the growth potential of Paraguay in this sector.

Alongside soybeans, livestock production has also shown notable growth over the years, particularly in Paraguay’s Chaco (see Figure 8).

FIGURE 8 | **Evolution of livestock production in the Gran Chaco, 2009-2021** (million cattle heads)



Sources: Analysis based on data from Argentina’s National Food Safety and Quality Service (SENASA) and Paraguay’s National Animal Health and Quality Service (SENACSA). **Note:** Disaggregated data by cities or provinces within the Gran Chaco biome in Bolivia was not found. Therefore, Bolivia was excluded to avoid potential misinterpretation of biome-specific data.

Similarly to soybean dynamics, livestock production in the Gran Chaco exhibits distinct trends across the region. Paraguay, in particular, stands out in this sector, having experienced significant fluctuations in livestock numbers over the past years. Between 2009 and 2011, the herd size averaged 4.5 million heads before dropping to just under 4 million. By 2020, the numbers had rebounded to a peak of more than 6.7 million, highlighting a period of substantial growth in recent years, especially when compared to Argentina's more stable trend.

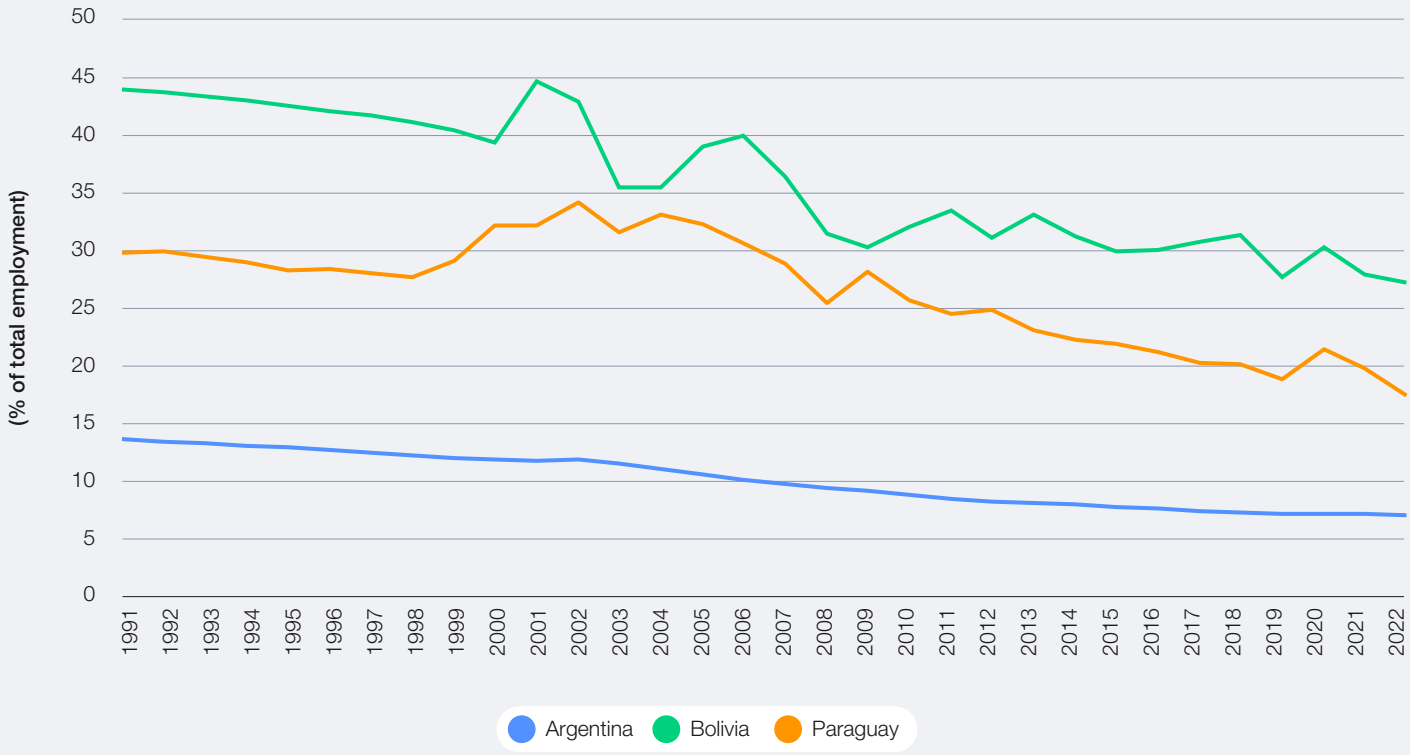
BOX 7 **The soy boom and livestock displacement in the Argentinian Gran Chaco**

The expansion of intensive agriculture in Argentina, driven by rising international demand for soybeans since the 2000s, has reshaped the country's agricultural landscape. The introduction of new technologies enabling land-use change has allowed formerly mixed-use areas in the Pampas region, where agriculture and livestock rotated seasonally, to transition into permanent cropland.

This shift displaced cattle ranching to more marginal areas. Between 1980 and 2020, more than 8.6 million heads of cattle were relocated from traditional livestock zones in the Pampas to the Gran Chaco or to more intensive production systems, such as feedlots.[27]

GDP data further underscores the importance of agriculture, livestock and also forestry to the economies of the Gran Chaco countries. According to World Bank data,[28] these sectors make notable contributions to each country's GDP: 12.53% in Bolivia, 11.34% in Paraguay and 6.06% in Argentina. These figures highlight the role of the food production and forestry sectors not only as economic drivers but also as essential sources of employment and livelihoods for millions of people in these nations, as illustrated in Figure 9.

FIGURE 9 **Agriculture employment in Argentina, Bolivia and Paraguay, 1991-2022**
(% of total employment)



Source: Analysis based on data from the World Bank.

The data in Figure 9 indicates that, although employment in the agricultural sector has decreased over the past 30 years, its contribution to total employment remains significant in all countries of the Gran Chaco. In 2022, this sector accounted for 27% of total employment in Bolivia, 17% in Paraguay and slightly more than 7% in Argentina.

BOX 8 | Unlocking the Gran Chaco's potential for global sustainable food production

Agricultural production, particularly in soy and beef, has seen significant expansion in the Gran Chaco in recent years. However, despite this growth, the region's contribution to the export markets of Argentina, Bolivia and Paraguay remains limited, apart from beef production in Paraguay.

This increase in production has led to a rise in deforestation, which adversely affects local communities, biodiversity and the long-term sustainability of the region. At the same time, the Gran Chaco presents a unique opportunity to balance economic development with environmental stewardship, particularly amid rising global demand for agricultural and livestock products. While shared challenges persist – such as water availability, road infrastructure and logistical bottlenecks, especially in Paraguay – they also reveal opportunities for strategic investment and cross-border collaboration.

Given the biome's vast diversity, a regional approach that respects the distinct production characteristics and needs of each area, while promoting sustainable intensification, improving supply chain efficiency and implementing coordinated land-use planning, can drive productivity gains while minimizing environmental impact beyond jurisdictional boundaries.

3 Unsustainable practices weaken Gran Chaco's ecosystem and productivity

The expansion of unsustainable agriculture across the Gran Chaco is impacting traditional livelihoods, challenging the biome's critical ecosystem services and influencing its long-term productive capacity.

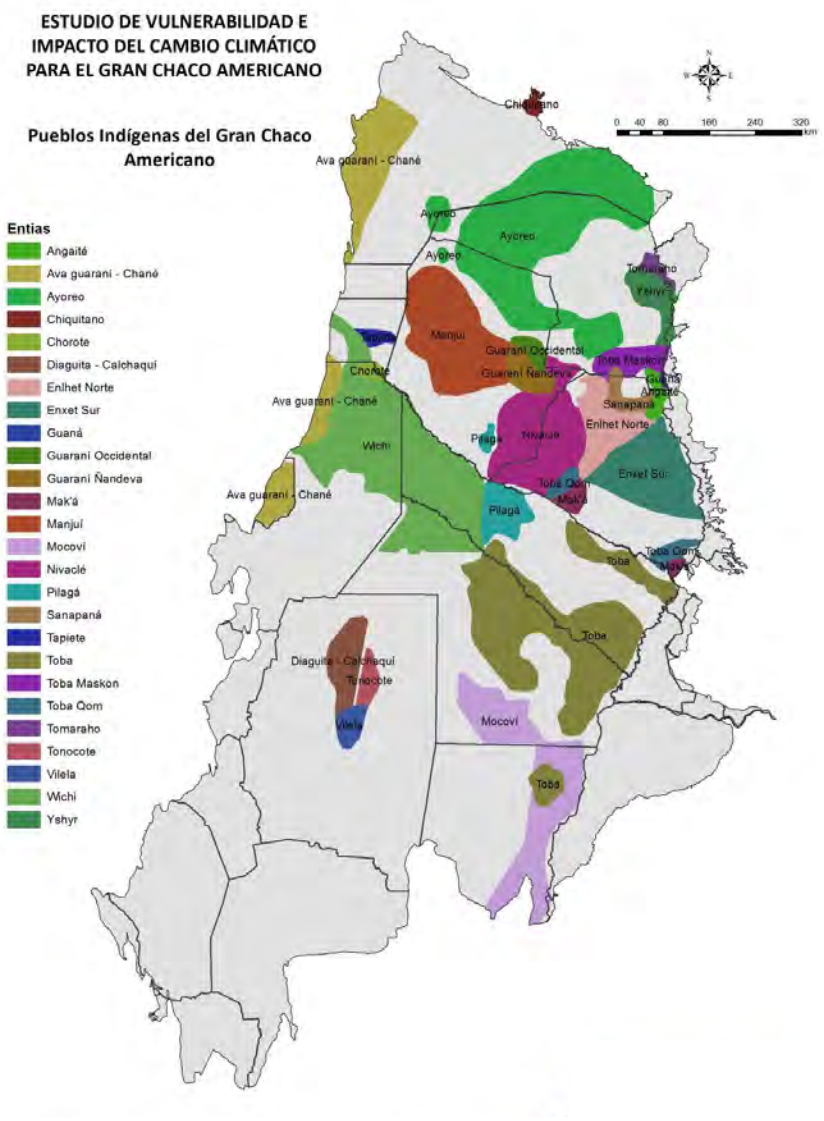
3.1 Historical significance, cultural and demographic diversity

> Today, the Gran Chaco is home to over 5.6 million Indigenous People from 27 distinct groups.

The Gran Chaco is home to a diverse population shaped by its environmental conditions and historical settlement processes,[29] heavily influenced by water availability and climate. Human presence in the region dates back roughly 7,000 years, when Indigenous Peoples developed a culture based on hunting, fishing, gathering and, to a lesser extent, agriculture. For traditional peoples such as the Qom and Guaraní, the territory holds profound cultural and religious significance, serving as a sacred space connected to their beliefs, knowledge and spiritual practices.[30]

Today, the Gran Chaco is home to over 9 million people,[31] including 5.6 million Indigenous People from 27 distinct groups, with settlement patterns and cultural landscapes varying across the biome, as shown in Map 4. Bolivia has the largest such demographic, with 41% of its population identifying as Indigenous, while Argentina and Paraguay report lower proportions, around 3%. These figures reflect historical processes such as colonization and assimilation, which shaped demographic distributions across the region.[32] Within the Gran Chaco, Paraguay stands out for its significant Indigenous presence, with Indigenous Peoples comprising 46% of the total population of 100,000 in the region. The majority reside in the departments of Alto Paraguay, Boquerón and Presidente Hayes, highlighting the biome's importance as both a cultural and demographic hub in this country.[33,34,35]

MAP 4 **Indigenous Peoples in Gran Chaco**



Source: Equipo Nacional de Pastoral Aborigen (ENDEPA), Argentina, 2011.[36]

BOX 9 **The role of Mennonite cooperatives in the Paraguayan Chaco**

The Mennonite communities of the Paraguayan Chaco have played a pivotal role in shaping the region's economic and agricultural landscape. Settling in the area in the early 20th century, these communities established cooperatives that have since become leaders in livestock production. Their influence extends beyond ranching, as they have also contributed to the development of agro-industrial chains, including the installation of meat processing plants to facilitate beef exports.[37]

The departments of Boquerón and Presidente Hayes, where Mennonite cooperatives are concentrated, have seen significant growth in cattle production over the past decade and a half. Between 2010 and 2020, the cattle population in Boquerón more than doubled, rising from 1.14 million to 2.39 million heads, while in Presidente Hayes, the herd expanded from 2.39 million to 2.46 million heads, driven mainly by technological advancements, improved logistics and the participation of international capital.[38]

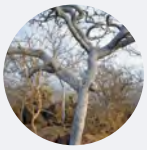
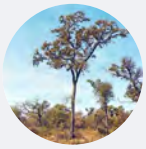
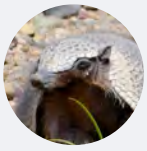
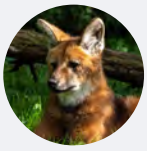
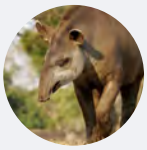
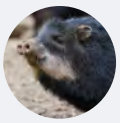
Beyond their technical contributions to agriculture and livestock, Mennonite cooperatives have played a key role in strengthening and integrating local Paraguayan ranchers.[39] Their organizational model and economic influence have helped develop rural infrastructure, improve logistics and facilitate access to markets, positioning the Chaco as a strategic region for Paraguay's growing beef sector.

Nevertheless, there is still room to enhance productivity and sustainability in the Paraguayan Chaco. Expanding efficiency in cattle production through pasture management, soil conservation and water optimization can boost yields without further land conversion. At the same time, advancing regenerative agriculture and sustainable grazing practices led by Mennonite cooperatives can reinforce environmental balance while maintaining economic growth. Despite social and environmental challenges, strengthening dialogue, innovation and governance can further support the region's continued development as a productive and sustainable agricultural hub.

3.2 Biodiversity and environmental services

The Gran Chaco supports rich biodiversity, high concentrations of wildlife and invaluable environmental services, including water regulation, food provision and carbon sequestration[40] (see Box 10). Its diverse climates and landscapes – ranging from grasslands, wetlands, savannas and marshes to salt flats, forests and shrublands – create habitats for over 3,400 plant species, 500 bird species, 150 mammal species and approximately 220 species of reptiles and amphibians – including species critical for biodiversity. However, unsustainable agricultural expansion has been threatening many of these species, some of which are now on the Red List of the International Union for Conservation of Nature (IUCN) – see Table 4.

TABLE 4 **Key threatened species in the Gran Chaco**

Common name		Scientific name	Type
Palo santo		Plectrocarpa sarmientoi	Hardwood tree
Quebracho Colorado		Schinopsis balansae	Hardwood tree
Jaguar		Panthera onca	Mammal
Blue-fronted amazon/parrot		Amazona aestiva	Bird
Giant armadillo		Priodontes maximus	Mammal
Maned wolf		Chrysocyon brachyurus	Mammal
Lowland tapir		Tapirus terrestris	Mammal
Tagua or Pecarí chaqueño		Parachoerus wagneri	Peccary (pig-like ungulate)

Source: Analysis based on Castro Arce et al. (2021).[41]

BOX 10 | The Gran Chaco – a critical water reservoir and carbon store

A critical water reservoir

The Gran Chaco is traversed by major rivers, including the Grande, Otuquis, Agua Dulce, Pilcomayo, Bermejo and Salado, which support agriculture and local livelihoods despite seasonal variability in water availability. Groundwater resources are also crucial, with freshwater deposits in deep aquifers in the west. However, in central and eastern Chaco, shallow aquifers often suffer from salinity due to evaporation and vegetation transpiration, limiting potable water access for communities and agriculture.[42]

Potable water scarcity in the Gran Chaco is worsened by high evaporation rates and arsenic contamination in aquifers and deforestation. These challenges exacerbate the difficulties faced by local communities and agricultural practices, highlighting the critical need to protect potable water resources for sustaining production, conserving vital resources and building resilience against climate variability.[43,44,45]

A vital carbon store

The Gran Chaco plays a vital role in climate change mitigation through carbon storage in its soil organic carbon (SOC). High SOC levels enhance CO_2 sequestration, support soil health and boost agricultural productivity. Studies show that nearly one-third of global SOC stocks are in forested areas, underscoring the importance of regions like the Gran Chaco.[46] Although SOC levels vary, all countries within the biome exhibit high SOC concentrations:

Argentina: the dry and wet Chaco together contain 25% of the country's SOC, averaging 48 tonnes per hectare (t/ha) in the dry Chaco and 59 t/ha in the wet Chaco.[47]

Bolivia: SOC levels range from 96 to 124 t/ha across diverse forest types.[48]

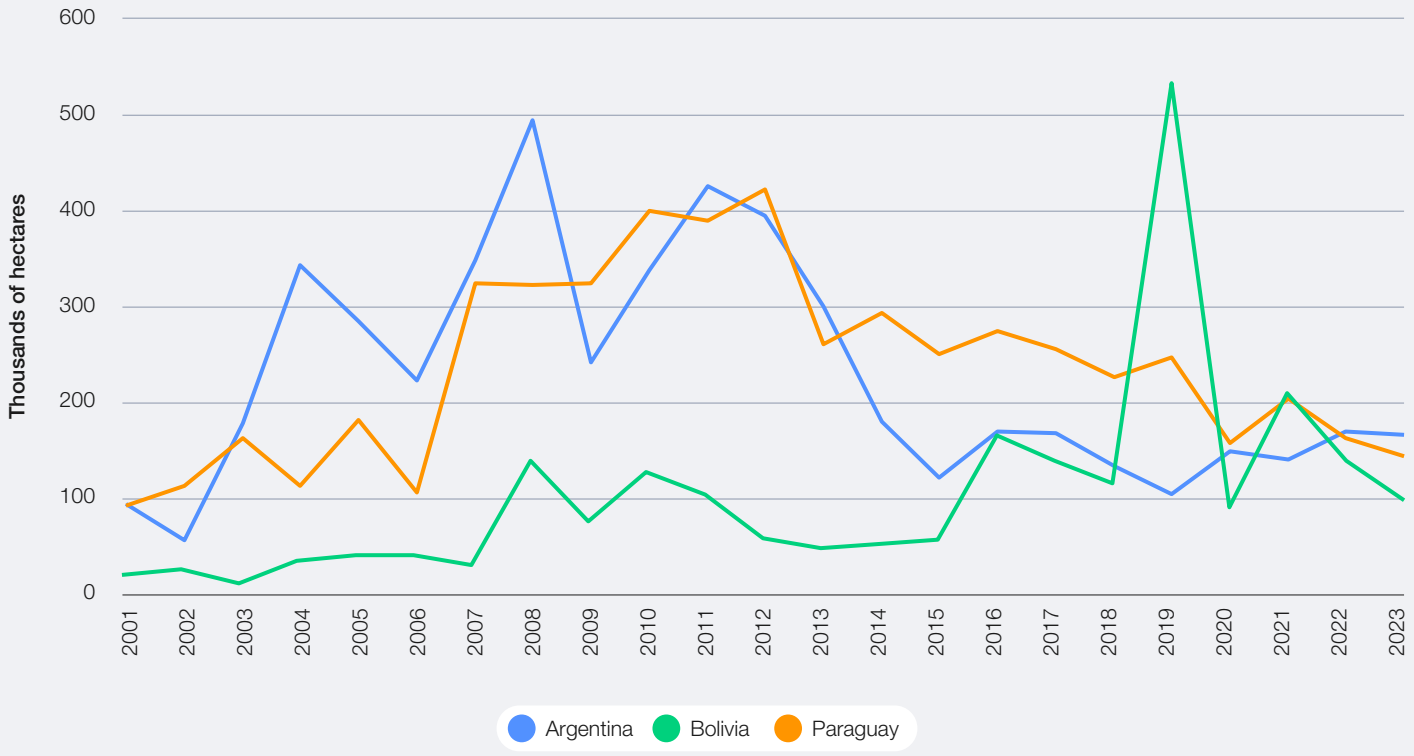
Paraguay: hydrophilic forests store about 55 t/ha, while dry forests hold 46 t/ha. The wet Chaco is particularly crucial for carbon storage and biodiversity.[49]

Protecting these carbon reservoirs offers opportunities to incentivize sustainable land management, contributing to biodiversity conservation and climate change mitigation.

3.3 Land-use change, vulnerabilities and socio-economic consequences

The expansion of unsustainable agriculture has significantly increased deforestation rates, particularly in the semi-arid Chaco Forest, one of the world's regions to suffer the greatest deforestation in recent decades.[50] Between 2001 and 2023, the biome lost over 13 million hectares of forest cover (see Figure 10), a change closely tied to land-use alterations. This has led to increased carbon emissions in the region (see Figure 11) at a critical moment in the wider context of global climate change. According to a report published by the United Nations in October 2024, a continuation of current policies could lead to global warming of up to 3.1°C over the course of this century[51] – double the 1.5°C threshold established by the Paris Agreement a decade ago.

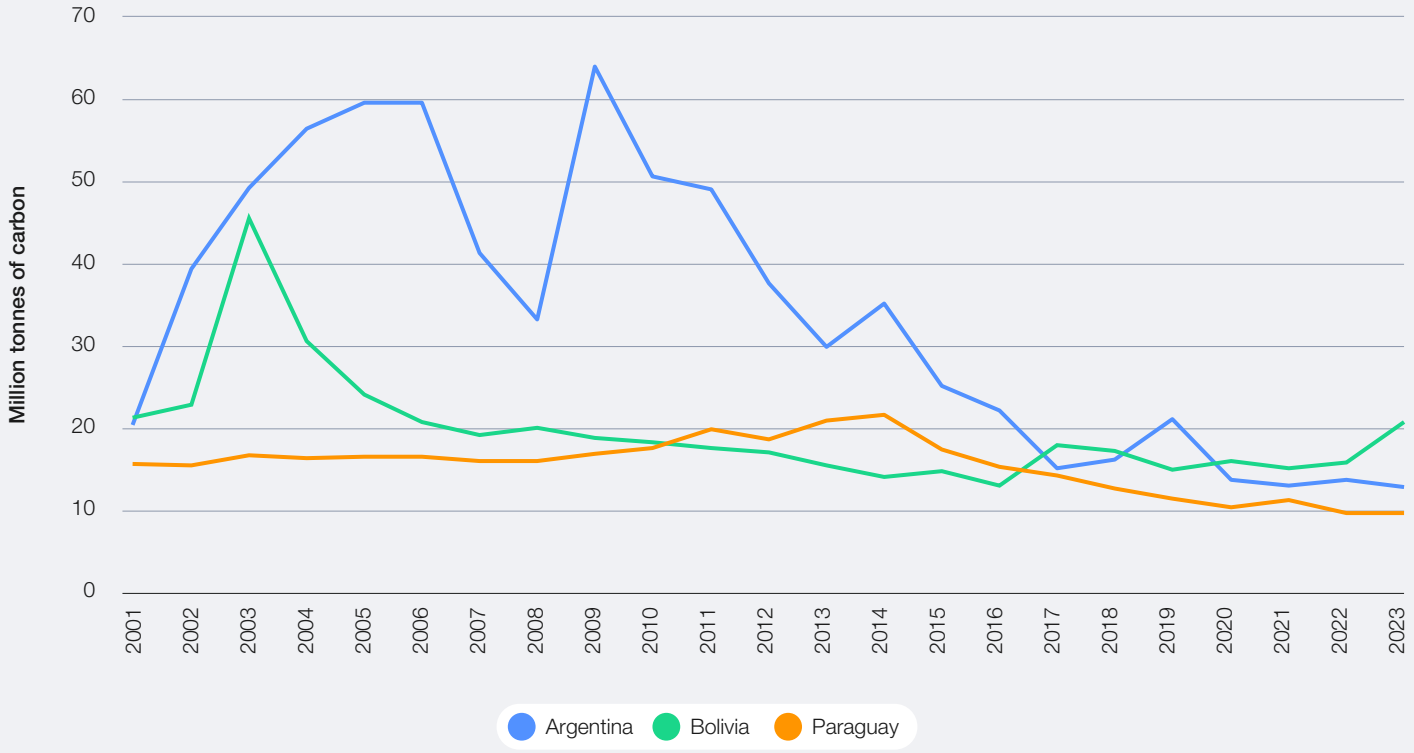
FIGURE 10 | **Evolution of deforestation in the Gran Chaco, 2001-2023** (thousands of hectares)



Source: Analysis by REVER, based on Global Forest Watch.[52]

Note: For each country, specific departments and provinces were considered for deforestation analysis and the development of the graph – namely those that encompass the largest areas of the Gran Chaco biome. The regions included were: the Argentina provinces of Salta, Chaco, Santiago del Estero and Formosa; the Paraguay departments of Alto Paraguay, Boquerón and Presidente Hayes; and the Bolivia provinces of Cordillera (Santa Cruz de la Sierra), Chiquitos (Santa Cruz de la Sierra), Luis Calvo (Chuquisaca) and Gran Chaco (Tarija).

FIGURE 11 | **Net carbon emissions resulting from land-use change in Argentina, Bolivia and Paraguay** (million tonnes)



Source: Analysis based on data from Global Carbon Budget (2023),[53] Our World in Data.[54]

Deforestation trends in the Gran Chaco exhibit significant variation across its three main countries, influenced by legislation, enforcement challenges and potential regional leakage. In Argentina, deforestation rose sharply from 59,270 hectares in 2002 to a peak of 486,496 hectares in 2008. Following the implementation of the Forest Law around 2010, annual forest loss decreased to 166,322 hectares by 2023. However, this reduction raises a critical question: was the decline primarily due to improved enforcement or shifts in deforestation to more remote areas or neighbouring regions with fewer resources and limited monitoring infrastructure? Moreover, enforcement gaps and underfunded provincial frameworks suggest that local laws alone may not fully explain the decrease.

Paraguay followed a similar trajectory, with deforestation peaking at 415,667 hectares in 2012 before dropping to 143,652 hectares in 2023. The decrease coincides with progress in compliance with environmental regulations, but inconsistencies in enforcement and the possibility of leakage to less monitored areas remain critical concerns.

In Bolivia, deforestation rates in the Gran Chaco have remained relatively low over time compared to Argentina and Paraguay, as shown in the graph. However, there is a notable spike in 2019, primarily driven by widespread wildfires that affected over 6 million hectares across Bolivia. These fires were fuelled by a combination of factors, including climate change-related impacts such as severe water deficits and higher-than-average temperatures, as well as land-grabbing and ongoing deforestation activities.[55]

BOX 11

Unsustainable practices in the Gran Chaco lead to significant economic consequences

A World Bank study on the effects of droughts in Argentina revealed that the 2021-22 drought cost the country approximately $1.44 billion in tax revenues, $2.67 billion in export revenues and 1% of GDP.[56] Ongoing droughts, without policy adjustments, could reduce Argentina's GDP by 4% annually by 2050.[57]

Agricultural losses from wildfires in Argentina in 2020 reached $6 billion, with recovery costs ranging from $1.1 billion to $3.7 billion, equivalent to 5-17% of national soybean production value.[58] Meanwhile, in Paraguay's Gran Chaco, wildfires in 2019 resulted in material losses of approximately $20.9 million to basic infrastructure such as fencing, livestock and other related assets. This estimate does not include costs associated with reforestation or losses to basic services, such as telecommunications during the wildfires.[59,60]

“ Areas where Indigenous land rights are respected experience lower rates of biodiversity loss, deforestation and forest degradation.

Furthermore, inadequate enforcement of public policies to support Indigenous Peoples and protect their territories has led to land tenure insecurity, exacerbating socio-economic vulnerability and weakening communities' ties to their land. This insecurity increases the likelihood of environmental conflicts and contributes to deforestation, particularly in Indigenous lands and protected areas, which are often targeted for agricultural and livestock expansion in the agro-industrial model.[61,62] A report by CRISOL highlights over 206,000 hectares of land-use conflicts in Argentina's north-east (NEA) and north-west (NOA) regions, which encompass the Gran Chaco, driven by the grain, oilseed and beef production sectors.[63] However, the report emphasizes that larger-scale conflicts are centred on other industries, such as mining.

Land tenure irregularities and deforestation not only harm communities, as land is often marketed and sold without transparency or recognition of traditional inhabitants, creating conflicts and undermining sustainable development. This situation also reflects the failure of states to uphold international and national legal frameworks that protect Indigenous rights and contribute to ecosystem conservation, such as the International Labour Organization's Convention 169.

The protection and recognition of Indigenous and local communities' rights and territories are essential to combat deforestation and land conversion. Studies show that areas where Indigenous land rights are respected experience lower rates of biodiversity loss, deforestation and forest degradation.[64,65] For example, in Brazil, Indigenous lands lost only 1.2% of their native vegetation between 1991 and 2021, compared to a 19.9% loss on private lands.[66]

However, ensuring resilience in the Gran Chaco requires not only securing land rights but also acknowledging the region's cultural and social plurality. The biome is home to diverse Indigenous and traditional communities, each with distinct identities, governance structures and relationships with the land. A comprehensive strategy must respect these specificities while leveraging shared opportunities to strengthen conservation and drive economic growth within a broader regional framework.

In summary, land-use changes and continued, uncontrolled expansion for unsustainable agricultural production can lead to serious impacts across the Gran Chaco, including:

- **Soil degradation and declining productivity:** Loss of native vegetation is accelerating soil degradation, reducing fertility and agricultural productivity. Deforestation, unsustainable land-use practices and climate change contribute to soil erosion, compaction and nutrient depletion, weakening the region's long-term capacity for food production and economic stability.
- **Impacts on ecosystem services:** Decrease in the biome's ability to deliver essential ecosystem services that support the local economy, biodiversity and the livelihoods of local communities.
- **Loss of biodiversity:** Increased loss of genetic diversity and pollinators.
- **Increase in greenhouse gases:** Loss of carbon sequestration capacity and increased direct emissions.
- **Modification of the nutrient cycle:** Reduced soil organic matter and loss of fertility.
- **Modification of the hydrological cycle:** Decreased interception by vegetation cover, increased surface runoff, higher erosion rates, more intense and frequent floods, increased soil salinization and rising groundwater levels.
- **Loss of livelihoods for local communities:** Decline in rural employment, increased land concentration and reduced access to natural resources.
- **Loss of cultural and spiritual values:** Erosion of traditions and ancestral knowledge, along with the loss of sacred sites or places of historical and archaeological significance.
- **Economic loss:** Droughts, wildfires and environmental degradation are projected to result in significant economic losses, with potential reductions in GDP and profound impacts on Indigenous and rural communities whose livelihoods depend on local resources.

Environmental and social impacts in the Gran Chaco undermine the biome's ability to provide critical ecosystem services, not only at local and regional levels but also globally. These impacts weaken the resilience of the biome, its biodiversity and the livelihoods of traditional communities that rely on it – not only for subsistence but also due to cultural and historical ties. Furthermore, these impacts affect the productive capacity of the biome itself, given the interdependence between the climate and agricultural production.

4 Unlocking Gran Chaco's potential: pathways for sustainable development

Solutions include stronger enforcement of existing laws against deforestation, regional initiatives to align with international regulation and leveraging private sector resources to incentivize sustainable practices.

The development of the Gran Chaco is shaped by a diverse array of stakeholders who hold decision-making power or exert significant influence over its economic model. These stakeholders include small-, medium- and large-scale producers; corporate actors, including soy traders, beef-packers and cooperatives for soy and beef; local and foreign investors and financial institutions; Indigenous and peasant communities; non-governmental organizations (NGOs); subnational and national governments; and international organizations – such as the World Bank and the Food and Agriculture Organization of the United Nations (FAO).

Over time, this diversity of actors and interests within the biome has led to the emergence of differing visions for the Gran Chaco's future, reflecting historical development and settlement patterns. These divergent perspectives often result in tensions and conflicts, but they also present opportunities to shape sustainable solutions. Four possible approaches have been identified (see Box 12):

Production with minimal protection (business-as-usual)

Sustainable development

Community management

Strict conservation

BOX 12 | **Four approaches shaping the development of the Gran Chaco biome**

Production with minimal protection: This business-as-usual approach focuses on maximizing production with little regard for environmental externalities. Advocates, often foreign or urban-based investors and large-scale producers, focus on low-cost land acquisition while overlooking environmental impacts, including deforestation and ecosystem degradation, that ultimately threaten long-term productivity. Furthermore, this approach risks isolating local producers and companies from global markets as international regulations and sustainability demands increase.

Sustainable development: This approach, supported by governments, international organizations (e.g. UN, World Bank), NGOs and parts of the private sector, promotes integrating sustainable practices into agriculture and livestock management. It emphasizes minimizing environmental impact while ensuring the responsible use of natural resources to meet current needs without compromising ecosystems' long-term viability. Stakeholders advocate for holistic approaches that align economic activities with conservation, balancing productivity and environmental sustainability.

Community management: This encompasses diverse groups, including Indigenous Peoples, Criollos and other traditional communities, engaging in varied strategies:

- Voluntarily isolated communities preserving traditional ways of life by avoiding external economic systems.
- Integrated communities participating in production due to necessity, sometimes engaging in harmful practices like logging.
- Sustainable development communities focusing on socio-biodiversity value chains, producing non-timber forest products, honey and handicrafts with support from NGOs, governments and multilateral organizations. This approach fosters social inclusion and income generation, while balancing conservation and resource use. However, it faces challenges due to the historical marginalization of these communities and undervaluation of their economic and environmental contributions.

Strict conservation: This prioritizes the protection of high-value ecological areas through rigorous conservation strategies to safeguard biodiversity and ecosystem services. However, tensions arise as this approach restricts traditional practices and sustainable economic initiatives, posing challenges in balancing strict preservation with responsible resource use and local community needs.

The future of the Gran Chaco depends on reconciling these diverse stakeholder visions and transitioning to an integrated development model that transcends jurisdictional boundaries. The primary opportunity lies in moving away from the business-as-usual approach towards one that combines the strengths of sustainable development, community management and strict conservation, creating a comprehensive framework for long-term resilience and growth.

This chapter delves deeper into examples and opportunities to enhance this integrated strategy, emphasizing actionable and scalable solutions that balance economic, social and environmental priorities for the sustainable future of the Gran Chaco.

4.1 Policy-making pathways for a resilient Gran Chaco

Addressing the environmental and social challenges of the Gran Chaco requires a coordinated and integrated approach that unites international, regional and local efforts to align the diverse interests and stakeholders present in the biome. The *Sixth Assessment Report* (AR6)[67] of the Intergovernmental Panel on Climate Change (IPCC) underscores the importance of such policies and initiatives at local, regional and global levels in key biomes like the Gran Chaco – one of the last remaining major forested areas in the world. These efforts must focus on improving land-use practices, which remain among the most cost-effective and impactful solutions for tackling environmental challenges, including climate change.

National strategies aligned with global regulations can advance best practices at local level

International agreements and regulations present valuable frameworks to orientate national strategies and promote the adoption of best practices towards sustainable development. Nevertheless, for these frameworks to be effective, their implementation must be aligned with local realities and developed in collaboration with national and subnational stakeholders.

Government efforts to promote sustainability in the Gran Chaco operate across international, regional, national and subnational levels. International agreements such as the UN Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD) and the UN Convention to Combat Desertification (UNCCD) have established key frameworks for conservation targets and greenhouse gas emissions reduction. Tri-national agendas have also been explored but have yielded limited practical outcomes.[68,69]

Regulations such as the European Union Deforestation Regulation (EUDR) and the UK Forest Risk Commodity Regulation introduce new compliance challenges for export-orientated sectors in the Gran Chaco. However, instead of being perceived as externally imposed constraints, these regulations can serve as catalysts for innovation and market access, provided that implementation strategies are designed in coordination with local producers, businesses and policy-makers.

Ensuring regulatory alignment requires investments in traceability systems and capacity building, reinforcing both international trade viability and local development priorities. Additionally, complementary measures should accompany these regulations to support producing countries in overcoming implementation barriers, fostering investment in sustainable production and strengthening the long-term resilience of local economies.

BOX 13 **European Union Deforestation Regulation (EUDR)**

The European Union Deforestation Regulation (EUDR)[70] aims to reduce greenhouse gas emissions and biodiversity loss by ensuring that products entering the EU market are free from deforestation and forest degradation. The EUDR is part of the EU's broader strategy to protect and restore global forests, as outlined in the *Communication (2019) on stepping up EU action to protect and restore the world's forests.*[71]

The EUDR imposes strict due diligence requirements on European buyers and importers, placing the responsibility on operators and traders to verify that commodities placed on or exported from the EU market comply with stringent environmental and social standards, including local legal frameworks and Indigenous rights.

Key EUDR requirements:

Deforestation-free products: Commodities must not originate from deforested land or contribute to forest degradation, including primary forests, after 31 December 2020.

Respect for human rights: Production processes must adhere to human rights and uphold the rights of Indigenous Peoples.

Regulated commodities: The regulation applies to livestock, cocoa, coffee, palm oil, soy, timber, rubber, charcoal and printed paper.

In December 2024 the European Union granted a 12-month additional phasing-in period, making the law applicable on 30 December 2025 for large and medium companies and 30 June 2026 for micro and small enterprises.

Regional initiatives can encourage collaboration on sustainability

Regional initiatives are critical to advancing sustainability in the Gran Chaco, leveraging institutional frameworks that foster collaboration among diverse stakeholders.

Regional initiatives that seek to integrate civil society, governments and NGOs to strengthen governance and effectively implement conservation strategies are crucial for bridging the diverse perspectives and visions surrounding the Gran Chaco. These efforts are key to locally advancing an integrated vision of sustainable development for the biome. The Gran Chaco already benefits from successful examples of such initiatives, which should be promoted and scaled-up to expand their reach and amplify their positive impacts:

- **Redes Chaco:** Established in 2008, this platform unites NGOs, community-based organizations, companies and public agencies to promote collective actions for equitable and sustainable governance.
- **ProYungas Foundation's biodiversity corridors and productive-protected landscapes:** The ProYungas Foundation leads two key initiatives that balance biodiversity conservation with sustainable land use in Argentina. Through biodiversity corridors and productive-protected landscapes, the foundation works in partnership with NGOs, government agencies and Argentina's National Parks Administration[72] to address habitat fragmentation[73] and promote ecological connectivity.

– **MapBiomas Chaco:** This collaborative initiative spans Argentina, Bolivia, Brazil and Paraguay, aiming to produce annual land-use maps to support data-driven decision-making and track changes across the Gran Chaco.[74]

Implementing national policies to reduce deforestation is essential

Enhancing national policies and strategies and addressing enforcement challenges are key to reducing deforestation, carbon emissions and biodiversity loss across the Gran Chaco.

At the national level, Argentina, Bolivia and Paraguay have implemented critical policies to reduce deforestation, conserve biodiversity and combat climate change. These initiatives align with international frameworks, such as the Paris Agreement and emphasize integrating conservation with sustainable development. Table 5 highlights key climate-related policies, biodiversity efforts and government initiatives across the three countries.

TABLE 5 **National policies and initiatives for climate change mitigation and biodiversity conservation in Argentina, Bolivia and Paraguay**

Initiatives	Argentina	Bolivia	Paraguay
REDD+ starting year for project and funding awarded [75,76,77,78]	**2020** ($80 million)	**2010** ($4 million)	**2021** ($50 million)
National climate change policies	**Law No. 27,520 (2019):** Establishes national climate goals for greenhouse gas (GHG) emission reductions and adaptation.	**Law No. 1500 (2023):** Approval of the Credit Agreement CBO 1037 02 L for the Program to Support Sustainable Economic Recovery and Climate Change Resilience in Bolivia, signed between the Plurinational State of Bolivia and the French Development Agency.[79]	**Law No. 3001 (2006):** Establishes compensation for environmental services to protect biodiversity. **Resolution of the Ministry of Environment and Sustainable Development No. 81/19:** Permits deforestation in the eastern region, provided it is offset in the Chaco (western region) by certifying a conserved area that exceeds the 25% conservation requirement established by forestry law. In this way, the conserved area can be traded in the market. **Law No. 7190 (2023):** Promotes carbon credit trading for forest protection.
Biodiversity protected areas	~0.5% of the Gran Chaco is under protection.[80] Only two national parks have been created since 2005: Impenetrable National Park and El Palmar Lagoon National Park, both in Chaco Province.	~25% of the Gran Chaco is under protection. The most recent protected area created was the Conservation and Ecological Importance Area of Ñembi Guasu in 2022.	~7% of Gran Chaco is under protection. The last national park established was Estero Milagro National Park in 2004.
Government initiatives	**Forests Law (No. 26,331):** Promotes the conservation, sustainable use and restoration of native forests through a system of land-use zoning. Provinces are mandated to map and classify their forests into three categories: strict conservation (red), sustainable management (yellow) and areas permitting forest transformation (green), subject to provincial authorization. Financed by a dedicated Forest Fund.	**Law No. 300 ('Mother Earth' Law):** Sustainable resource management based on Indigenous values. **Law No. 337:** Legalizes specific clearings and supports reforestation. **Law No. 1333:** Regulates the protection of natural resources, while the Forest and Land Authority (ABT) grants permits for controlled burns.	**Forest Law (No. 422/73):** Mandates a minimum protection of 25% for properties in the Chaco region. However, complementary regulations, including afforestation and water management laws, contribute to increasing conservation levels beyond this baseline.
Nationally Determined Contributions (NDCs)	Argentina (2021) has committed not to exceed net emissions of 349 million tonnes of carbon dioxide equivalent ($MtCO_2e$) by 2030.	Bolivia's updated NDC (2022) includes mitigation and adaptation goals for non-greenhouse gas emissions, focusing on water, energy, forests and agriculture. However, it does not include a specific GHG emissions reduction target.	Paraguay's NDC (2021) does not specify an absolute emissions reduction target but proposes a 10% reduction in its net emissions.

Complementing national climate-related policies, several key strategies have been developed to enhance forest resource management in Gran Chaco countries. For additional details on national strategies and each country's regulatory guidelines on climate change refer to Tables A1 and A2 in the Annex.

BOX 14 **Bolivia: enhancing conservation through protected areas and Indigenous leadership**

Increasing the percentage of protected areas, including the creation of national parks and the recognition of Indigenous and traditional community lands, is essential for advancing conservation efforts. Bolivia's Gran Chaco exemplifies this approach, maintaining a well-conserved landscape due to its extensive protected areas and small-scale local agricultural practices. Indigenous-led initiatives further strengthen conservation, as demonstrated by the Indigenous Autonomous Government in Charagua (Santa Cruz de la Sierra). This governance model has designated significant land for preservation and established an ecological corridor connecting Kaa Iya and Otuquis National Parks, ensuring habitat connectivity and biodiversity protection.

Protected areas not only ensure the preservation of the biome but also play a strategic role in mitigating natural disasters. During the wildfires of September to October 2024, hotspots in Bolivia – particularly in Santa Cruz Department (e.g. San José de Chiquitos and Pailón) – highlighted the critical function of protected zones. These areas acted as natural firebreaks, reducing fire spread and preserving biodiversity.

These national strategies provide a blueprint for aligning conservation goals with community-led governance and proactive public policies.

80%

of deforestation in Santiago del Estero, Argentina, in 2022 was illegal.

Enforcing existing national laws requires stronger governance

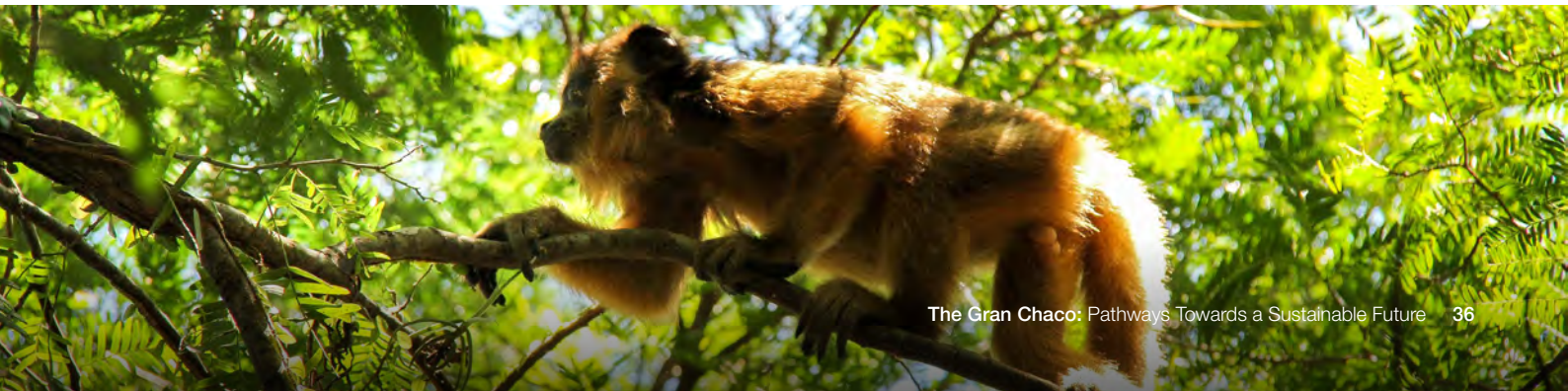
While Gran Chaco countries have established national laws and strategies to address climate change and biodiversity conservation, their effective implementation remains work in progress. Key challenges, particularly related to funding, governance and enforcement, highlight opportunities for enhancing institutional frameworks and improving coordination across national and regional levels. Strengthening governance structures and fostering multi-stakeholder collaboration can help bridge implementation gaps, ensuring that policies translate into tangible environmental and socio-economic benefits.

Argentina situation update

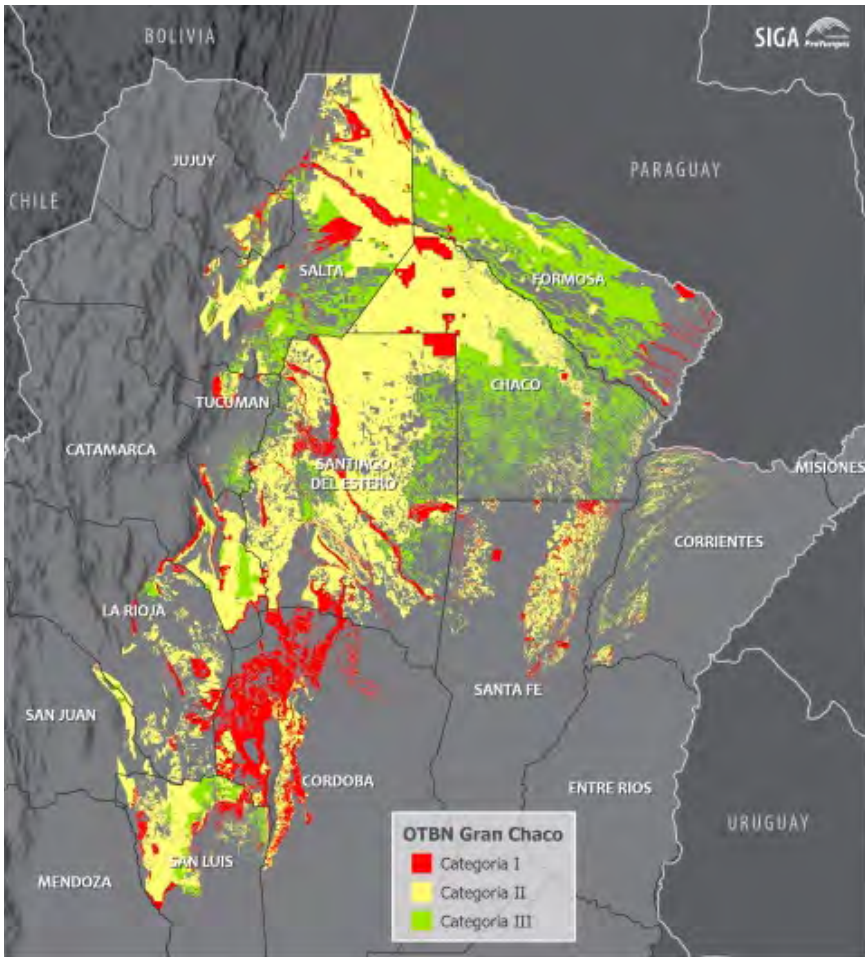
Provincial adherence to OTBN: All forested provinces have approved their OTBNs (Territorial Planning of Native Forests, in Spanish), classifying forests into red, yellow and green conservation zones (Map 5). This framework has established the OTBN as a cornerstone of national environmental policy and a distinctive tool for territorial planning at the national level. Consultations with governmental stakeholders underscore OTBN's significance as a milestone in environmental planning. However, OTBN criteria vary significantly across provinces, particularly in the Gran Chaco, where standardization is constrained by funding limitations and insufficient technical resources.

Increased Forest Fund allocation needed: The Forest Fund has received less than 10% of its legislated budget, with only 2.9% projected for 2025. Underfunding restricts the law's impact on deforestation, although funded conservation plans have shown positive results.[81] Increased financing could amplify these effects and improve enforcement.

Impact on deforestation: Despite national efforts to reduce deforestation through the Forest Law, illegal clearing remains widespread, particularly in red and yellow zones of the Gran Chaco. Weak enforcement continues to undermine the law's impact, allowing deforestation in protected areas. In 2022, northern Argentina lost approximately 112,545 hectares of forest, with the Gran Chaco provinces of Santiago del Estero, Chaco, Formosa and Salta being the most affected. Alarmingly, over 80% of deforestation in Santiago del Estero was illegal, occurring in Category I (Red) and Category II (Yellow) forests, where clearing is strictly prohibited. In Chaco province, illegal deforestation reached 36,159 hectares in 2022, a sharp increase from 24,427 hectares in 2021, which were also illegally cleared.[82]



MAP 5 **Territorial planning of native forests in Argentinean Gran Chaco provinces**



Source: ProYungas Foundation.

25%

of the land on properties over 20 hectares (in designated forest zones) must be preserved as a forest reserve under Paraguay's Forest Law.

Paraguay situation update

Achievements and areas for improvement in the Forest Law: Paraguay's Forest Law (Law No. 422/73) mandates that properties larger than 20 hectares in designated forest zones must preserve at least 25% of their area as a forest reserve.[83] Additionally, complementary regulations, including the Water Resources Law (Law No. 3239/2007), various decrees, resolutions from official bodies such as INFONA (Paraguay's National Forest Institute), plus improved monitoring efficiency have contributed to conservation requirements reaching approximately 40% in certain properties and regions. This percentage may vary depending on factors such as property size, the presence of water resources and the extent of forest cover within the property.

Nevertheless, stakeholders consulted for this report identified opportunities to refine the Forest Law's design to enhance its effectiveness. The uniform protection levels and parcel-based approach, while ensuring compliance, may also contribute to landscape fragmentation, posing challenges for ecosystem connectivity and broader conservation goals. Additionally, the law could be enhanced to better address deforestation risks and prioritize areas of high biodiversity significance. As land-use changes, particularly livestock-driven expansion, continue to shape the region, strengthening integrated land management strategies could help balance sustainability with economic development.

Enhancing wildfire management: Paraguay is working towards improving wildfire management strategies, with a comprehensive system under development since 2021. Moving towards a preventive approach, rather than reactive responses, would enhance preparedness and resilience in the face of increasing climatic and land-use pressures.

Incentives and tax exemptions to conserve forest lands: Forestry authorities consulted for this report have noted that, over the past four years, tax exemptions for conserved land have been introduced in eastern Paraguay, encouraging landowners to maintain areas not used for production. While this initiative has not yet been implemented in the Gran Chaco, it presents a viable opportunity to incentivize sustainable land management in the biome. Expanding such measures, alongside technical and financial support for conservation, could create economic incentives for sustainable production.

Bolivia situation update

Gaps in environmental policy implementation: Bolivia faces substantial challenges in implementing effective environmental policies. For instance, under Law 1333, controlled burns are often authorized by the forestry authority without proper monitoring, frequently escalating into large-scale forest fires.

Absence of specific zoning regulations: While Argentina has its Forest Law and Paraguay has controlled deforestation policies, the absence of specific zoning regulations in Bolivia limits the government's ability to manage deforestation beyond protected areas, exacerbating environmental degradation.

BOX 15 **Strategies for strengthening institutional stability in the Gran Chaco**

A robust and stable national and regional regulatory framework is essential for advancing sustainable development in the Gran Chaco. The following approaches and examples highlight the effectiveness of well-designed legal frameworks and incentive-based policies in balancing economic development with environmental conservation:

- **Strengthen legal frameworks:** Strengthening legal frameworks is essential for reducing deforestation and promoting sustainable land use. Brazil's Action Plan for Prevention and Control of Deforestation in the Legal Amazon (PPCDAm), launched in 2004, reduced deforestation rates by 83% between 2004 and 2012 through a combination of law enforcement, territorial planning and sustainable development initiatives.[84]
- **Incentivize conservation:** Costa Rica's Payments for Environmental Services Program (PES), introduced in 1997, incentivizes landowners to conserve forests by compensating them for ecosystem services. This programme has been instrumental in reversing deforestation trends, increasing forest cover to approximately 54% of the country's territory.[85]
- **Introduce tradeable certificates:** In Paraguay, the Environmental Services Regime is a key policy tool to promote conservation, by allowing landowners to generate environmental services certificates (CSA), which can be traded to compensate for unavoidable environmental impacts. However, opportunities exist to enhance its effectiveness, including increasing resources for CSA acquisition, improving mechanisms for their commercialization and facilitating the inclusion of Indigenous communities in CSA transactions.[86]

To replicate these successes, it is crucial to develop and enforce context-specific legislation for the Gran Chaco, integrating strong governance, financial incentives and monitoring mechanisms to ensure long-term sustainability. To address current enforcement challenges, key actions to consider include:

- **Increase bureaucratic capacity:** Expand technical and monitoring capabilities, enhance enforcement mechanisms and strengthen sanctioning authority to ensure compliance.
- **Foster collaboration:** Facilitate partnerships between state authorities, private sector actors and local communities to align conservation goals with sustainable economic activities.
- **Scale-up incentives:** Expand financial mechanisms, such as tax exemptions, conservation funding and the strengthening of payment for ecosystem services (PES) schemes, to promote and reward sustainable practices across the region.

4.2 Leveraging innovative financial mechanisms to incentivize sustainability

Enhancing sustainability in the Gran Chaco requires a range of financial mechanisms to support the transition to sustainable practices. Payment for ecosystem services (PES) schemes, private investments, national government programmes, international cooperation and financial sector initiatives are all critical tools for enabling change. Recognizing this need, financial institutions and government authorities in the Gran Chaco are increasingly advancing initiatives to finance sustainable efforts and strengthen value chains. Scalable initiatives that can accelerate this transition are explored further below.

Carbon markets represent effective mechanisms for incentivizing sustainability

Carbon markets and carbon bonds allow companies and other entities to offset their GHG emissions by financing conservation and environmental restoration activities. However, for these markets to function effectively, a regulatory framework is essential to ensure transparency and efficacy. International organizations and standards, such as those set by the Paris Agreement or voluntary carbon markets, require rigorous verification mechanisms, transparency in emission reduction measurements and adherence to environmental and social criteria.[87] Paraguay is leading the way in carbon market projects under its carbon market law (see Box 16), which is attracting increasing investment from foreign companies into the Chaco region. Carbon market projects in Argentina and Bolivia remain less developed, highlighting significant potential for growth in these countries.

BOX 16 **Paraguay's REDD+ and carbon market initiatives in the Gran Chaco**

Quadriz – Green Heart of the Chaco

One of the most notable carbon market initiatives is the Quadriz project, known as the "Green Heart of the Chaco", implemented in the Presidente Hayes Department in Paraguay. This project preserves 32,000 hectares of native forest and adheres to international standards, such as the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB), enabling it to operate in international markets.

In addition to conserving endangered species, the project provides economic opportunities for local Indigenous communities (e.g. María Auxiliadora, San Isidro), by integrating them into a local development plan. It also aims to mitigate approximately 5.6 million tonnes of carbon dioxide emissions over its first 10 years.[88] In June 2023, the project issued its first carbon credits (VCUs) after verification for 2020 and 2021, showcasing its positive impact on the conservation of the Gran Chaco.

Chaco Vivo

The Chaco Vivo project[89] is one of Paraguay's largest REDD+ avoided planned deforestation (APD) initiatives, covering over 187,000 hectares (1,800 km²) in the Gran Chaco. Developed under the VCS–CCB standards framework, Chaco Vivo seeks to protect high-value conservation areas (HVCAs) containing critical biodiversity and Indigenous lands.

A key aspect of Chaco Vivo is its social impact strategy, particularly through the L.I.F.E. Program™ (Land-use Initiatives & Forest Enterprises Program). This programme promotes socio-economic enrichment, aiming to improve the livelihoods of Indigenous and marginalized communities, including the Maskoi people – an ethnolinguistic group of the Lengua-Maskoi.

The project aligns with multiple UN Sustainable Development Goals (SDGs), fostering community engagement, self-sustaining enterprises and long-term generational impact. Through carbon finance, conservation and inclusive development, Chaco Vivo demonstrates how climate action and economic empowerment can go hand in hand in the Gran Chaco.

The financial sector can provide incentives to industry to promote sustainability

Financial institutions, including banks and investment firms, can contribute to sustainable development by managing environmental and social risks (e.g. deforestation, Indigenous land claims, inadequate labour practices) and by providing incentives to industry leaders and best practice. In both Paraguay and Argentina, financial institutions are taking steps in this regard.

BOX 17 | Initiatives to promote sustainable investment in the productive sectors in Argentina and Paraguay

Argentina

The Sustainable Finance Protocol, established in 2019 and renewed in 2024, is a voluntary agreement among 38 financial entities to promote international best practice in sustainability.[90] While this protocol represents 24.5% of the loan market share and encourages higher standards by integrating environmental and social risk analyses into credit assessments, it lacks regulatory backing from Argentina's Central Bank, limiting its implementation compared to mandatory frameworks in Brazil and Paraguay.

According to consultations with experts, the voluntary nature of this protocol is both a strength, fostering institutional leadership and a weakness, as it relies on self-regulation. Nonetheless, the protocol also benefits from a regional network of financial institutions, including BID Invest (Inter-American Investment Corporation), which provides financial and technical support to scale-up sustainable practices within financial institutions.

Paraguay

A Central Bank Regulation (Resolution No. 8/2020) requires financial institutions to incorporate environmental and social risk assessments into their lending processes. Producers must provide documentation verifying the legality of their agricultural activities, such as environmental licences and land-use plans.

Other examples include the Procampo Verde Project created by the Paraguayan Development Finance Agency (AFD). Established and approved in 2024, Procampo Verde aims to finance sustainable and regenerative livestock practices. This programme, co-created with international organizations, offers lower interest rates compared to traditional loans and supports projects focused on water management, pasture improvement and reducing pressure on natural resources. It sets sustainability conditions, such as a prohibition on land-use changes from December 2020 and imposes penalties for non-compliance, such as increased interest rates.

For Paraguay, scaling-up Procampo Verde's resources must be a top priority for the financial sector and economic authorities to drive sustainable development in the country.

Paraguay's Voluntary Green Taxonomy,[91] launched with support from the Inter-American Development Bank (IDB), provides a classification system to identify environmentally sustainable economic activities. It aims to guide investors, financial institutions and policy-makers in aligning investments with climate resilience and sustainability goals. The taxonomy defines key sectors such as energy and construction, and establishes criteria for climate mitigation and adaptation. While it enhances transparency and green finance opportunities, its voluntary nature and lack of regulatory enforcement may limit widespread adoption compared to mandatory frameworks in other countries.

For Paraguay, scaling-up Procampo Verde's resources must be a top priority for the financial sector and economic authorities to drive sustainable development.

Overall, despite some isolated initiatives, the actions of the financial sector fall short of matching its level of relevance, exposure and influence, as highlighted by a 2023 Forest 500 report that assessed companies, banks and investors' progress in tackling deforestation and conversion.[92] In this context, collaborative initiatives are essential to help banks and investors understand the urgency of taking action and to provide them with training on how to transform their practices.

In Bolivia, since 2023, WWF has been supporting financial institutions through the *DCF Implementation Toolkit* in collaboration with a major investor and a development bank. This toolkit focuses on helping institutions restructure internally, commit to deforestation- and conversion-free portfolios, develop actionable plans, assess the risks they face and engage and mobilize their clients and investees. Through projects like this, WWF aims to support committed companies that can demonstrate the feasibility of adopting and implementing such commitments, thereby encouraging their local peers to follow suit.[93]

The Amazonia Forever programme, led by the Inter-American Development Bank (IDB), serves as a model for integrating blended finance, public-private partnerships and sustainable investment strategies to drive regional development. By bringing together all countries within the Amazon biome – Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru and Suriname – the initiative fosters collaborative resource-mapping, project preparation and multi-stakeholder coordination. Through this approach, it mobilizes funding for sustainable agriculture, conservation and infrastructure, ensuring that investments are both environmentally responsible and socially inclusive, with a strong emphasis on local community engagement.[94]

A similar financial framework could be adapted for the Gran Chaco, addressing investment gaps in conservation, sustainable land use and climate resilience. Strengthening financial instruments, such as green bonds, carbon markets and credit incentives, while aligning with international sustainability standards, could unlock funding opportunities and accelerate regional development.

BOX 18 | **Innovative Finance for the Amazon, Cerrado and Chaco (IFACC)**

IFACC is an initiative of The Nature Conservancy, the Tropical Forest Alliance and the United Nations Environment Programme to significantly increase and accelerate lending and investment in sustainable agriculture in Brazil, Argentina and Paraguay. IFACC's goal is to mobilize $10 billion in commitments and disbursements by 2030 by bringing together leading companies, banks and investors who, together, work to meet the need for transitional finance in the production of beef, soy and other agricultural products without further deforestation or conversion.

Source: IFACC.

4.3 From farm to industry: harnessing private sector opportunities for sustainable development

The productive and corporate sectors in the Gran Chaco are increasingly embracing initiatives to advance sustainable development. These efforts centre on sustainable and regenerative production practices, robust traceability systems and alternative income-generating pathways such as ecotourism, particularly within the soybean and beef value chains. Key initiatives poised for scaling-up to drive this transition are explored below.

Regenerative, integrated production models can enhance productivity and minimize environmental impacts

Sustainable strategies such as regenerative agriculture and livestock farming[95] and integrated crop-livestock-forestry (ICLF) systems are being promoted across the region. These approaches incorporate principles of proper soil and herd management, as well as promoting the health of both humans and ecosystems. They include practices such as rotational grazing and the use of native grasslands to minimize environmental impact.

In Argentina, notable initiatives include projects conducted by The Nature Conservancy, the NGO Solidaridad[96] and recent efforts by the Chaco provincial government.[97] ICLF in Argentina seek to balance livestock production with ecosystem conservation, preventing deforestation and safeguarding the environmental services provided by forests. This approach also aims to address unsustainable practices in silvo-pastoral systems, which, in some cases, have contributed to deforestation and the degradation of natural resources.[98] This project is implemented by the National Secretariat for the Environment, the Secretariat of Agriculture, Livestock and Fisheries, the National Agricultural Technology Institute (INTA), provincial agencies, livestock producers and NGOs such as Fundación Vida Silvestre.

In Paraguay, Mennonite cooperatives adhere to sustainability regulations by preserving over 25% of their properties as reserves or implementing restoration measures, while also maintaining forest windbreaks. They also promote sustainable livestock projects in some cases: one study shows that semi-intensive livestock farming implemented by such communities maintained the ecosystem services of the forest while also encouraging regeneration processes in the Paraguayan Chaco Forest.[99]

In addition to Mennonite-led initiatives in Paraguay, the Alliance for Sustainable Development – a collaboration between WWF-Paraguay and the United States Agency for International Development (USAID) – is advancing silvo-pastoral systems in the Chaco region. This initiative focuses on integrating tree cover into grazing areas, thereby enhancing biodiversity, improving soil health and increasing livestock productivity. By combining local knowledge with technical expertise, the project aims to develop and replicate successful silvo-pastoral models across the Chaco, promoting sustainable land use and contributing to climate change adaptation.[100]

In Bolivia, most producers in the Gran Chaco engage in environmentally sustainable production that follows regenerative principles. Through the NGO Nativa Bolivia, efforts are focused on certifying 100,000 hectares in the Department of Tarija as regenerative livestock lands. According to consultations conducted for this report, the initiative targets medium-sized properties, ensuring that deforestation does not exceed 5%. This approach underscores a strong commitment to preserving environmental integrity while promoting sustainable livestock practices.

“In Bolivia, most producers in the Gran Chaco engage in environmentally sustainable production that follows regenerative principles.

Traceability for export sectors can boost responsible supply chains

Traceability and the adoption of best practices within export-orientated sectors present opportunities to promote responsible supply chains, access new markets and enhance value-added production.

Driven by trends and pressures from major buyers and international regulations, such as the EUDR, initiatives like VISEC Soy and VISEC Beef in Argentina have established national monitoring, reporting and verification systems. These systems enable product traceability while ensuring compliance with critical environmental and social criteria, such as avoiding deforestation and respecting human rights.

Paraguay has shown interest in developing a similar system, building on Argentina's experience to facilitate seamless information exchange for Paraguayan soybean exports to Argentina. Such systems align with international sustainability standards, fostering a more transparent, responsible and ethical supply chain, while strengthening market competitiveness. Strengthening traceability systems adds a critical layer of control to complement existing state regulations and helps mitigate risks such as fraud and commodity laundering. Among traceability systems, VISEC is the best example in the region.[101]

BOX 19 **Best in class – VISEC Argentina**

VISEC is a platform for environmental and social sustainability that helps economic actors in Argentina's soybean and beef value chains to meet new international and national demands, while maintaining global market competitiveness. Established in 2019 for soy, VISEC is supported by the Chamber of the Oilseed Industry of the Argentine Republic (CIARA/CEC), The Nature Conservancy, Tropical Forest Alliance and Peterson Consultancy, which form its permanent technical secretariat. Between 2019 and 2023, stakeholders from across Argentina's soy production and industry joined the platform. In August 2023, the Consortium of Argentine Beef Exporters expanded VISEC's scope to include beef and by-products for EU export.

The VISEC Protocol ensures traded commodities are deforestation-free. It tracks the origin of soy and beef from production units (e.g. soy farms, cattle birth farms), ensuring compliance with EU regulations and Argentina's Law 26.331/07, with a cut-off date of 31 December 2020. The system focuses on:

- **Monitoring land use** from production units to export ports.
- **Transparent reporting** on progress toward commitments.
- **Independent verification** of compliance with sustainability indicators.

NGOs play a critical role in governance, ensuring transparency and credibility throughout the process.

Source: VISEC.

Although traceability systems have been established in Argentina's Gran Chaco beef value chain, significant gaps remain, particularly in domestic markets where traceability has yet to become a regulatory priority. The challenge extends beyond small retail outlets to local and municipal slaughterhouses, which often lack the necessary capacity, infrastructure and regulatory oversight to implement comprehensive traceability measures.

National roundtables for sustainable beef, under the framework of the Global Roundtable for Sustainable Beef (GRSB), have the potential to serve as powerful platforms for uniting diverse stakeholders to address sustainability challenges in biomes such as the Gran Chaco. These roundtables provide a structured space for collaboration, bringing together private sector initiatives, NGOs, governments and research institutions to develop innovative and actionable solutions to key challenges in the beef industry.

Private sector actors hold significant influence over production practices, supply chains and consumer behaviour. By engaging these stakeholders within national roundtables, their expertise, resources and market influence can be leveraged to promote sustainable practices, enhance traceability and unlock financing for sustainability.

Dialogue among diverse stakeholders is essential for addressing the complex challenges facing the beef industry in ecologically sensitive areas such as the Gran Chaco. Transforming dialogues into collaborative action can leverage the private sector's role as both a challenge and a solution for sustainable development in this critical biome.

Ecotourism can boost income from conservation

Ecotourism can serve as a complementary tool for agricultural and livestock producers to boost income and support conservation efforts.

In alignment with ProYungas Foundation's protected productive landscapes project – which integrates protected areas with privately managed productive lands – agricultural and livestock producers, encouraged by public-private financing initiatives, could dedicate portions of their properties to conservation, establishing private nature reserves. These areas, together with state-protected zones, can be connected through ecological corridors, creating ecotourism routes and trails that promote local biodiversity, facilitate wildlife movement and generate sustainable, long-term jobs. This approach not only enhances biodiversity conservation but also helps producers diversify income streams from their land.

4.4 Building resilient, multi-stakeholder governance to navigate political shifts and drive sustainable development

Recent political and structural changes in Argentina and Paraguay highlight the challenges and opportunities for advancing sustainable development in the Gran Chaco. In Argentina, shifts in environmental policies and budget allocations have raised concerns about the continuity of conservation efforts. However, re-aligning national strategies with international frameworks, such as the 2030 Agenda, could strengthen resilience, secure food and water systems and unlock international funding for infrastructure, conservation and climate adaptation initiatives.

In Paraguay, collaborative efforts within the beef value chain, such as the Paraguayan Roundtable for Sustainable Beef, demonstrate progress in building multi-stakeholder sustainability initiatives. Strengthening public-private partnerships and fostering science-based decision-making can further enhance long-term environmental and social outcomes. By leveraging existing initiatives and reinforcing stakeholder engagement, Paraguay has the potential to advance sustainable land-use strategies while maintaining economic growth and environmental preservation.

Based on the opportunities and scenarios outlined above, the imperative to enhance governance and resilience in the Gran Chaco emerges as a critical and central pillar for scaling-up these initiatives and solutions, as well as ensuring resilience to withstand political shifts. Strengthening governance is essential to achieving a development model that effectively harmonizes production and conservation within the biome.

Pathways to driving such governance improvement across the biome are explored further below.

Foster local and private sector engagement

> The Paraguayan Roundtable for Sustainable Beef has developed a comprehensive action plan for sustainable livestock, looking to position the country as a reliable supplier of sustainable beef for global markets.

Encouraging the creation of networks among private sector actors, such as companies, producers and local entrepreneurs, can facilitate the exchange of information, best practice and resources. These networks can drive shared sustainability initiatives, such as land restoration projects or forest management programmes, generating a positive impact on the conservation of the biome.

According to a representative from a multilateral organization consulted for this report, the success of these networks hinges on effectively demonstrating viable and profitable sustainability models. When producers witness tangible economic benefits from such initiatives, alongside credible information and outreach efforts, they are more likely to adopt and replicate these practices, amplifying their impact across the biome.

Efforts like some Mennonite experiences, VISEC or ICLF projects in Argentina provide interesting foundations to continue expanding these types of connections. Similarly, engaging local stakeholders – including communities, Indigenous groups and regional businesses – anchors sustainability at the grassroots level, ensuring resilience against political shifts.

In this context, the Paraguayan Roundtable for Sustainable Beef (MPCS),[102] part of the GRSB, has been instrumental in promoting sustainable practices within Paraguay's beef industry. The MPCS has focused on training human resources at various levels and expanding its outreach to financial systems and production support networks, aiming to increase production efficiency while contributing to environmental and social balance in beef production. Additionally, the MPCS has developed a comprehensive action plan for sustainable Paraguayan livestock, looking to position the country as a reliable supplier of sustainable beef for global markets and facilitating access to specific market segments that demand such products.[103]

Similarly, the Bolivian Roundtable for Sustainable Beef (MBCS), also part of the GRSB, has been actively working towards reducing greenhouse gas emissions in the beef supply chain. The roundtable has initiated efforts to approve indicators and identify quantitative sustainability metrics across the beef supply chain to measure progress against their goal of a 30% reduction in GHG emissions by 2030.[104]

Strengthen links between experts and producers and promote evidenced-based advocacy

Establishing collaborations between the academic sector and local producers is crucial for developing research and practices that address specific challenges of the Gran Chaco. Academia can provide data and analyses that enable producers to adopt more sustainable practices, while producers can offer practical, localized insights that enhance research relevance. Additionally, connecting with expert knowledge can deepen insights into the potential impacts of climate change on development, highlighting the risks posed by continuing unsustainable practices in the biome. An example of this is the ICLF pilot projects in Argentina.[105]

Furthermore, research and data demonstrating the economic, social and environmental benefits of sustainable practices, along with the potential economic losses of inaction, should be shared to build broader support, highlighting which policies are most effective in terms of economic incentives, strengthening local capacities and clear regulatory frameworks.

Enhance partnerships between NGOs and private sector

NGOs often have expertise in implementing conservation and sustainability projects. By joining forces with the private sector, including participating in national roundtables and platforms, they can develop programmes that not only benefit ecosystems but are also economically viable. This could include carbon offset projects, traceability systems or community development initiatives involving sustainable practices. Furthermore, NGO participation can lend greater credibility to decision-making by the private/productive sector. VISEC in Argentina and the DCF Implementation Toolkit developed by WWF in Bolivia serve as useful bases to continue strengthening these networks.

Incorporate jurisdictional approaches for sustainable development

Jurisdictional approaches provide a strategic framework for establishing sustainable land use across entire regions, aligning economic activities with conservation goals. These initiatives often involve public-private partnerships that drive financing, public policies, technology and market initiatives to promote sustainability. One of their key aspects is fostering a multi-stakeholder governance structure that ensures all actors in the region (e.g. producers, companies, universities, NGOs, sectoral associations, financial institutions) participate in defining how the territory will be managed.

> Inspired by the Pan-Amazonian framework, a Pan-Chaco initiative could serve as a unified governance mechanism to align development and conservation strategies.

Such approaches rely on specific metrics and monitoring mechanisms to assess their impact, ensuring measurable progress.[106] A noteworthy example is the PCI (Produce, Conserve, Include)[107] strategy implemented in Mato Grosso, Brazil, which integrates public and private stakeholders to balance agricultural production with environmental preservation and the social and economic inclusion of local communities. Drawing lessons from PCI, the Gran Chaco could adopt similar approaches to harmonize conservation outcomes with economic opportunities, benefiting ecosystems, supply chains and local communities.

Enhance tri-national governance and international collaboration

Strengthening and establishing new cooperation mechanisms among the countries sharing the Gran Chaco is essential to addressing the ecological and socio-economic challenges in the region and preventing the displacement of negative environmental and social impacts to less regulated and protected areas. Developing a tri-national governance framework can enable integrated natural resource management, promote conservation and ensure coherent and effective policies across all participating countries, fostering an aligned approach that transcends national boundaries.

Inspired by the Pan-Amazonian framework – which encompasses all countries that share the Amazon biome, including Brazil, Peru, Colombia, Ecuador, Venezuela, Guyana, French Guiana and Suriname – a Pan-Chaco initiative could serve as a unified governance mechanism to align development and conservation strategies while respecting and valuing the plurinational identity of the biome and its people. The Amazon region has demonstrated the effectiveness of such cooperation through initiatives like INPE's satellite monitoring systems, which provide real-time data on deforestation and land use[108] and the Forum of Pan-Amazonian Cities, which connects local governments to coordinate sustainable urban and rural development within the Amazon biome.[109]

This collaborative effort can enhance land-use planning and ensure that sustainability initiatives deliver positive outcomes for biodiversity and local communities. Additionally, partnerships with international organizations, NGOs and governments committed to sustainability should be forged. International funding, technical support and regulatory alignment can ensure continuity even amid local policy changes.

Leverage private sector commitment

Private sector players, particularly global companies and local leaders in the beef and soy value chains, should adopt sustainable practices that explicitly include the Gran Chaco in their commitments and scope of work.

Incorporate environmental criteria in trade agreements

Exporters, importers, Mercosur negotiators and chambers of commerce should include environmental clauses in trade contracts. The EU-Mercosur agreement serves as a key example, incorporating not only requirements related to broader environmental standards but also mechanisms to reward compliance through improved market access. This approach highlights the potential to align trade policies with sustainability goals, ensuring that environmental considerations are integral to international trade negotiations.

Boost infrastructure and productivity while preserving the region's ecological balance

Water availability and infrastructure are two critical factors shaping development in the Gran Chaco. Despite its arid and semi-arid conditions, the region holds significant water storage potential, with Mennonite communities pioneering efficient water harvesting and retention systems – essential for sustaining agriculture and livestock across Argentina, Bolivia and Paraguay. At the same time, infrastructure development, particularly in Paraguay, is advancing, with projects like the Bi-Oceanic Corridor set to transform regional connectivity. This corridor, linking the Atlantic and Pacific coasts, presents both economic opportunities and conservation risks. To maximize benefits while safeguarding the biome, strategic planning and coordinated action among governments, the private sector and multilateral organizations are crucial. Integrating infrastructure expansion with sustainable land-use policies and improved water management will be key to enhancing productivity while preserving the region's ecological balance.

5 Call to action

Businesses, governments, financial institutions and academia must unite to demonstrate how the Gran Chaco can strengthen economic production alongside ecological protection.

According to the IPCC, reducing deforestation in tropical regions remains the most cost-effective and impactful approach to climate mitigation.

The Gran Chaco has achieved significant economic and social development over the past decades, reinforcing its key role in agricultural and livestock production. However, to fully unlock its enormous potential, as outlined in this white paper, it is essential to foster stronger dialogue and collaboration in policy-making and public-private partnerships to ensure a more sustainable and resilient future. Addressing deforestation, soil degradation and land conversion in a balanced manner will not only secure local livelihoods but also align the region with global climate goals. According to the IPCC, achieving sustainability goals requires a focus on conservation, improved production management practices and the restoration of forests and ecosystems – among these strategies, reducing deforestation in tropical regions remains the most cost-effective and impactful approach to climate mitigation.[110] The Gran Chaco must not be left behind in this global effort.

This challenge is also a profound opportunity. The Gran Chaco has the potential to lead in reconciling economic growth with ecological preservation, demonstrating how sustainable practices can transform a biome into a global model for progress. However, this transformation requires urgent and coordinated action from a coalition of diverse stakeholders, including businesses, governments, financial institutions, local communities and academia.

By uniting, stakeholders can amplify their impact, pooling resources and expertise to implement solutions that halt degradation and foster resilience. Collaborative efforts can align regulatory frameworks across national boundaries, promote innovative solutions like traceability systems to combat deforestation and scale-up green financing mechanisms to reward sustainable practices. These actions not only address environmental challenges but also position the Gran Chaco as a destination for international funding and investment in sustainability.

Crucially, this coalition must prioritize local engagement, ensuring initiatives respect cultural values, empower communities and deliver tangible economic and social benefits. By fostering shared learning and tailoring solutions to the region's realities, stakeholders can drive transformative change that benefits people, nature and the planet.

The time to act is now. With a unified vision of environmental stewardship, community resilience and economic opportunity, the Gran Chaco can emerge as a leader in sustainable development – offering lasting benefits and a blueprint for global action.

→ Call to action

to accelerate the sustainable development of the **Gran Chaco**

While significant efforts have been made by civil society to support the Gran Chaco's sustainability, there remain substantial opportunities for other key stakeholders to further contribute to a more resilient and inclusive development model for the region.

Investors

- Invest in sustainable solutions aimed at restoring degraded lands in the Gran Chaco, supporting ecosystem conservation projects and certification mechanisms for deforestation-free products.
- Invest in agricultural and livestock production in non-high conservation areas, supporting projects that promote economically, environmentally and socially sustainable systems such as regenerative agriculture, livestock, or MBGI (forest management with integrated livestock).
- Invest in carbon credits and participate in payment for ecosystem services (PES) schemes that generate financial returns and environmental benefits.

Financial sector (e.g. banks, economic authorities)

- Design green financial schemes that encourage the adoption and expansion of clean technologies and sustainable practices in the productive sector, including loans targeting sustainable production activities and ecological restoration.
- Evaluate and mitigate environmental and social risks when granting loans, ensuring that financed projects comply with regulatory conservation standards.
- Collaborate with governmental economic authorities to create a robust green taxonomy that defines and classifies sustainable economic activities, enabling the development of effective green financial mechanisms and ensuring alignment with conservation goals.

Producers (e.g. farmers, ranchers)

- Implement sustainable production practices, such as regenerative agriculture, sustainable livestock farming and agroforestry on degraded or agricultural lands, avoiding expansion into native vegetation areas.
- Establish partnerships with technical or academic organizations to create innovative initiatives that improve productivity while ensuring ecosystem sustainability.
- Participate in traceability schemes to demonstrate transparency in the production system.

Corporate actors (e.g. traders, downstream companies, processors)

- Adopt explicit, measurable commitments to protecting the Gran Chaco biome, underpinned by robust monitoring systems and transparent reporting to ensure accountability to stakeholders.
- Strengthen and expand current initiatives at farm and value chain levels, providing clear and traceable information that builds trust with investors, clients and civil society.
- Support fair and effective compensation mechanisms for producers implementing conservation practices, while prioritizing their needs and incentives within core business strategies.

Multilateral organizations

(e.g. World Bank, regional development banks)

- Continue to promote financing and technical support for the conservation of ecosystems in the Gran Chaco, channelling resources through programmes such as REDD+ and supporting long-term conservation projects.
- Assist and advise governments in creating and executing public policies and regulatory frameworks that promote sustainability and regional collaboration throughout the biome.
- Enforce environmental clauses in trade agreements between countries and private entities.

National and subnational governments

- Implement and enforce policies for land conservation and restoration, offering economic and fiscal incentives to producers who adopt sustainable practices.
- Establish monitoring and control systems to ensure compliance with environmental regulations, with a special focus on protecting native areas (e.g. forests, wetlands).

Researchers

- Generate data and knowledge on best practices for sustainable production in the Gran Chaco, contributing scientific evidence for conservation policy and strategy design.
- Collaborate with local actors to adapt sustainable practices to the specific challenges of the Chaco, promoting technology transfer and environmental monitoring.

Conclusion

The Gran Chaco offers an unprecedented opportunity to create a global model for reconciling production and protection.

The Gran Chaco is both a biodiversity hotspot and a vital provider of resources for local communities and national economies. Its rich ecosystems – forests, savannas, wetlands and grasslands – are home to over 3,400 plant species and numerous animal species, many of which are under threat from agricultural expansion, land conversion and wildfires. The region also holds immense cultural value, being home to diverse traditional peoples whose ways of life are deeply interconnected with the biome.

However, the Gran Chaco is not a singular entity – it is a mosaic of interconnected subregions, each shaped by distinct climates, landscapes and development pathways. While the Humid Chaco, with its wetlands and fertile floodplains, supports more intensive agriculture and cattle ranching, the Dry Chaco faces harsher environmental conditions, requiring tailored strategies for water management, infrastructure development and sustainable land use. Recognizing this plurality is essential to designing policies that respect local identities and realities, while fostering a coordinated, tri-national approach that balances conservation and economic growth.

Amid rising global demand for food and commodities, the Gran Chaco presents an unprecedented opportunity to become a global model for reconciling production with environmental stewardship. Governments, businesses, NGOs and multilateral organizations have already taken steps to advance sustainable solutions in the region. Expanding and scaling-up these initiatives will be key to unlocking the full potential of the biome.

By embracing this transition, Argentina, Bolivia and Paraguay can position the Gran Chaco as a leader in green economic development – one that integrates economic prosperity, ecological integrity and social inclusion. This white paper is a call to action – to strengthen regional cooperation, scale-up sustainable investments and ensure that the Gran Chaco thrives as a productive, resilient and biodiverse landscape for generations to come.

Annex

TABLE A1 **Summary of laws, plans and projects governing climate action in Gran Chaco countries**

Instrument	Argentina	Bolivia	Paraguay
United Nations Framework Convention on Climate Change	Law 24.295/1994	Law 1576/1995	Law 251/1993
Kyoto Protocol	Law 24.438/2001	Law 1988/1999	Law 1447/1999
Paris Agreement	Law 27.270/2016	Law 835/2016	Law 5681/2016
National laws	Law 27.520/2019 on Minimum Standards for Adaptation and Mitigation to Global Climate Change	Law 300/2012 - Framework Law of Mother Earth and Integral Development for Living Well	Law 5875/2017 on National Climate Change
National plans and strategies	National Action Plan for Forests and Climate Change (National REDD+ Strategy), National Agro and Climate Action Plan, National Mitigation Plan, National Adaptation Plan	National Strategy on Forest and Climate Change	National Strategy for Adaptation to Climate Change, National Adaptation and Mitigation Plans for Climate Change
Green climate fund projects	Results-based payment project approved in 2020 for $82 million		Results-based payment project approved in 2020 for $50 million

Source: Castro Arze et al., 2021.[111]

TABLE A2 **National strategies for management of forest resources in Gran Chaco**

Theme	International initiatives	National initiatives		
		Argentina	Bolivia	Paraguay
Forest monitoring systems and deforestation alert systems		Early warning system for deforestation (SAT) monitors native forest loss for rapid response to illegal deforestation	Identification and monitoring system (SIS-D) uses satellite images to track deforestation at high resolution	Satellite-based deforestation monitoring system involving the Ministry of Environment and National Forest Institute, essential for control and environmental licencing
Restoration of degraded forests	Ecosystem restoration initiative (UNEP-FAO)	National Plan for Native Forest Restoration	NGO and academic collaboration on forest restoration, including rehabilitation under the Forest Law	Restoration pilot studies with the Natural Environment Directorate, focusing on degraded areas in the Chaco
Silvo-pastoral management		National Forest Management Plan with Integrated Livestock	ABT 002/2019 regulation establishes standards for silvo-pastoral management; promoted specifically in the Gran Chaco	Law No. 1561 establishes environmental assessment norms, emphasizing silvo-pastoral management in the Gran Chaco
Community forest use	GEF (Global Environment Fund) project for sustainable transboundary forest management in the Gran Chaco; Euroclima project for sustainable forest management	Native forests and community project focuses on sustainable community engagement in Chaco regions	Law 338 regulates sustainable family agriculture activities involving Indigenous and campesino communities	National Forest Strategy for Sustainable Growth and Development 2030 (ENBCS) aligns with the National Development Plan

TABLE A2 | **National strategies for management of forest resources in Gran Chaco** (continued)

Theme	International initiatives	National initiatives		
		Argentina	Bolivia	Paraguay
Wildfires		Law No. 26.815/2013 establishes national minimum standards for forest fire protection	Law No. 1171/2019 regulates controlled burning, specifically relevant to fire management in rural areas of the Chaco	Law No. 4014 establishes protocols for wildfire prevention and control, focusing on forest, vegetation and interface areas. Decree 2868/2024 regulates Law No. 6818/2021 on Integrated Fire Management, establishing the Forest Fire Monitoring System for early detection, prevention and response to wildfires

Source: Castro Arze et al., 2021.[112]

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