SYSTEMIQ

BLENDED FINANCE TASKFORCE

BETTER FOOD, BETTER BRAZIL

ACCELERATING FINANCE INTO NATURE-POSITIVE AGRICULTURE IN BRAZIL

OUTLINE

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The report's modelling work draws heavily on previous efforts to estimate hidden costs, business opportunities and investment requirements at a global scale from FOLU's *Growing Better* report and AlphaBeta's *New Nature Economy* report. We received insights and guidance from Diletta Giuliani, Oscar Ibsen and Lloyd Pinnell at SYSTEMIQ and Shivin Kohli at AlphaBeta in adapting and applying the analysis to Brazil. For details of the modelling, please see the annexes in the full report. There is also a rich and extensive body of existing research and analysis from which we benefitted. The bibliography in the full report details the key reports and studies consulted by this report's authors.

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Partnerships for Forests UKaid from the British people

BLENDED FINANCE TASKFORCE

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BETTER FOOD, BETTER BRAZIL: Executive Summary

The What

Our current food system is failing us. The way the world currently produces and consumes food globally is having a catastrophic impact on human and planetary health. Today's food and land-use systems create $12 trillion in hidden costs every year across the world,[1] from impacts to public health, the environment and society. And the world is waking up to this fact.

Food is now at the centre of global discussions around climate change, social inequalities and a COVID-19 economic recovery. The UN hosted its first ever Food Systems Summit in September 2021. Prominent global actors, such as Pepsi and Walmart, are making commitments to regenerative food that will exclude unsustainable producers from key markets. Consumers are boycotting irresponsibly sourced food, creating an ever-increasing demand for sustainable products.

To achieve the UN SDGs, global food systems must transition to become planet- and people-positive. This means creating a global food system that still spurs economic growth and feeds a growing population while also fostering nutritious diets, improving livelihoods and protecting nature: a food system that looks to long-term profitability rather than prioritising short-term gains, that does not sow inequality or conflict, and that does not irreversibly deplete the resources on which it depends.

Brazil's local food system will play a critical part in achieving a global food system transformation. Farms across the Cerrado savannah, Atlantic Forest and the Amazon put breakfasts on people's kitchen tables around the globe – producing half of the world's orange juice and sugar, one third of its coffee, and half of the soya beans that feed egg-laying hens.[2, 3] Brazil also stores a quarter of the world's carbon and is home to one in ten of all species on Earth.[4]

The impacts of Brazil's food system are not just confined to Brazil – they affect the economies, climates and diets of the world over. Just this year, 1.5 million km^2 of crops in Brazil – an area the size of Peru – were scorched and then frozen by the worst drought in a century quickly followed by an unprecedented thick frost. The cost of Arabica beans increased by 30% in six days, orange juice jumped 20% in three weeks and sugar prices hit a four-year high, contributing to a surge in global food prices and hardships for many lower-income families.[5]

This puts Brazil at a critical juncture. Brazil's agribusiness sector has played a pivotal role in growing the country's economy from $500 billion in 2002 to $1.9 trillion in 2019.[6] However, for this economic success to continue, Brazil must transform its food system to one that is nature- and people-positive as well as resilient. This report proves such a transformation is possible, but Brazil is running out of time.

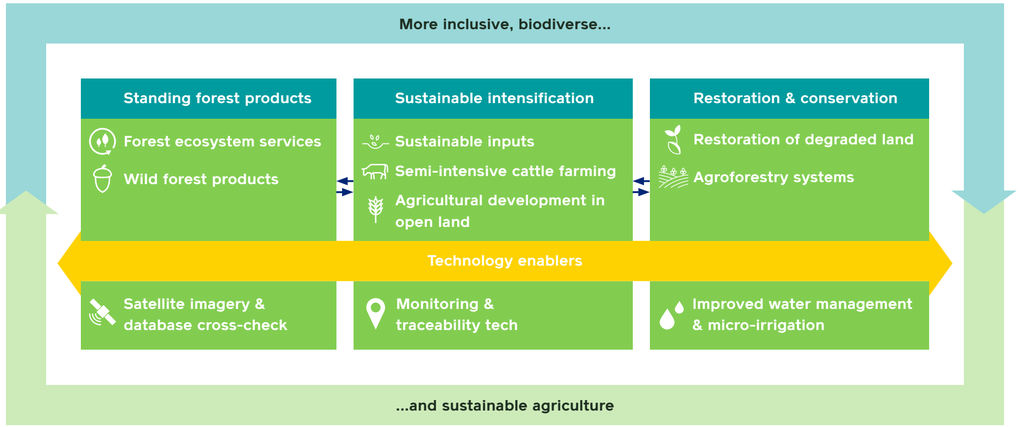
The Why

By transitioning its food system, Brazil can reduce the $300 billion worth of hidden costs currently incurred annually. These hidden costs largely result from (i) environmental damage such as greenhouse gas emissions, biodiversity loss and water scarcity, (ii) public health costs from obesity, undernutrition and pollution, and (iii) impacts on society such as rural poverty and (iv) inefficiencies such as food and fertiliser waste.

A transition will also generate $70 billion worth of new business opportunities per year, more than three times the investment requirement of $21 billion, creating 8 million new jobs by 2030. All stakeholders will share these benefits in the Brazilian food system. For the production sector, a transition will lead to (i) longer-term profits, (ii) reduced risk due to multiple income streams and (iii) increased food security. For the investment sector, a transition will (i) reduce reputational risks and accommodate changing consumer preferences, (ii) avoid transition risks from regulatory changes and (iii) reduce exposure to nature-related risks such as droughts, fires and frosts. For the public sector, a transition will (i) alleviate pressure on public expenditure to mitigate hidden costs, (ii) boost tax revenues and (iii) improve social inclusion through the creation of alternative livelihoods in the forest frontier.

The How

Finance is key to mobilising the $21 billion a year to scale eight nature-positive business models required for such a transformation.[7] The report splits these into business models that create value from (i) standing forest products, (ii) sustainable intensification, (iii) restoration and conservation and (iv) technology enablers that enhance productivity and generate cost savings. The scope of this report centres on production-focused business models, and hence this list of opportunities is not exhaustive.



** Standing forest products refer to food from trees grown in primary or native forests*

** Restoring degraded land includes muvuca, a restoration method consisting of sowing a mix of high-density tree seeds directly in the field*

** The intersection of semi-intensive cattle farming and agroforestry systems includes Integrated Crop-Livestock-Forestry Systems (ICLFS)*

** Agroforestry systems considered here focus on forest regrowth as the primary technique to drive restoration of degraded land*

However, in transitioning to nature-positive models, producers face nascent business models and markets as well as the high uncertainty and costs associated with transition. Maximising agricultural output without additional deforestation requires a 50% increase in farm equipment to prepare the land[8] and technical assistance to learn how to use it. It also entails forgoing short-term earnings from continuing unsustainable production while the new business matures, gains scale, enters new markets and turns a profit.

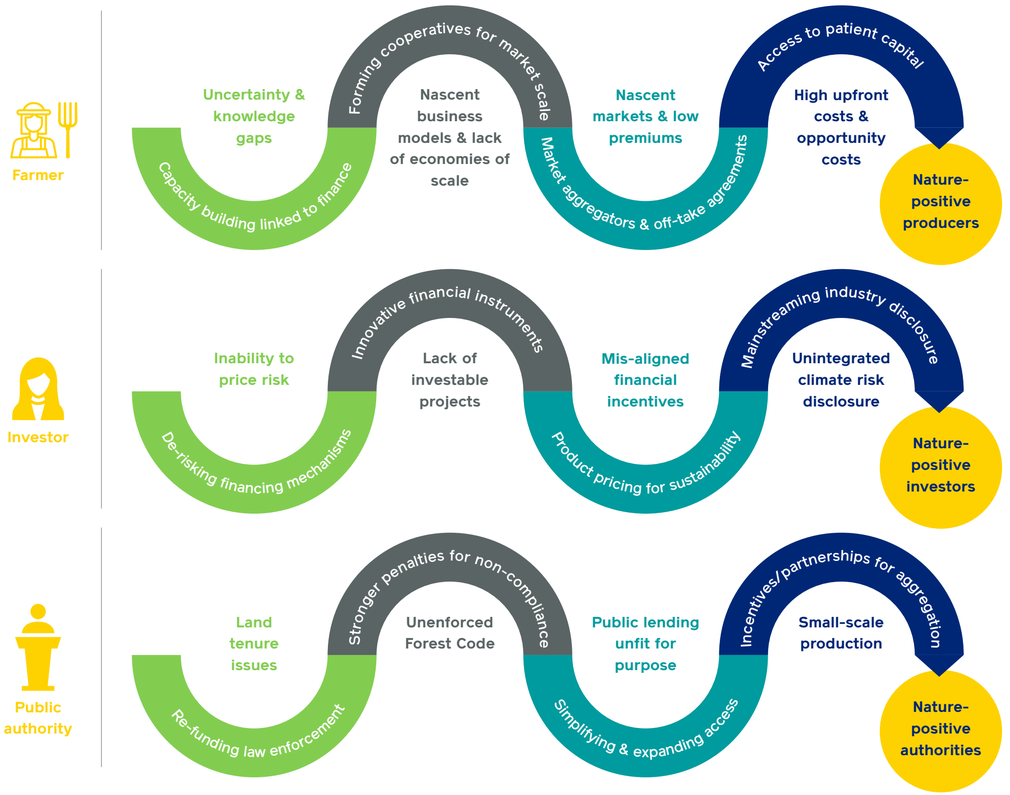
Producers can overcome these barriers through hands-on capacity building, cooperatives to gain scale, partnerships with market-access agents and patient capital until take-off. Capacity building can help farmers fill their knowledge gaps by providing learning-by-doing opportunities in demonstration units. Cooperatives can then provide logistical support, process their products and trade them in domestic and international markets to gain scale. Cooperatives have been among the top growth performers during the COVID-19 pandemic and have played a significant role in connecting family farmers from marginalised rural areas to the market economy. Partnerships with market-access players – such as market aggregators and off-takers – can increase market exposure and product differentiation, allowing producers to sell at a premium and earn higher profits. Moreover none of this will be possible without access to patient capital that offers longer time horizons, payment flexibility and greater risk tolerance.

Transition investors have a hard time pricing the risk of sustainable business, lack an investment-ready pipeline, have misaligned incentives and do not integrate climate risk in their decisions. Currently, loans are granted with short repayment periods suited to the traditional bi-annual monoculture cycle, as opposed to sustainable producers whose risk is hard to price. This is compounded by the lack of investable projects and counterincentives to prioritise short-term profits over long-term sustainability. This misalignment occurs because lenders overlook the climate change threats they are exposed to.

To revert this, investors must leverage philanthropic and development capital to de-risk investment, create innovative tools to grow businesses, right price sustainability correctly and mainstream industry disclosure. De-risking financing mechanisms such as blended finance facilities with first-loss capital and credit guarantee options can improve the risk profile of early/growth-stage companies. Innovative financial instruments like weather insurance and green, sustainability and deforestation bonds can then help build pipelines more attractive for institutional investors. Investable pipelines, in turn, facilitate the benchmarking and pricing of sustainable portfolios that meet rigorous sustainability requirements following ESG due diligence. Finally, investing in these portfolios that not only assess risk but also better price sustainability at sector level can incentivise lenders to adopt industry risk disclosures.

Finally, the public sector does not sufficiently incentivise actors in the food system to change their practices. On the contrary, land tenure, which serves as collateral for access to capital, is problematic, as land grabbers are not penalised and land registries are broken. The Forest Code, a primary legal instrument to regulate land use in private rural areas, is not fully enforced, and public loans are not suitable for sustainable investment. Nature-positive models do not obtain sufficient rural credit, and transition farmers have a hard time accessing it. These disincentives result in small-scale, dispersed production.

To create an enabling environment that attracts private capital, the sector needs to bring back enforcement, strengthen penalties for non-compliance, make public lending accessible and encourage aggregation. This should include re-funding enforcement entities like the Brazilian Institute of the Environment and of Renewable Natural Resources (IBAMA) or enforcing penalties for illegal deforestation – penalties that made a difference in the past when they were implemented. Stricter enforcement and guaranteed land tenure provide the necessary security for investment. Complementary to this, the reduction of burdensome applications, expansion of public credit lines for models such as agroforestry systems and trained business correspondents in rural areas can make public lending more accessible and fit for purpose. With these enablers in place, public authorities can provide incentives (e.g., subsidies or land zoning) and use their convening power to create sustainable investment corridors and clusters. These areas of concentrated nature-positive production can offer viable alternatives to deforestation for smallholder farmers, who represent two thirds of the rural workforce.



The Who

This report highlights eight top priority actions for specific stakeholders in the Brazilian food space.

- **For the donor community:** Provide better de-risking strategies in early-stage project development to support nascent business models throughout their expansion stages.
- **For development finance institutions (DFIs) and donor-funded vehicles:** Channel long-term capital that is risk-tolerant, concessionary and flexible, to crowd in private capital at scale.
- **For Brazilian economic decision-makers, public and international private banks:** Strengthen public and private green credit provision, simplify its application and reduce knowledge gaps through business correspondents that share information and better assess risk.
- **FFor food processing, distribution, trading and wholesale firms, corresponding lenders, and conservation NGOs:** Strengthen pre-competitive sectoral collaborations to build coalitions that enable information sharing and market research to grow business opportunities faster.
- **For coalitions of corporates, governments, climate funds and conservation NGOs:** Help improve carbon market integrity through offtake agreements, standardisation of internationally recognised certifications and project delivery facilities.
- **For heads of sustainability units, government innovation labs, nascent market-access entrepreneurs and financial technology firms:** Support market aggregators that can transfer technological packages and unlock credit more efficiently.
- **For farmers and producers:** Set up or join cooperatives that can build capacity and increase collective bargaining power in order to access better credit, markets and training.
- **For the federal government, state land institutes and land registry offices:** Enable and enforce policies to secure land rights, especially for traditional communities in the forest frontier.

The When

Brazil needs to start transitioning its food system *today* – before it is too late. The business models, financial capital and policy instruments to create the $70 billion worth of opportunities per year already exist, and the $300 billion worth of hidden costs are only set to mount. Given the international attention that the country is attracting and the growing concern of domestic actors over climate change, from agribusiness to indigenous people, there will not be a better time to embark on a transition. Accelerating investment in the forest frontier can create sustainable growth poles for agribusiness while protecting the livelihoods of traditional communities, radically changing the way food is produced – and financed. Brazil can become a trailblazer in this space, paving the way for other countries to follow suit. The 'lungs of the planet' and global biodiversity hang in the balance.

"The tipping point is here, it is now."

– Carlos Nobre, Brazilian scientist and meteorologist

CHAPTER 1

Brazil has a unique opportunity to transition its food system into one that is nature-positive

I. AN OPPORTUNITY STORY

Brazil's vast amount of natural capital puts the country in a unique place to transition to a new food system that is people- and planet-positive. A nature-positive food system generates strong financial returns and meets nutritional needs while simultaneously delivering a larger diversity of plants and animals and not degrading ecosystems.[9] It follows a set of farming practices present in the country to keep soil healthy, water flowing and carbon stored. It works alongside nature to produce food rather than against it. It regenerates soil and recycles water, maintaining agrobiodiversity and providing the ecosystem services on which farming depends. A nature-positive food system ultimately seeks to maintain high productivity levels to give farmers alternative livelihoods that are economically viable, environmentally sustainable and climate-change resilient.

Brazil has the structure, maturity and knowledge to become a leading global producer of sustainable foods. To accelerate and scale a transition to nature-positive agriculture, the country has:

i. **the sustainable business models** with identified revenue sources, product lines and market prospects that can unlock economic opportunities and improve productivity, profitability and resilience;

ii. **the financial capital** and instruments under construction that can incubate and accelerate businesses to help investors tap into frontier markets, reduce risks and yield higher long-term returns while protecting nature; and

iii. **the policy toolkit** to create an enabling environment by addressing coordination and enforcement barriers to align stakeholders' incentives and stimulate decent COVID-19-recovery jobs, higher tax collection and enhanced social development.

Shifting to a nature-positive food system will allow Brazil to capture 7% of the world's $1 trillion market per year (Figure 1).

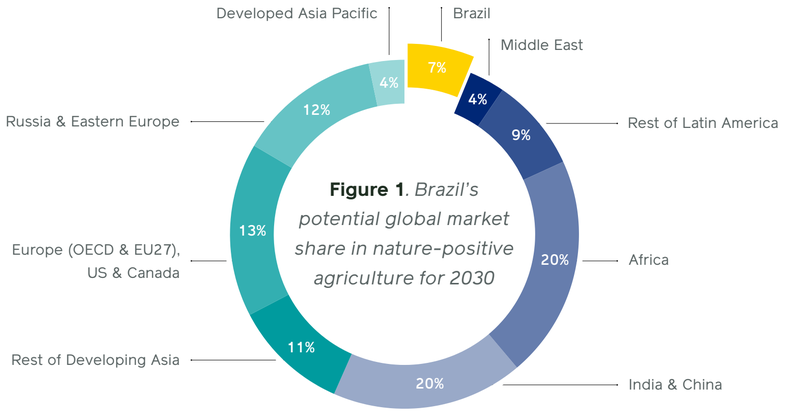


Figure 1. *Brazil's potential global market share per year in nature-positive agriculture for 2030*

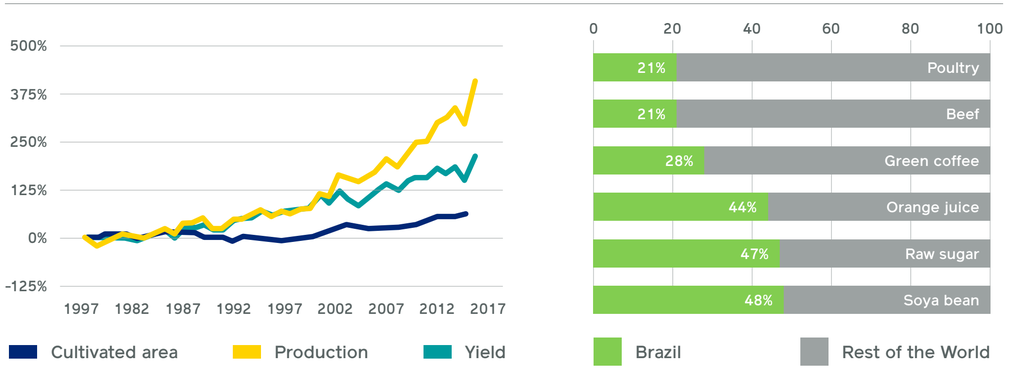
Source: *Authors' calculations based on FOLU, 2019 and WEF, 2020*

II. BRAZIL'S CURRENT FOOD SYSTEM

The agribusiness sector is the backbone of Brazil's economy. In the last 40 years, grain production has grown by 400% (Figure 2), transforming Brazil into an agricultural powerhouse. Brazil's agribusiness sector contributes to one third of Brazil's GDP[10] and has played a pivotal role in growing the economy from $500 billion in 2002 to $1.9 trillion in 2019.[11] The sector has helped develop Brazil's southern and mid-western regions, with each part specialising in different products: coffee, sugarcane and citrus in the south east; soya beans in the central south; cotton in Mato Grosso; and cocoa in Bahia and Pará.

Now the fourth largest global food producer, Brazil has become one of the world's breadbaskets. According to data from the Food and Agriculture Organization (FAO), Brazil produces 39% of the world's sugarcane, 34% of its soya beans, 30% of its coffee, 22% of its oranges and 15% of its beef. Much of this is destined for the export market – with Brazil being the world's largest exporter of soya beans, raw sugar, orange juice, green coffee, beef and poultry (Figure 2). The agribusiness sector has proven not just successful but resilient too – continuing to grow through 2020–21 during the COVID-19 pandemic, unlike the service and industry sectors.[12]

Figure 2. *Brazil's historical grain production growth (left) and share of global exports of its top 6 export commodities (right) (%)*



Source: *Authors' calculations based on Conab (left) and FAOSTAT (right). Note: The data for the cultivated area was in millions of hectares, production in millions of tonnes and yield in tonnes per hectare.*

However, this immense success has not come without cost and cannot be sustained in the medium term. Brazil's current food system is generating collective environmental, health and social costs, reducing the profitability of Brazilian agribusiness and costing the Brazilian economy $300 billion per year (Figure 3).

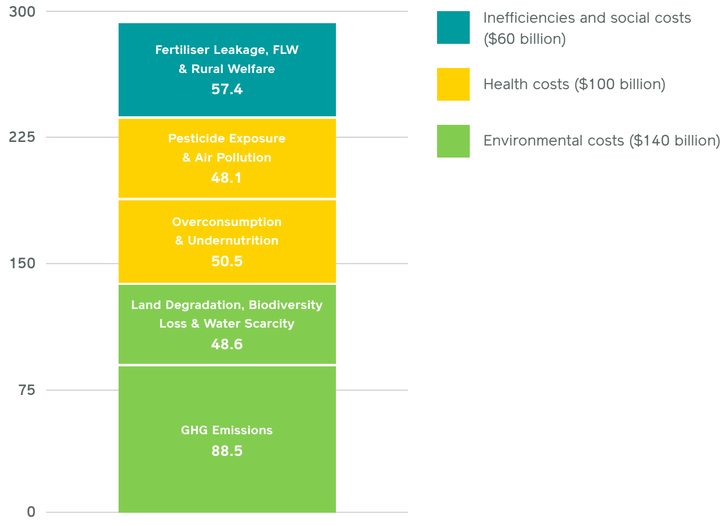


Figure 3. *Graph showing the hidden costs of Brazil's current food system*

Source: *Authors' calculations based on IMHE GDB, FAOSTAT, WEF & Harvard, World Bank, GLASOD, SEEG, GLOBOIM and more. For full explanation and breakdown, see Technical annex.*

The majority of these costs are the result of environmental externalities ($140 billion/year).

- **Since 1970, 90% of the Atlantic Forest,[13] 50% of the Cerrado and 20% of the Amazon rainforest have been deforested.[14]** Between August 2019 and July 2020, an area of 11,088 km2 of rainforest (seven times the size of Greater London) was cleared in Amazonia. Portions of the Amazon rainforest now emit more CO2 than they absorb.[15] Agriculture and land-use change are the leading causes of Brazilian greenhouse gas emissions,[16] driving costs associated with climate change such as frosts, droughts, fires and a loss of productive life.
- **The reduced forest cover means Brazil's forests are recycling less and less water.[17]** This disrupts precipitation patterns, reduces rainfall and increases temperatures in the Amazonia and Cerrado regions. Studies show agribusiness is set to lose between $1–3.5 billion of revenue each year from decreased yields.[18, 19] Also, the National Supply Company (Conab) predicts the productivity of the second harvest of corn (kg/ha) will fall by 25% this year compared with last year due to prolonged droughts and frosts.[20]
- **The cost of water scarcity is on the rise.** Brazil is home to 12% of the world's freshwater reserves, but around 70% of its water supply is already employed in agriculture.[21] Prolonged droughts are creating costs to the Brazilian economy from increasing the need for irrigation, driving national inflation from rising energy tariffs[22] and making transportation of goods more expensive due to lower waterway levels,[23] to name a few.
- **Biodiversity loss coupled with soil erosion and land degradation presents huge economic costs.** Brazil is home to around 15–20% of the world's biodiversity, with an average of 700 new animal species discovered every year.[24] However, a study in 2014 by the Brazilian Institute of Geography and Statistics (IBGE) showed 20% of these species are under threat.[25]

The current food system also creates hidden costs to public health ($100 billion/year).

- **The intensification of the dry season in Eastern Amazonia is increasing fire occurrence.[26]** In September 2019, the forest fires of that year saw 4.5 million people exposed to harmful atmospheric pollution, causing 2,195 hospitalisations due to respiratory illness.[27]
- **Health costs are also being incurred from the widespread use of pesticides and malnutrition.** Brazil is now the third-largest user of pesticides in the world,[28] according to the FAO. And despite considerable successes to date in reducing malnutrition, Brazil's current food system is still leading to nutritional deficiencies and increasing levels of obesity (which grew in the adult population from 15% in 2001 to more than 22% in 2016[29]).

Moreover, Brazil's current food system is (i) burdened by inefficiencies and (ii) leading to social costs such as rural poverty ($60 billion/year).

- **Wasted resources could be put to better use.** Around one third of food is wasted along the supply chain,[30] and according to the authors' calculations, Brazil wastes $8 billion each year in fertilisers.
- **Meanwhile, long-standing decreases in agricultural poverty may have slowed or even stagnated.[31]** Around 40% of the Brazilian rural population lives below $5.5/day,[32] costing the Brazilian economy $2 billion each year to mitigate rural poverty. A study of 286 municipalities in the Brazilian Amazonia found that socio-economic indicators like living standards, literacy and life expectancy improve as deforestation begins but decline to previous levels as the frontier advances.[33]

Therefore, it is clear that the Brazilian food and agricultural sector must evolve in order to maintain its remarkable economic growth. Brazil must transform from a siloed model – where producers, financiers and consumers optimise resources individually – to one where costs are considered collectively.

CHAPTER 2

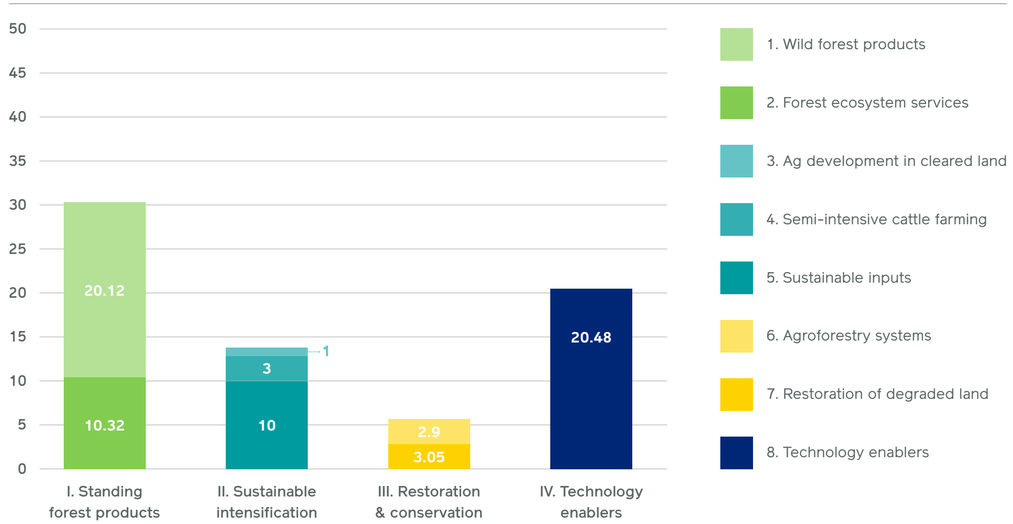
Nature-positive business models need to be scaled and replicated for Brazil to achieve such a transition

Brazil has a range of nature-positive business models that can help the transition to a nature-positive food system. This chapter discusses eight of these, split into four groupings, and provides tangible examples of businesses. In doing so, we showcase the diversity and range of business models and production techniques that Brazil could scale to realise this opportunity and become a global leader in nature-positive agriculture. These models are not mutually exclusive, and some of their elements may overlap due to intrinsic evolution towards integrated farming practices.

Finance will be a crucial lever for growing these nature-positive businesses. Finance must be redirected away from existing harmful agricultural practices in favour of the business models outlined below. Put simply, Brazil must scale and optimise what is nature-positive in its food system. By mobilising capital to accelerate and scale these business models and production methods, Brazil can improve productivity, increase profitability and enhance resilience.

Shifting to nature-positive agriculture can create annual business opportunities worth $70 billion for Brazil by 2030 (Figure 4).[34] These business opportunities reflect the revenues of new business niches (e.g., selling traceable deforestation-free commodities) or freed-up resources when introducing new farming practices (e.g., land cost savings for less extensive cattle ranching) that can be re-allocated.

Figure 4. *Estimated annual business opportunities by 2030*



Source: *Authors' calculations based on FOLU, 2019 and WEF, 2020*

I. STANDING FOREST PRODUCTS

The first group of business models comprises those that enhance the value of standing forests. These create new value chains from native forests, including wild forest products like nuts and resins, or those that finance natural climate solutions.

1. Wild forest products ($20 billion/year)

Wild forest products (WFPs) represent a growing market for Brazil. WFPs are products sourced from autonomously growing forests such as oils, fruits, edible nuts and seeds, leaves and roots, and bark and resins. The WFPs with the highest market participation in Brazil are açai and Brazil nuts (Box 1).[35] Both have been named superfoods.

Demand for these products has surged over the last decade, with the production of açai almost doubling in value and volume.[36] The açai market was worth $720 million in 2019 and is expected to grow to $2 billion by 2025.[37] The global market size for WFPs is expected to grow to $125 billion by 2030,[38] and Brazil can capture around $20 billion[39] per year by 2030.

WFP businesses also benefit the environment and society. Mature forests, which WFPs are usually extracted from, can retain twice as much aboveground carbon stock in the Amazon rainforest than natural regeneration from abandoned agriculture.[40] Meanwhile, although açai is harder to scale and manage than soya, farmers can earn three times more per hectare.[41]

Box 1. *Sourcing Brazil nuts from indigenous communities to the world*

Project
Cooperativa dos Agricultores do Vale do Amanhecer (COOPAVAM)

Opportunity area
Standing forest products

Capital mobilised
$1.3 million

Segment
Wild forest products

Objective: COOPAVAM is a cooperative of smallholders that processes Brazil nuts into oil and flour and sells them for use in food, health and cosmetic products. The cooperative consists of rural settlers who collect the nuts from smallholders and indigenous people located in north-west Mato Grosso – one of the Amazon deforestation frontiers.

COOPAVAM's business model has provided the basis on which an entire local forest economy and social ecosystem has been built. It consists of strengthening indigenous land tenure and creating community land management plans to produce deforestation-free nuts in 1 million hectares of Amazon forest. The cooperative receives above-average prices, largely due to strong negotiations and a tax exemption from the government. It can generate profits 64% and 145% above cattle and logging, respectively.

COOPAVAM partners with Carrefour to sell Brazil nuts on the shelves of the supermarket chain. In 2020, 15 tonnes of nuts were made available across stores in Brazil – from Manaus to Porto Alegre states.[42] That same year the cooperative signed an agreement with Gebana, a market access network for producers in disadvantaged regions, to commercialise 48 tonnes of nuts.[43] The business also has a deal with Natura – a Brazilian global personal care cosmetics group – to sell nut oil for its Ekos brand.[44]

2. Forest ecosystem services ($10 billion/year)

Business models focused on forest ecosystem services present another market opportunity for Brazil. Ecosystem services are benefits to humans that are provided by nature. Forests and their biodiversity provide society with services like clean air and water, nutrient recycling for productive soil, and carbon sequestration. Brazil is home to around 60% of the Amazon rainforest, responsible for one quarter of the 2.4 billion tonnes of carbon the world's forests absorb each year. Holding 100 billion tonnes of carbon stocks[45] and home to 1 in 10 known species on Earth,[46] the Amazon, and hence Brazilian farmers and governments, are well-positioned to become global leaders in supplying carbon credits and other ecosystem services. It is expected that the market for forest ecosystem services will grow to $85 billion by 2030,[47] and Brazil can capture around $10 billion annually.[48]

Forest ecosystem services are attractive as they present a complementary source of revenue for farmers. In exchange for watershed protection, reforestation, land restoration and avoided forest conversion, farmers can receive financial compensation known as payments for environmental services. For example, Conserv (a programme launched in 2020 by the Amazonia Environmental Research Institute (IPAM) with support from the governments of Norway and the Netherlands) pays $35–70 per hectare to help farmers preserving their Amazonia legal reserve.[49] The programme aims to issue thirty 30-month contracts in Mato Grosso to help conserve 22,000 hectares of legal reserves in three years. Similarly, the LEAF Coalition, an offset agreement supported by corporates like Bayer, Unilever and Amazon, and the governments of the United States, United Kingdom and Norway, pays state governments a minimum of $10 per tonne of CO2 emissions reduced[50] to create an incentive to avoid deforestation.

II. SUSTAINABLE INTENSIFICATION

The second group of business models involves intensifying production in a sustainable way. Under this group of business models, commodity crops are grown, typically in large volume and at high intensity, specifically for sale to the commodities market (as opposed to direct consumption or processing),[51] but with improved land management practices to reduce the environmental impacts. The crops include corn, soya, cotton, tobacco and sugar beet.

3. Agricultural development on cleared land ($1 billion/year)

The first business model in this category is the improvement and cultivation of already cleared land that has been vacated, underused or naturally regenerated. This business model contrasts with the current practice of expanding production into areas that are currently virgin forests.[52] In this way, Brazil can reduce the hidden costs from its food system while continuing to meet market demand sustainably.

Brazil would need to raise soya production by 30% over the next 10 years to meet projected demand increases. The World Economic Forum estimates that demand from emerging markets for deforestation-linked commodities could increase by 43% by 2025 due to population growth and dietary shift.[53] This could require an increase in the area used for soya bean cultivation from 12 million to 27 million hectares by 2030.[54]

Traditionally, this demand would be met through deforestation, with all the associated hidden costs. However, there are already 20–50 million hectares in the Cerrado suitable for soya[55] that could be used instead. Improving this land allows for more sustainable production expansion.

There is a new business opportunity here for certified sustainable produce. As traceability becomes increasingly required for international trade (Box 2), agricultural expansion to open land can help meet the rising demand for certified deforestation-free products. The global market for certified soya beans, cocoa, coffee and palm oil is expected to grow to $20 billion by 2030,[56] out of which Brazil can capture around $1 billion[57] per annum, equivalent to 5% of the global market.

This business model could also help ensure farmers have access to competitive credit. Farmers who expand production onto their mandated legal reserve (Box 9) become ineligible for subsidised rural credit[58] and government extension services.[59] Improving open land instead avoids this risk.

Box 2. *Informing agricultural expansion with intelligence units*

Project
Agroideal

Opportunity area
Sustainable intensification

Capital mobilised
n/a

Segment
Agricultural development on cleared land

Objective: Agroideal was launched by The Nature Conservancy and the ProYungas Foundation, alongside a coalition of over 14 other companies, NGOs and government entities. It is a free online intelligence system that collates socio-environmental (e.g., deforestation, level of conflict for land tenure) and economic (e.g., pastureland suitable for soya crops) information into a single database.

The detailed spatial information at a low geographical level helps traders ensure they source their supply from non-deforested areas in the Amazon and Cerrado biome. It also allows users to identify where they can expand soya and beef production in a way that minimises environmental impact and maximises return on investment.

From its first launch in September 2017 to September 2018, the Agroideal platform has received 4,000 visits from 2,200 users, and more than 700 of these users visited the page at least twice. Almost one in two visitors are from Brazil, with other visitors coming from 72 countries, including the United States (17%) and Argentina (5%).[60] High-level executives of leading agribusiness firms with headquarters in the United States have been showing interest in the application of Agroideal, which explains the country's considerable share of visitors.

4. Semi-intensive cattle farming ($3 billion/year)

There is a significant business opportunity in Brazil for ranchers to shift to more sustainable practices. Globally, sustainable cattle grazing is expected to be worth $65 billion by 2030.[61] In Brazil, we estimate the sector has a potential of $3 billion[62] each year – representing 5% of this global prize. Sustainable ranching means using (i) less land and (ii) more efficient, high-quality inputs such as improved feed, animal health and replanted pasture.

Traditional cattle ranching practices in Brazil can be associated with deforestation. More than 80% of deforestation is associated with forests being cut down for pasture.[63] In Amazonia, one quarter of this deforested land is later abandoned.[64] Due to the size of ranches and their impact on soil nutrient levels, vast areas of Brazilian land become useless for cattle ranching over time, forcing ranchers to encroach into new areas to maintain production levels.

There are proven cattle intensification methods that can support the long-term use of pastureland with little or no loss of fertility or productivity. The average cattle farm currently operates at just 32–34% of its production capacity. Low technology intensity, low maintenance of pastures and low levels of soil fertilisation are among the main reasons for underperformance.[65] Conversely, semi-intensive cattle ranching practices are profitable – for those that are 300–400 hectares in size in particular.[66, 67] These higher profits result from productivity gains,[68] land appreciation and the viability of more profitable production systems such as breeding and fattening.[69] An excellent example of this is Pecsa (Box 3).

Integrating livestock with other products like crops and forestry can be another good option for Brazilian ranchers, particularly when on already degraded land. Through integrated crop-livestock-forestry like silvopastoral systems or forest-pasture systems, farmers can combine, rotate and sequence the three components of crops, livestock and forestry in the same area.

Integrated systems result in a plethora of benefits. These systems can improve soil properties thanks to increased organic matter and reduce productivity loss during heatwaves. They can also enhance biodiversity and lower incidence of diseases and weeds despite reduced agrochemical use and greater input efficiency. Finally, these integrated systems can reduce erosion risk and pressure to clear and open new areas for agriculture.

In addition, this business model reduces the risk for farmers as they are less reliant on a single income stream in the event of droughts, crop failure or drops in demand. Best of all, integrated cattle ranching leads to increased food production at a lower cost. According to a 2021 study by Amazon Institute of People and the Environment (IMAZON) and the Amazon Entrepreneurship Centre, integrated livestock practices can boost output per hectare by 3–5 times,[70] while reducing half of the pastureland can increase earnings by 20%.[71]

Despite the benefits created, semi-intensive cattle farming does not come without its challenges. Intensification has significant animal welfare implications linked to restrictions on movement, disease transmissions and the emergence of antimicrobial resistance due to overuse of antibiotics. The lessons learned elsewhere should be rapidly transferred so as to develop risk mitigation capacity in these settings. Where intensification is more advanced, the institutions, regulations and mechanisms to monitor animal health that are required to manage these externalities must be in place.

Box 3. *Increasing productivity and restoring degraded land through cattle intensification*

Project
Pecuária Sustentável da Amazônia (Pecsa)

Opportunity area
Sustainable intensification

Capital mobilised
$10.5 million

Segment
Semi-intensive cattle farming

Objective: Pecsa is a company that aims to increase livestock productivity to reduce deforestation in the Amazon Rainforest. The company takes over the operations of a degraded ranch for 6–10 years, transforming extensive cattle ranching systems into semi-intensive systems.

Pecsa conducts an initial diagnosis to understand the opportunities and constraints of the ranch and then takes appropriate action, such as (i) clearing and preparing the land to plant and restore pasture; (ii) reforesting areas with environmental liabilities; (iii) setting up semi-intensive cattle ranching techniques such as fences, water ponds and feeding platforms; (iv) training staff to help the farm comply with environmental regulations; (v) setting up a traceability system with geospatial technologies to monitor livestock. Pecsa requires its clients to commit to a zero-deforestation supply chain and comply with Brazil's national Forest Code.

In doing so, Pecsa enhances the profitability of total production by 25% by raising six times the number of animals per hectare than the national mean. As a result, it reduces the CO2 per kilo of beef produced by 80%[72] and methane emissions by 40%[73] compared with traditional cattle ranching. Since its foundation in June 2015, Pecsa has restored 10,000 hectares of forest across 48 farms and has mobilised $10.5 million in capital.

5. Sustainable inputs ($10 billion/year)

Sustainable inputs present a significant business opportunity for Brazil. In this model, farmers employ water conservation techniques and avoid fertiliser runoff and excessive nutrient loading to keep the quality of the soil. Globally, sustainable inputs are estimated to generate $230 billion per year by 2030,[74] and Brazil is expected to capture $10 billion[75] of this, equivalent to around 5% of the total market.

Sustainable inputs create revenue for stakeholders from the supply side in terms of cost savings. Reduced fertiliser application creates savings from avoided nitrogen overloading that lowers plant and insect biodiversity,[76] especially during droughts.[77] Excess nitrogen can also drain into water sources, causing excessive growth of plants and algae whose decomposition can reduce the amount of oxygen and kill most life forms.[78] There is also an opportunity for agricultural biotechnology companies who conduct R&D to produce biopesticides and biofertilisers and sell bio-innovation technologies, with the market expected to reach $125 billion per year by 2030.[79]

Sustainable inputs are associated with lower GHG emissions. Compared with mineral fertilisers, a study found that organic fertilisers reduce GHG emissions by 78% for nitrogen and 41% for phosphorus.[80] Organic production systems can also sequester carbon in the soil, which can be certified and traded in the carbon market. Bayer, for instance, launched the Carbon Initiative and PRO Carbono. These initiatives stimulate the adoption of organic production techniques such as cover crops (plants that cover the soil to slow down runoff and increase organic matter) and biotechnology to generate avoided nitrogen emissions from better application of fertilisers, by providing carbon credits to 500 participating farmers.[81]

III. RESTORATION & CONSERVATION

The third group of business models are those that generate value from restoration and conservation of degraded land.

6. Agroforestry systems ($3 billion/year)

Agroforestry combines, in the same area and at a given time, the cultivation of three elements:

i. Perennial shrubs and trees (like mango, cocoa, açai, coffee and nuts) that generate medium- and long-term income;

ii. Short-cycle and semi-perennial crops that bear fruits in 2–3 years (like tomato, watermelon, banana and beans) and generate short- and medium-term income; and

iii. Animals that contribute towards income diversification.

There is a connection to the WFPs and sustainable cattle farming business models but the business model here focuses on forest regrowth and restoration of degraded land. This type of agroforestry deliberately integrates fruit-bearing trees into short-cycle crop production and animal farming.

The global agroforestry market is expected to grow to $20 billion in 2030.[82] Cocoa beans, palm oil, mangoes and guavas grown in agroforestry systems can earn two, seven and eleven times more per hectare a year than soya, respectively.[83] Cocoa grown in agroforestry systems can generate $9 billion a year globally, while guavas, mangoes and mangosteen can generate $3 billion a year.[84] These agroforestry fruits are abundant in the Amazon rainforest but today the Legal Amazon states only capture 1% of the $9 billion global markets for all fruits and juices.[85]

There is a significant opportunity for Brazil to capture a larger market share of this emerging global market. Brazil benefits from a range of agribusiness-supporting agencies such as the Brazilian Agricultural Research Corporation (Embrapa) for research, Emater for extension services, Brazilian Micro and Small Business Support Service (Sebrae) for business development and Banco da Amazônia for access to finance. The country also has the world's second-largest forest cover,[86] navigable rivers, and accessible ports and airports, giving Brazil a competitive advantage in scaling agroforestry. Unsurprisingly, areas in Brazil with at least one type of integrated crop-livestock-forestry production system jumped from 11.5 million to 17 million hectares between 2015–2020.[87]

Box 4. *Forest restoration combined with agroforestry production*

Project
Cocoa restoration hub

Opportunity area
Restoration and conservation

Capital mobilised
$1 million

Segment
Agroforestry systems

Objective: Brazil used to be a top cocoa producer in the 1990s, but today it has to import cocoa to supply its ground cocoa industry. In order to turn cocoa agroforestry into a forest restoration driver for Pará (the Brazilian state with the most deforestation), Olam, TNC, Mondelez, Partnerships for Forests and Instituto Humanize set up a multi-partnership technical assistance hub in 2019. The hub trains farmers in restoration practices and provides access to credit to support farm conversions.

Profits are generated from industry companies sourcing cocoa domestically, reducing import costs. Farmers also receive premium payments worth $31,000 in exchange for zero-deforestation commitments. The programme has enabled 250 farmers to develop 134 land restoration plans, plant 436 hectares of new cocoa agroforestry systems in degraded lands and protect 575 hectares of legal areas. Over the next two years, the project plans to expand to new locations, train 700 more farmers and increase the area of land under management to 60,000 hectares.

Moreover, agroforestry systems are useful for restoring degraded or deforested lands. This is especially true for smallholders, who – by complying with the Forest Code (Box 9) – can receive both environmental and financial returns. Pará state set a regulatory framework that allows producers to restore their Legal Reserve by planting cocoa in agroforestry systems, bringing together economic incentives with environmental compliance.[88] Cocoa agroforestry is a good example (Box 4), and can retain six times more aboveground carbon stock than intensive multi-species restoration.[89]

Lastly, similar to the value from standing forests discussed above, this business model reduces the risk for farmers. Producers can become less reliant on a single income stream in the event of crop failure or drops in demand. Agroforestry systems have proven effective in buffering the impact of extreme weather, lowering temperatures and providing alternative food sources during floods and droughts.[90]

7. Restoration of degraded land ($3 billion/year)

Restoration is where farmers dedicate part of their degraded or abandoned land to grow trees and recover its vegetation. This can be done through the installation of windbreaks – to allow vegetation to recover – and alley cropping and farmer-managed natural regeneration, which enable crops to thrive.[91]

The restoration of degraded land is increasingly becoming a viable business opportunity for Brazilian farmers. It can generate cost savings over time by avoiding soil erosion and landslides while helping farmers recover wildlife habitat and water quality. The cost savings of restoring degraded land are expected to generate $75 billion by 2030 globally, and Brazil can capture $3 billion[92] of this per year, equivalent to 4%.

Restoration can generate monetisable ecosystem services to finance its take-off. The country's Forest Code (Box 9) and the nationally determined contributions (NDCs) require the rehabilitation of 8–12 million hectares of forest by 2030, creating demand for farmers to change land use. And the business model has the potential to generate revenue streams for carbon sequestration in plants and soils, enhancing biodiversity and improving water cycle regulation. Multi-species restoration in the Atlantic Forest can store 1.5 times more carbon per hectare per year than natural regeneration in Eastern Amazonia.[93]

Many organisations looking to offset their ecological footprint may be interested in paying for such services. The municipality of Extrema with the National Water Agency, for instance, offered farmers $80 per hectare per year[94] to plant 1.3 million native trees that help recycle water.[95] With that, farmers could pay the restoration costs of producing native species within 5 years, which hover around $440 per hectare.[96]

IV. TECHNOLOGY ENABLERS

The fourth and final grouping that this report highlights is enhanced means of production through technology, which are ways of farming more sustainably that can cut across the seven business models outlined above.

8. Technology Enablers ($20 billion/year)

Technology on farms can simultaneously improve farm productivity and reduce environmental impact. Farm technology encompasses everything from mechanised operations to help prepare the land with care, to micro-irrigation systems to improve water usage, to sensors, drones and solar-powered GPS ear tags to facilitate cattle tracing. Precision agriculture (Box 5) in particular allows farmers to create yield maps through satellites and drones to help inform the application of pesticides and fertilisers. The value of land cost savings from yield improvements through technology is expected to grow globally to $395 billion by 2030,[97] and Brazil has the opportunity to capture 5% of this, equivalent to $20 billion[98] a year.

Micro-irrigation in particular can help unlock costs benefits for the agriculture sector, especially during dry spells like the one happening right now. It is a low-pressure, low-flow-rate technique that delivers water closer to the root zone of a crop through a sprinkler or drip method. In doing so, it generates cost savings from a more efficient use of water, minimising the likelihood of overwatering the landscape while reducing runoff potential. The combination of micro-irrigation to make the most out of water and climate-smart techniques to help farmers plan for droughts is likely to be adopted faster.

To date, the application of technology in Brazilian agriculture has been very successful. The number of AgTech companies in Brazil increased by 40% in 2020 compared with the previous year, reaching about 1,575.[99] These companies support improved efficiency, enhanced monitoring and traceability systems, and consequently improved productivity. Higher yields mean there is less land required and less need for planted area expansion and deforestation. For example, OLAM Farmer Information System (OFIS) is a digital tool developed to collect farm-level data offline, such as the socio-economic profile of the families and yield, with geo-location of farms. Based on the data collected, producers then receive via their mobile phone customised farm development plans to improve their productivity.[100]

Despite its significant opportunities, the challenge of connectivity in rural areas is still a considerable barrier to technology adoption. In 2020, 44% of the rural population did not have access to the Internet.[101] This means that combining online and offline technologies will remain fundamental conditions to improve yields cheaply. For instance, the Brazil government is piloting extension services through landlines and mobile phone messages. The pilot will offer guidance on pest control, climate conditions, soil preparation and overseeing animal health, aiming to improve the output per hectare of 200,000 farmers in 9 states in the north-east region of Brazil. The cost of this technology can be 200–300 times less than traditional technical assistance services.[102]

Box 5. *Using farmers' data to diagnose constraints and design sustainable roadmaps*

Project
Production Right Platform

Opportunity area
Technology Enablers

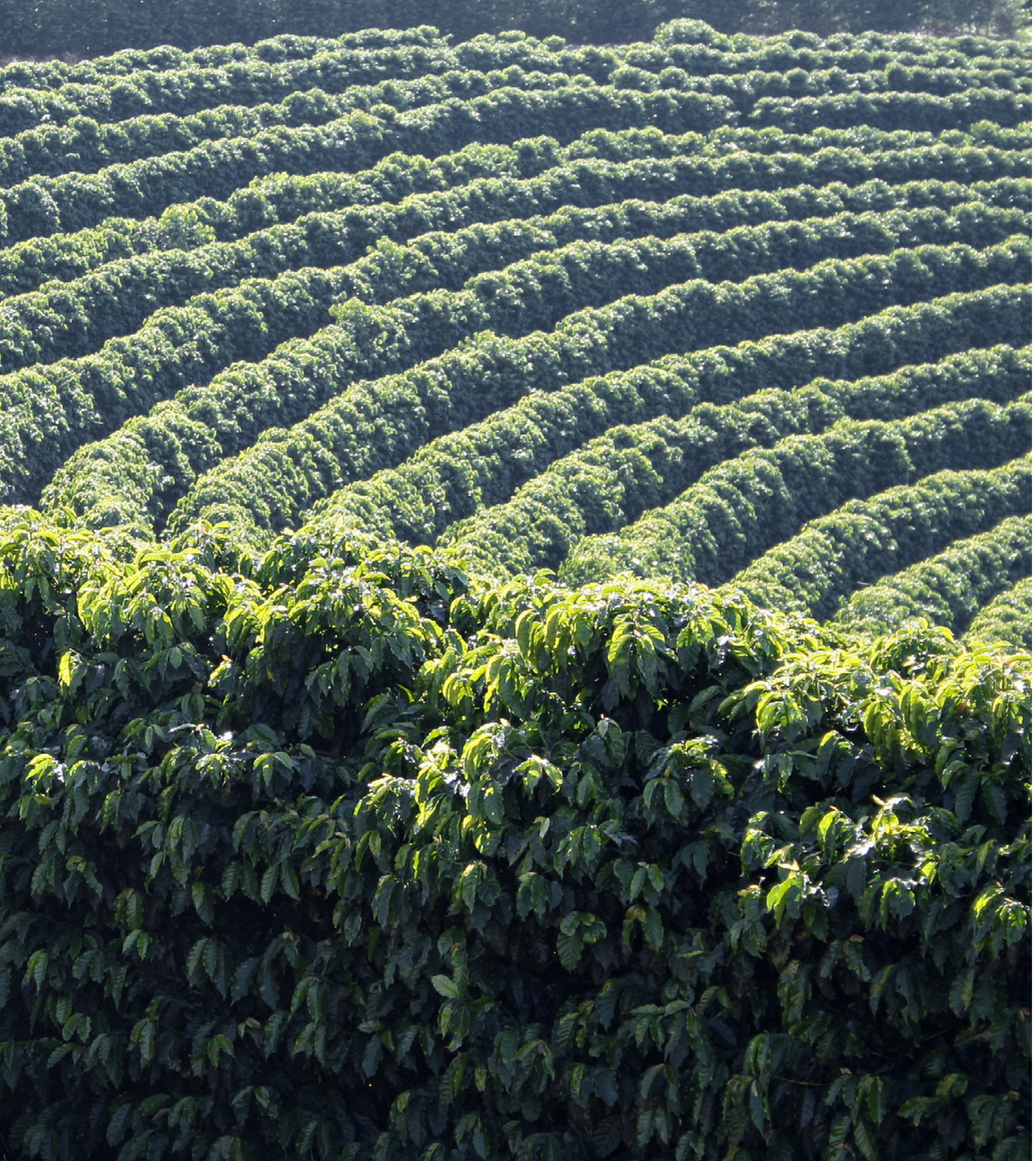
Capital mobilised
$12.6 million

Segment
Technology Enablers

Objective: Producing Right Platform (PRP) is a platform that helps multinational businesses with responsible sourcing standards connect with producers who can improve the environmental practices of their farms. This supports large corporates looking to evaluate the sustainability of their supply chains, providing them with the information they need and linking them with a sustainable network of farmers.

The platform collects farm data, generates diagnostics using artificial intelligence (AI) and develops a socio-environmental roadmap for farmers. Farmers sign a "no illegal deforestation" commitment and are required to implement the recommendations for improving the social, productive and environmental performance of their farms. PRP provides technical assistance and undertakes continuous monitoring. It awards a label to responsibly produced products.

Almost 10% of producers on the platform already receive a premium since 2019, when PRP was founded.



CHAPTER 3

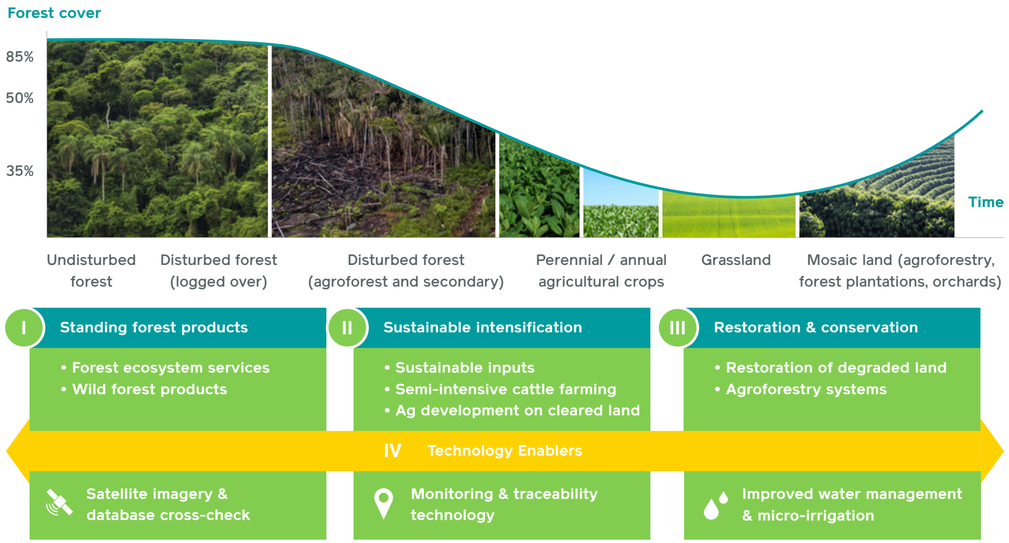
A transition for the producer

I. PRIZE

By scaling up regenerative businesses, farmers can develop a new forest economy with complementary revenues and cost savings worth $70 billion. As set out in Chapter 2, new business models diversify crop production and integrate it with forestry and cattle ranching to improve sustainability. This diversification not only expands the number of products, creates access to new markets and delivers a price premium, but also provides ecosystem services for a potential additional income source. This extra income creates a further incentive for farmers to improve their management of natural resources, restoring soil, improving water management and enhancing productivity. If done well, land conservation can also improve biodiversity in the surrounding area.

These opportunities exist in every geographical region of Brazil (Figure 5), with different models for different landscapes. These range from harvesting products from the forest, more sustainable grazing and agroforestry to restoring degraded land.

Figure 5. *Key opportunity areas and cross-cutting means of production*



Source: *The Little REDD Book (GCP); The World Bank online dataset 2016; the University of Maryland (as found on Mongabay.com Deforestation Rates); Margono, Potapov, Turubanova, Stolle & Hansen: "Primary forest cover loss in Indonesia over 2000–2012" (Nature Climate Change, 2014), team analysis*

Notes: ** Standing forest products refer to food from trees grown in primary or native forests*

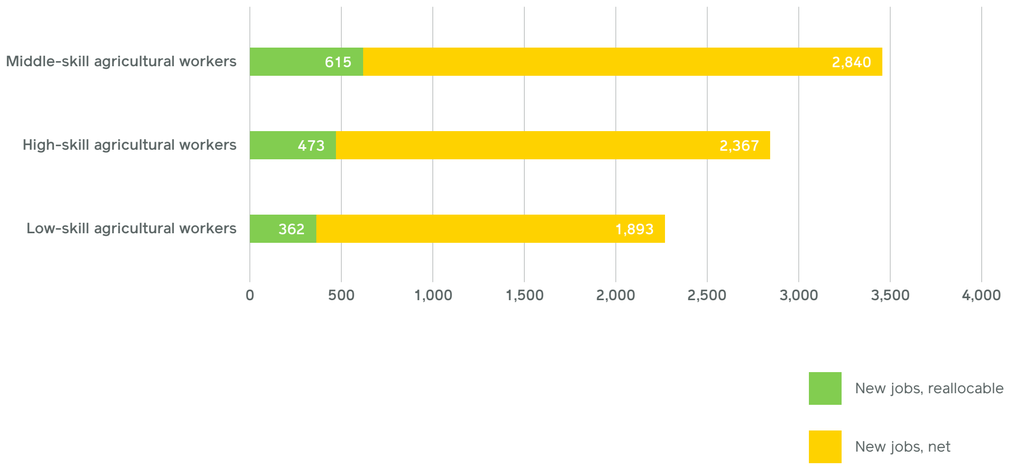
** Restoring degraded land includes muvuca, a restoration method consisting of sowing a mix of high-density tree seeds directly in the field*

** The intersection of semi-intensive cattle farming and agroforestry systems includes Integrated Crop-Livestock-Forestry Systems (ICLFS)*

** Agroforestry systems considered here focus on forest regrowth as the primary technique to drive restoration of degraded land*

These business models, if widely adopted, could create 8.5 million new jobs by 2030[103] (Figure 6). This is equivalent to the number of informal workers, unemployed individuals and workers who have stopped looking for work across all the Legal Amazon states combined.[104] Harvesting nuts with hands will require more manual, low-skill labour. Rotational grazing will require more middle-level skills like budgeting and planning. Forest management will need higher skills, including the ability to demonstrate compliance with carbon accounting requirements. This increased demand for workers across the range of skills creates the prospect of improving the livelihoods and wages of millions of Brazilians who rely on the forest and government subsidies to survive. Around 35% of the income of the poorest 20% inhabitants of the Legal Amazon comes from government transfers compared with 15% in the rest of the country: a 20 percentage points differential.

Figure 6. *Occupations with the highest number of jobs added in 2030 (in thousands)*



Source: *Authors' calculations based on IDB and ILO, 2020. Note: Low-skill workers = subsistence farmers; middle-skill workers = agriculture, forestry and fishery labourers; high-skill workers = market-oriented skilled agribusiness workers*

II. BARRIERS

Despite the significant potential gains, there are barriers to producers looking to transition to more nature-positive practices. Unlike in the energy sector, where policy support ensured long-term contracts and companies could focus on just one element of the system (e.g. wind generation), transition farmers need to diversify portfolios without access to long-term off-take agreements, farming insurance or credit guarantees.

Farmers thinking of making the transformation face initial risks related to their lack of knowledge of sustainable farming practices and uncertainties of making a transition, which can deter change. These include:

- **Uncertainty** – Many farmers will be tied into existing contracts to meet pre-determined output to purchasers. This obligation to maintain a certain level of production can act as a barrier to transformation, given that the process may mean some variation in output in the short term and uncertainty about long-term performance. This uncertainty may be especially relevant if demand for traditional commercial crops – a secure bet – is on the rise.

- **Knowledge gaps** – Similarly, changing farming practices carries risks for farmers. Whereas under current arrangements they will be familiar with the inputs necessary, new practices require farmers to learn how and when to apply more sustainable inputs, when to rotate crops and what are the new cropping cycles. These barriers can increase if there is limited access to extension services to learn from new farming practices.

As uncertainty and knowledge gaps are overcome, farmers also need to deal with business-related risks. These include:

- **Nascent business models** – New business models present challenges for farmers. In monoculture businesses, farmers are knowledgeable about where to get better prices for the input and sales market or when is the best season to sell the product. For nascent business models, farmers need to learn new business management skills to secure price premiums for differentiated, more sustainable products. They may also require coordinating activities and revenue streams across food production, carbon credits and other forest management activities. This coordination may prove challenging, though diversifying revenue streams should also reduce risk over time.

- **Lack of economies of scale** – Brazilian farmers face direct barriers to scale their production that could be very expensive to overcome or could reduce the value of the produce. These obstacles are related to economies of scale that do not allow farmers to reap cost advantages once production becomes efficient. They include (i) lack of storage and logistics to transport their product cheaply,[105] (ii) limited access to farm equipment and credit at a cheaper price with better conditions,[106] and (iii) limited bargaining power vis-à-vis buyers that allows farmers to market their products at more competitive prices.

As farmers start increasing their output, they start facing risks related to new markets. These include:

- **New markets and low premium prices** – The demand for more sustainable products is still small, with uncertain future growth and limited distribution channels. In Brazil, a price premium for sustainability can still be difficult to achieve, with consumers unwilling to pay more for greener products,[107] a proportion that increases further at lower income levels,[108] though younger consumers do show more willingness. This number contrasts with the higher proportion of consumers in the UK, US, Germany and Australia willing to pay more for sustainability products.[109]

  A lack of a price premium in the Brazilian market may deter change, especially for smallholders, who may find it harder to export to international markets. Some markets may be saturated even where domestic or international price premiums exist, making it less attractive for farmers to take risks. Only half of certified coffee is sold at a premium under an accredited label, limiting the potential benefit to producers of producing a certified product.[110] An absence of aggregators to support access to new markets exacerbates this barrier to change.

Throughout all these phases, farmers transforming their businesses incur the following costs, both directly and in the form of lost alternative revenues:

- **High upfront costs** – Farmers looking to transition face upfront costs in changing how they farm their land. They may also need to pay for advisory services to help them make the transformation, and they could see a short-term dip in yields while the soil regains its health in the initial transition years and they learn the new techniques. The Climate Policy Initiative estimates that maximising agricultural production without additional deforestation requires a 50% increase in capital expenses (e.g. farm equipment to prepare the land such as harrows and ploughs) at the national level.[111]

  Despite knowing the high capital costs will be made back over time from increased yields, resilience to drought and higher-earning crops, many farmers may lack the financial flexibility to manage the short-term fall in net income.[112]

- **High opportunity costs** – Farmers also face high short-term opportunity costs (the forgone earnings that would have been obtained from continuing business as usual). These opportunity costs result from the fact that converting forests for soya production or cattle ranching is a more profitable business model in the short term than conversion to nature-positive farming, harvesting forest products or receiving payments for ecosystem services.

  Where there is standing forest, the opportunity cost relates to the potential profits from clearing the land and planting quick-maturing soya beans.[113] Lax enforcement of the Forest Code (Box 9) in the forest fringes means that land is easily acquired, converted and sold. This weak enforcement, plentiful land supply, high short-term yields and high commodity prices encourage speculation, with more and more people buying and clearing land expecting that its value will increase given the potential for soya production.

  One study estimated that forest restoration in Pará had an opportunity cost of $480 per hectare for cropland and $210 per hectare for pasture.[114] In Mato Grosso, the opportunity cost of standing forest to cattle ranching is $364 per hectare and to soya and corn plantation seven times that ($2,516 per hectare) (Figure 7).

Figure 7. *The opportunity cost of land-use transitions*

Source: *Authors' calculations based on Agrolink and IMEA. All values are in net present value (10 years), calculated considering an 8% discount rate. Assumed 2020 average US Dollar (USD) to Brazilian Real (BRL) exchange rate (1 USD = 5.156 BRL).*

III. SOLUTIONS

These challenges are not insurmountable if farmers form partnerships among themselves and others for specific purposes. These can be related to capacity-building opportunities linked to finance access, forming cooperatives, working with market aggregators, and accessing patient capital. Here we outline these solutions in more detail:

Capacity building can help farmers fill their knowledge gaps by providing learning-by-doing opportunities in demonstration units.

- **Capacity building linked to finance** – Some food companies and other organisations are already coming together to help farmers reduce their uncertainty and knowledge gaps through hands-on capacity building linked to finance. These organisations package their technical assistance with credit to practise the technical skills learned in demonstration units and reduce farmers' uncertainty as they observe the results first-hand. They link this assistance with finance to make sure farmers can replicate the models. This can be seen in the case of the Cocoa Agroforestry. It is a multi-partnership supported by chocolate industry giants Olam and Mondelez, to expand skill training and unlock rural credit for cocoa producers to restore degraded land through agroforestry crops.[115]

Cooperatives can then provide logistical support, process their products and trade them in domestic and international markets to gain scale.

- **Forming cooperatives for market scale** – Cooperatives are people-centred enterprises owned, controlled and run by their members, in this case, farmers. They can reduce the physical dispersion of farmers and increase their production to facilitate access to credit and markets (Box 6). Their capacity to bring together farmers and increase their production lowers transactional costs, thus increasing their economies of scale. Moreover, cooperatives can teach farmers new business models and add value to members' production by managing the product certification process to gain access to new markets and increase producers' earnings.

- **Incentives to farmers to create cooperatives can encourage them to coordinate in order to access benefits they would not obtain otherwise.** Incentives can vary by cooperative size and can be in the form of non-reimbursable grants and access to cheaper inputs and markets. For instance, Cooperacre provides logistical support to its members, processes their products and commercialises them in domestic and international markets (Box 6).

- **These incentives may need to be complemented with additional support to overcome the coordination costs for farmers.** Philanthropy-funded programmes like Partnerships for Forests (P4F), public or privately funded promotion agencies and NGOs can help set up and accompany cooperatives through their development process, especially small ones that require capacity building to reach maturity. For instance, the National Union of Family Farming and Solidarity Economy Cooperatives (UNICAFES), an NGO, provides training in cooperative strategy and governance as well as management, finance and social inclusion to a network of up to 700 cooperatives in Brazil.[116]

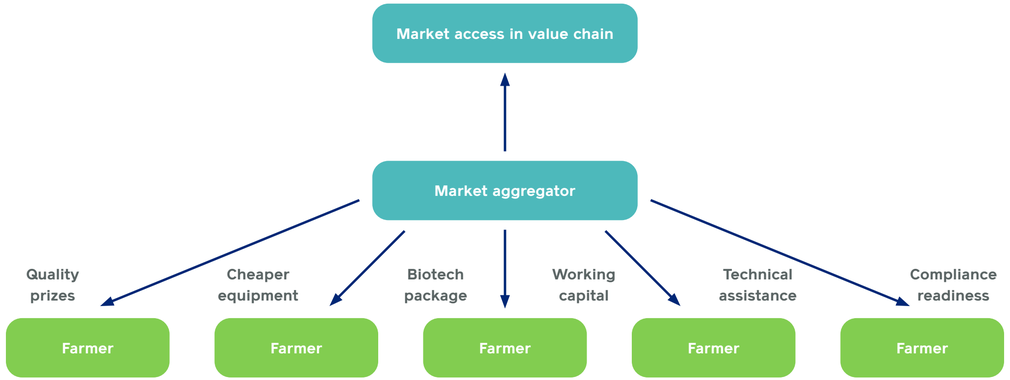
Box 6. *The role of cooperatives as market and credit access players for farmers*

Agricultural cooperatives are an essential part of modern Brazilian agribusiness: 20 of the 100 largest agribusiness firms in the country are cooperatives. Cooperatives have been among the top growth performers during the COVID-19 pandemic and have played a significant role in connecting family farmers from marginalised rural areas to the market economy. They have also played a role in increasing producers' access to credit and to markets.

Cocamar is one of the largest cooperatives in Brazil and generated revenues worth $7 billion in 2020. Cocamar will participate in the Sustainable Agriculture Finance Facility (SAFF)'s first credit operation in the country. This facility will finance the implementation of Integrated Crop-Livestock-Forestry Systems on degraded lands. It will combine credit, technical assistance and environmental monitoring and will also include a carbon credit fund, unprecedented in Brazil. The fund will allow cooperative members who reduce emissions to access funding for carbon credits that the cooperative can then sell in voluntary markets. The SAFF Cocamar pilot is expected to cover 200,000 hectares and 300 farmers.

Cooperacre is one of the largest Brazil nut cooperatives in Brazil. Located in 14 municipalities of the state of Acre, Cooperacre represents a network of 32 cooperatives and associations. Cooperacre buys raw materials, provides logistical support for its members and commercialises its products. The cooperative has three processing plants with the capacity to process 120 tonnes of Brazil nuts per year and one plant to produce 400 tonnes of fruit pulp per year. Cooperacre processes the nuts locally and sells them to the domestic and international markets. It generated $8 million in profits in 2018 and 250 jobs, benefiting 5,000 families directly and indirectly.[117]

Figure 8. *Type of services market aggregators can provide to help farmers take off*



Source: *Author analysis*

Partnerships with market-access players – such as market aggregators and off-takers – can increase market exposure and product differentiation, allowing producers to sell at a premium and earn higher profits.

- **Market aggregators and off-take agreements** – Market aggregators (a broad category of organisations including associations, traders, marketing roundtables, e-commerce) can play an essential role in helping producers navigate new markets and obtain higher prices for their products. They bring together many producers to guarantee significant off-take agreements from buyers. In coordination with other organisations, these aggregators can also offer services at a scale to reduce some of the transition costs farmers need to bear before their business models become viable (Figure 8). The advantage of market aggregators is that they can (i) work with farmers to provide off-farming marketing planning to meet demand projections and requirements along the chain of custody and (ii) serve as market distributors and representatives, dealing with different actors in the value chain.

None of the above solutions will be possible without access to patient capital that offers longer time horizons, payment flexibility and greater risk tolerance.

- **Patient capital** – This is another name for long-term capital. With patient capital, investors or donors are willing to make a financial investment in a business with no expectation of making a quick profit. Instead, the investor is willing to forgo an immediate return in anticipation of more impactful returns down the road. The *Fundo JBS pela Amazônia* is a good example. It has committed $50 million[118] to support forest conservation and restoration, the socioeconomic development of communities and technological advances. The fund has already mobilised $450,000 from another donor, Elanco Foundation, to support agroforestry systems and aims to eventually provide reimbursable grants to more mature businesses.

CHAPTER 4

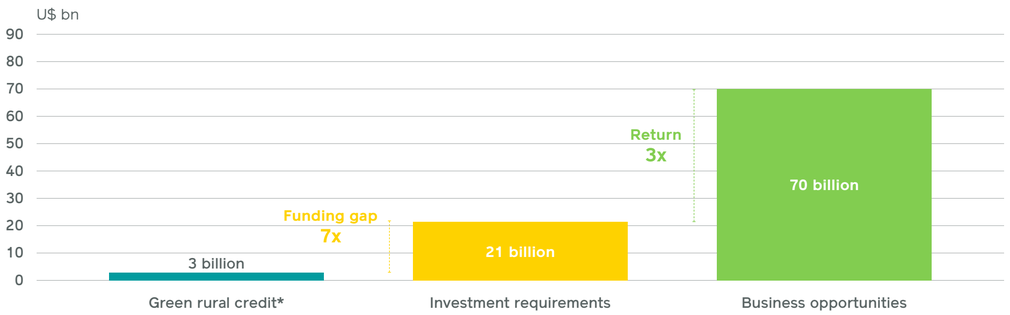
A transition for the finance sector

This report estimates that to make Brazil's food system nature-positive by 2030, we need to mobilise an additional $21 billion for the sustainable business models outlined in Chapter 2. This chapter discusses the prize from, barriers to, and solutions for, such a transition for financial stakeholders in the Brazilian food space.

I. PRIZE

By investing $21 billion in sustainable business models, the financial sector can generate returns worth three times this initial investment (Figure 9). This sum is large, but represents almost half the 2020/2021 budget for the federal government's agricultural credit framework, Plano Safra.[119] However, it is a significant step up from the $3 billion the government earmarked towards green rural credit in 2020/2021 that we estimated, including credit lines for low-carbon agriculture (ABC Plan), agroforestry plantation (Pronaf Floresta), deployment of renewable energy technologies and soil recovery.

Figure 9. *Investment requirements and business opportunities for nature-positive agriculture in 2030*



Source: *Plano Safra, 2020/2021; authors' calculations based on Global Marshall Plan, 2021, FOLU, 2019 and WEF, 2020*

** Green rural credit stands for rural credit programmes designed for low-carbon agriculture (ABC Plan), agroforestry plantation (Pronaf Floresta), deployment of renewable energy technologies and soil recovery.*

Much of the prize for the financial sector comes from reducing exposure to nature-related physical, operational and transitional risks. This comes from the fact that assets may start to underperform as Brazilian agriculture continues to be affected by changing weather patterns, water scarcity and loss of soil health. For example, Brazil's drought in August 2021 forced authorities to redirect water from rivers for hydroelectricity generation. Due to the resulting low water levels in the Tietê-Paraná route – one of Brazil's main waterways for the transport of soya, maize and sugarcane – 90% of vessels were stalled.[120]

Companies may also find it increasingly difficult to sell their produce as export markets begin to restrict imports of deforestation-linked commodities (Box 7) and consumer preferences change. Plant-based proteins and nature-positive products could capture 10% of the global meat market by 2030.[121] By starting to transition now, investors can reduce the risk of losses from stranded assets.

Financial actors are already capitalising on the business opportunities from change. For example, Ambipar – an environmental management group – recently acquired a majority stake in Biofílica, a pioneer in development projects that generates carbon credits in Brazil. This transaction is the 18th acquisition of the firm since its initial public offering last year. Since then, the company's shares have risen almost 75%.[122] Additionally, Rabobank (a multinational banking and financial services company) just announced a sustainability-linked loan worth $40 million with SLC Agrícola,[123] a large-scale producer of cotton, soya beans and corn and Brazil's largest publicly traded agricultural company.[124] The loan is linked to SLC's success in reducing its carbon emissions goals and increasing its rate of water reuse in its farming practices by 2023.

Companies are also starting to see the value in a nature-positive food system. The multinational retailer Carrefour recently announced the sale of 100% deforestation-free meat in São Paulo, allowing consumers to trace the product's information from farm to shelf using a QR code.[125] Meanwhile, Marfrig (the second-largest Brazilian food processing company, after JBS) launched a carbon-neutral beef in 2020, a production line certified under Embrapa (a state-owned research corporation affiliated with the Brazilian Ministry of Agriculture) for cattle farmed in integrated livestock farming systems or agrosilvopastoral systems.[126] Further, Marfrig issued a 10-year sustainable transition bond worth $500 million via BNP Paribas, ING and Santander. The bond was three times oversubscribed and was priced at 6.625%, the lowest interest Marfrig has ever paid in a transaction.[127]

Box 7. *Upcoming anti-deforestation regulatory measures in commodity-importing economies*

UK: The Environment Bill, currently in Parliament, will prohibit the use of forest risk commodities (likely to include beef and soya) in UK commercial activities unless they were produced in compliance with relevant local laws, including that the land where the commodity was produced was legally occupied and used. The company in the UK using the produce must implement a due diligence system for the regulated commodities.

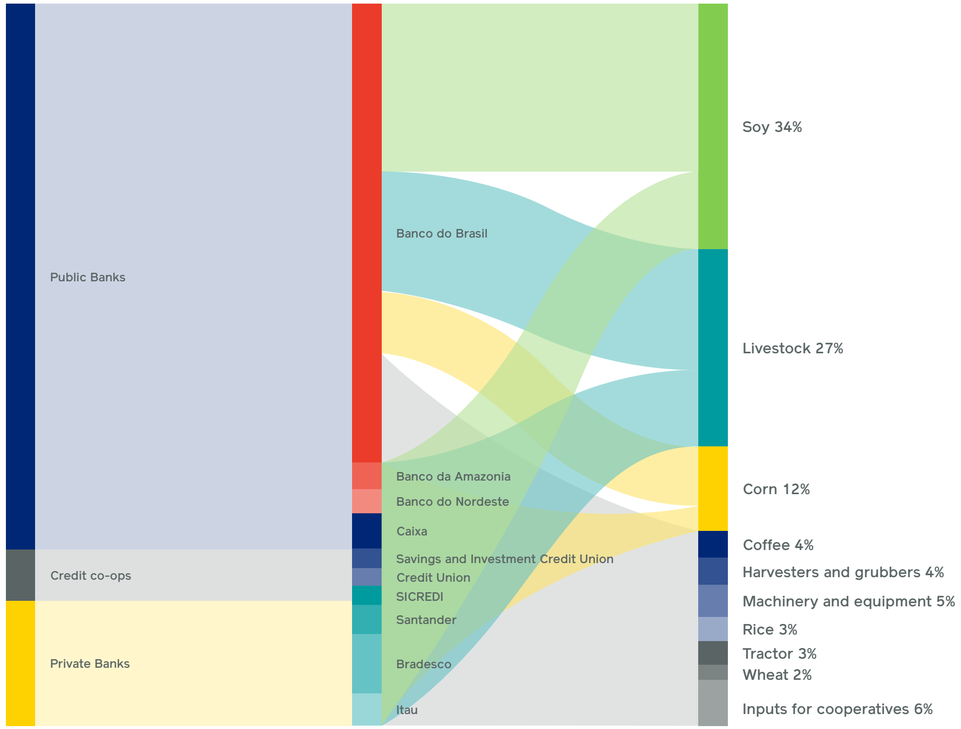
EU: In July 2019, the European Commission adopted an initiative that listed the encouragement of the consumption of products from deforestation-free supply chains as a priority area for EU action, including a commitment to assess potential regulatory measures. The Commission's Biodiversity Strategy in 2021 committed to bringing forward legislation in 2021 to avoid or minimise the placing of products associated with deforestation or forest degradation on the EU market.

US: Senator Brian Schatz is preparing a bill to restrict market access for commodities originating from illegally deforested land.

II. BARRIERS

Despite the significant potential financial returns from sustainable business models, finance is still being funnelled towards unsustainable ones. From 2013 to April 2020, $100 billion of private credit was given to the soya and cattle sectors in the form of bonds, loans, shares and underwritings,[128] with three quarters of this coming from domestic institutions. The soya and cattle sectors also benefit largely from public financing. The Brazilian government subsidises credit for working capital, investment and marketing for rural producers, channelling it through publicly owned banks, selected private banks and credit cooperatives. In the 2019/2020 agricultural year, almost two thirds of credit operations in the Amazon biome were related to cattle raising, a value chain often linked with deforestation in the biome.[129] In the 2020/2021 harvesting season, traditional soya beans, corn production and livestock capture three quarters of the rural credit earmarked towards the top 10 products, most of which comes from public banks[130] (Figure 10).

Figure 10. *Rural credit earmarked towards top 10 products by source type and financial institution (2020/21)*



Source: *Central Bank of Brazil, Rural Credit 2020/2021*

This continued channelling of credit towards unsustainable business models reflects a number of barriers and risks that can deter investors from shifting their credit towards more nature-positive business models. These can be categorised as the inability to price risk, a lack of investable projects, mis-aligned financial incentives and unintegrated climate risk disclosure.

Transition investors find it challenging to assess the risk of sustainable businesses, often because some of these models are developing and misunderstood.

- **Inability to price risk** – The failure to assess risk can happen because of lack of data, the absence of auditing mechanisms in place to disincentivise malpractices, and a limited evidence base of successful models, which makes risks hard to assess. The inability to price risk leads to misperceptions of new business models and ultimately disinterest in investment. Investors consulted for this study cited perceived high investment risk – i.e. concerns over the likelihood of profitable returns – as the number-one barrier to investment.

  There is often a perceived high investment risk for nature-positive business models, mainly where the business models are novel or involve young or female smallholders. This discrimination results in significant early-stage credit gaps for these farmers or farmers transitioning between production systems. For instance, ranchers who have switched from cattle ranching to agroforestry or semi-intensive cattle production are perceived to have increased their exposure to weather shocks, as these methods tend to rely more on nature to thrive. Furthermore, because farmers in 60% of the municipalities in Brazil have no access to rural insurance for crops, livestock or forests,[131] most producers must use credit to accommodate shocks, increasing their risk profile further.

Even if investors are willing to take some risk, there may not be enough mature nature-positive projects to invest in.

- **Lack of investable projects** – One of the biggest challenges to private sector investment cited in author consultations with investors active in Brazil was identifying bankable projects with attractive returns. This lack of investable projects represents a problem for investors. While they may have pledged capital seeking investments with measurable environmental benefits and financial returns, there may not be enough projects from concept to bankability for them to invest. The lack of investable pipelines is not only an issue that occurs in Brazil. In 2015, Forest Trends' Ecosystem Marketplace estimated that over 30% of capital committed for sustainable food and fibre production, habitat protection, or clean water remained underemployed. Lack of deals was cited as the biggest obstacle to investment among most banks, corporates, fund managers, family offices and NGOs surveyed.[132]

Investors may still prioritise short-term profits over long-term sustainability despite the potential existence of investable projects with long-term impacts and returns.

- **Mis-aligned financial incentives** – Investor valuations often focus on short-term profitability, shifting attention away from the long-term transformation required to reduce risks. Investors look for short-term profits to boost the perceived valuation of their portfolios, but this comes at the cost of favouring

potentially unsustainable businesses. This perverse incentive may undermine long-term sustainability and result in a higher risk portfolio overall.

Short-termism occurs because the payback period of nature-positive business models tends to be longer than traditional farm businesses at present, as new processes bed in and the soil heals. This delayed payback period makes it harder for nature-positive business models to attract lending and investment, given the desire to show quick financial returns and the lack of focus on risks described above.

Buoyant commodity prices exacerbate the impact of short-sighted valuations on the transition to sustainable business models.[133] Price hikes further increase the opportunity cost of changing land management practices. The effect this has had on investment flows is that the shares of ADM and Bunge – two American traders – are up by one third this year since 2019, even though the soya and corn industries are not currently on pathways to sustainable production.

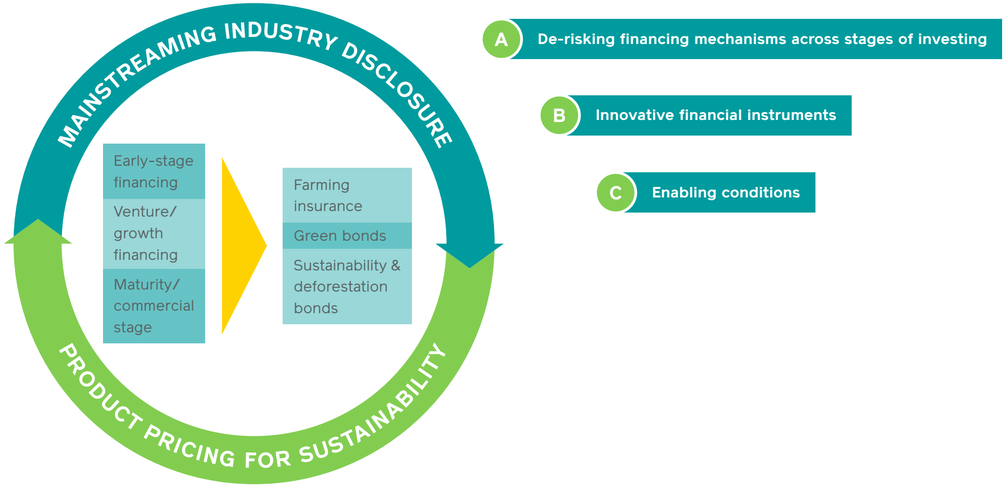
This mis-alignment is exacerbated because lenders overlook the climate change risks they are exposed to at the industry level.

- **Unintegrated climate risk disclosure** – Domestic and international banks in Brazil are not taking climate risk sufficiently seriously, given the speed at which climate is affecting Brazil. Regulation to disclose climate-related financial information, in part spurred by the Central Bank of Brazil, is advancing, but its enforcement is not fully integrated across the banking sector. Only two in five institutions that use climate scenario analysis to assess their resilience strategy disclose their results.[134] It is essential to recognise that, as mentioned above, there are significant challenges in evaluating risks across wide portfolios, particularly when lending to large numbers of (often small-sized) businesses. However, institutions sitting on "4-degree" portfolios in Brazil – investment portfolios aligned with 4°C global warming scenarios – may suffer from decreases in their valuations faster compared with their competitors. Brazil's harvesting season was recently rocked by the worst drought in a century, followed by an unprecedented frost that damaged crops in 1.5 million km2 of land – the size of Peru.[135]

III. SOLUTIONS

There are ways to overcome these barriers and accelerate investment into nature-positive food and agriculture in Brazil. Solutions include de-risking financing mechanisms across the different stages of investing, innovative financial instruments, and enabling conditions such as product pricing for sustainability and mainstreaming industry disclosure (Figure 11).

Figure 11. *Priority solutions for investors*



Source: *Author analysis*

De-risking investment mechanisms – De-risking investment mechanisms coordinated across the business development stages – early, growth and maturity – are starting to change the perception of risk of sustainable business models. These mechanisms, such as policy support, innovative public-private partnerships or blended finance funds, are helping create proofs of concepts that show these solutions can outperform the market.

- **Early-stage finance.** This includes philanthropic, development and public funding to support early movers who would not otherwise be able to start a new business given the high perceived risk of investing in them. This type of funding can take the form of repayable or non-repayable grants to support setting up the business, following assessment of the business plan or project proposal. The incubation of these business models can serve as proof of concept that others can replicate. A critical mass of investable projects can reduce perceived risk for investors, helping future investment to flow.

One example of such a scheme is the partnership between the Brazilian-German company INOCAS, the Inter-American Development Bank (IDB) and the Climate Investment Funds (CIF) to develop the first commercial value chain for the production of macaúba palm oil. The business model uses the indigenous macaúba palm tree planted on pastureland or agroforestry systems that can be expanded across Brazil. The IDB has provided a contingent recovery grant of $1 million, which has allowed INOCAS to set up the business and repay if the business becomes profitable. It includes $3 million in equity from the Forest Investment Program (FIP).[136]

- **Venture/growth capital.** In the same line as early-stage finance, growth capital can help first-movers who have proven profitability and are looking to grow but are still perceived as high-risk due to lack of maturity and scale. Businesses that are not yet commercially consolidated may be perceived as riskier during the first large sales. The risk of a company defaulting on its loan commitments may be higher during expanding stages if it does not have enough working capital to stay afloat, for example. To address these issues and de-risk investment of more institutional investors, entrepreneurs can use venture capital (funding directed to expanding start-ups) and growth capital (funding directed to more consolidated firms with positive cash flows). For instance, venture/growth capital can de-risk working capital loans for businesses looking to reach commercial maturity. They can do so through first-loss protection to mitigate potential losses of first large sales or through guarantees that another party will repay the debt if the borrower defaults. One example of this is the &Green Fund, which has helped finance $10 million for a Roncador Group farm (Box 8).

Box 8. *Blended credit for sustainable agriculture*

Project
Roncador Group

Opportunity area
Producing while protecting

Capital mobilised
$40,000,000

Segment
Sustainable cattle farming

Objective: &Green is a fund that invests in commercial agricultural projects that seek to protect and restore forests and peatlands. It was developed by the IDH Sustainable Trade Initiative alongside Norway's International Climate and Forest Initiative and is funded by the Global Environment Facility, Ford Foundation, Unilever and FMO (a Dutch development bank). Its goal is to provide financing to inclusive, sustainable and deforestation-free value chains that can be commercially viable and replicable.

The fund is financing Fazenda Roncador, a farm founded in 1978. Since its foundation, the farm has employed extensive cattle ranching. As a result, in 2000 the farm entered a downward spiral of land degradation and decreased profitability. With support from the fund, the farm will extend a sustainable intensification farming system that integrates crops (predominantly soya) with livestock to their entire farming operations, including restoration of degraded pastures. Around 60,000 of the farm's 150,000 hectares will move to an integrated crop-livestock model. The project will also conserve 70,000 hectares of forest while ensuring early compliance with the Brazilian Forest Code (Box 10).

&Green's $10-million loan in 8 years – a maturity longer than usual in Brazil – leveraged Roncador's $30-million credit line payable in 6 years with commercial bank Bradesco.[137] The transformation started with a pilot in 2018 that increased food production 40 times in the same area. The business model is expected to reach maturity in 2022–2023 and aims to increase farm productivity by 60% until 2026 without any area being deforested, avoiding GHG emissions.[138]

- **Maturity/commercial stage.** Pipeline development vehicles can discover an array of promising sustainable businesses, provide technical assistance to increase their maturity and mobilise private capital (such as in the form of credit) to reach a commercial stage. These vehicles eventually build mature business models, overcoming a vital barrier of a lack of investable opportunities. The maturity of businesses and resulting private capital mobilisation make investors much more likely to want to invest in the project.

  The SAFF is an example of a vehicle that develops integrated crop-livestock-forestry (ICLF) businesses. It blends philanthropic capital with concessional and commercial finance for different products of ICLF (i.e. land management, soil recovery, livestock, equipment and forestry). It also packages credit with a technical assistance programme and a specialised ICLF certification.[139]

Innovative financial instruments – Innovative financial instruments, especially those with an aggregation lens, have started to provide credit solutions to make businesses grow. Instruments like weather insurance and green, sustainability and deforestation bonds can help create pipelines of investable projects that are more attractive for institutional investors.

- **Weather insurance.** Insurance protects farmers by compensating them for a specified loss or damage in return for premium payments. For example, in weather insurance, indicators like rainfall indices help estimate the investment and asset losses after a weather event. Payments are triggered when the index performs above or below a certain threshold (e.g. 12 inches of rain during 48 hours). Given that weather events are expected to become more frequent, climate funds and multi-donor trust funds working with insurers can subsidise access to weather insurance to small-scale farmers at risk. They can also finance efforts to make weather information more accurate and accessible to farmers.

  Extending insurance in this way reduces the risk to lenders and investors, as it reduces farmers' reliance on credit to manage risks and can provide more confidence about farmers' ability to make repayments despite potentially volatile yields.

- **The Secured Pasture – Index** is a satellite-based pasture insurance tool for livestock farmers in Brazil. The insurance combines remote-sensing technology with weather data to estimate production losses caused by climate change. It compensates farmers who would otherwise divert their borrowed capital to buy forage to feed their livestock[140] or expand grazing areas to compensate for pastureland loss. By avoiding the diversion of loaned money, insurance makes the investment less risky for institutional investors.

- **Green bonds.** Bundling small green loans and illiquid assets into tradeable green instruments can help lenders secure capital at lower rates as global investors look to invest in high-quality green opportunities. This lower-cost capital can make it easier for them to invest in the sort of novel business models the transition requires, helping overcome the higher risk perception and the longer repayment period.

One such example is Agribusiness Receivables Certificates (CRAs). CRAs give investors the right to receive remuneration at regular intervals or when the security matures from producers engaged in sustainable farming.[141] A partnership of Produzindo Certo, Traive Finance and Gaia Impacto issued Green CRAs worth $11 million, certified by the Climate Bonds Initiative (CBI), to invest in rural producers with good socio-environmental practices. Recipients of this investment include a group of seven medium and large grain and cotton producers from the Cerrado who have committed to zero deforestation.[142] This commitment will allow the preservation of 25,000 hectares of protected areas with intact native vegetation.[143]

- **Increase use of bonds related to sustainability and deforestation.** Private companies and sovereigns can issue bonds to investors to finance specific sustainable initiatives within the company or country. Again, given the current strong global interest in ESG investing, this can help raise money at a lower cost, helping to justify the investments and overcome risk aversion and short-term biases. Projects could include changes in operations to reduce environmental impact or measures to address deforestation. Coupon payments could be linked to performance, with the borrower making lower repayments if they perform well against specific criteria.

Enabling conditions – Creating an enabling environment through the right pricing of products for sustainability and mainstreaming industry disclosures allows investors to understand the benefits of mobilising capital towards investment-ready pipelines.

- **Product pricing for sustainability.** Institutional investors such as private equity funds, asset managers, investments funds and pension funds often focus on short-term profits without considering long-term risks. This is usually to boost the perceived valuation of their short-term earnings to raise more funding in capital markets. This type of capital tends to be more speculative and is divested quicker when long-term risks become apparent. For example, the stock price of JBS (a Brazilian company and the largest meat-processing company globally) decreased following the 2019 Amazon fires.[144]

  To start reverting the short-termism of their investees and attract less speculative, longer-term capital, institutional investors can begin pricing sustainable products by conducting ESG due diligence on their investees and providing green financing to those that meet rigorous standards. Investable projects facilitate the benchmarking and pricing of sustainable portfolios that meet sustainability requirements. This has started occurring in Brazil, albeit slowly. Most private equity funds are already building a value proposition plan for their investees to prepare them for market requirements. There has also been a recent boom in sustainable investment funds creating green portfolios for their clients. Almost 85 ESG funds were created in Brazil in 2020, 14 times more than the previous year.[145]

- **Mainstreaming industry disclosure.** Investing in portfolios that reduce risk and better price sustainability at the sector level can incentivise lenders to adopt industry risk disclosure. Banks, capital market investors and food companies are all facing risks to their businesses from climate change. The Task Force on Climate-related Financial Disclosures (TCFD) provides a methodology for these risks to be identified and assessed. A further emerging framework is looking at nature: the Taskforce on Nature-related Financial Disclosures (TNFD).

Adopting these methodologies at the sector level – among domestic and commercial banks, for example – helps accelerate the disclosure of climate risks by peer-pressuring entities not to stay behind and confronting the risks building on the portfolio. The Brazilian Federation of Banks (FEBRABAN), for example, started helping Brazilian banks adopt the recommendations of the TCFD,[146] outlining a roadmap for individual and collective action.

Peer pressure, however, is not enough. Disclosing climate risk should be conducted in a way that creates a case for investment in more nature-positive food businesses, as these can help mitigate the risks. For example, insurance companies can incorporate the value of natural assets in proving resilience to climate shocks into their modelling, enabled by new technologies, thereby justifying investment in these assets. Food companies can also adjust their supply chains to more sustainable sources, or support their suppliers to invest in the transformation to mitigate risks.

Finance is already starting to be redirected as companies adopt these frameworks. BNP Paribas, for instance, has committed to stop financing firms producing or buying either cattle or soya beans from land in the Amazon rainforest that was cleared or converted after 2008. In 2019, Norway's largest pension fund, KLP, threatened to divest from Archer Daniels Midland (ADM), Bunge and Cargill because of links to deforestation, and asset manager Nordea imposed a temporary quarantine on Brazilian government bonds due to the forest fires that year.[147]

CHAPTER 5

A transition for the public sector

Box 9. *Forest Code*

The Brazilian Forest Code is the primary legal instrument for regulating land use in private rural areas. It mandates the preservation of native vegetation for the property.

The first version of the Code was introduced in 1934, but it was not until the 1990s that the country started enforcing its regulations. The Code has undergone many modifications over the years. In general terms, it requires landowners in Amazonia to maintain 80% of their forests as legal reserves, 20–35% in the Cerrado biome and 20% in the rest of Brazil. It bans all deforestation of environmentally significant and fragile areas, such as riparian zones of rivers and hilltops to prevent erosion, landslides and destruction of springs.

The newest version of the Code was enacted in 2012 and established a more flexible approach to addressing any excess deforestation that occurred before July 2008.[148] Landholders who deforested more than was allowed before 2008 are now obliged to either restore their land or offset the deficit through compensation schemes in areas of equivalent size in the same biome.

Key to the compliance of the Code is the rural environmental registry (CAR), a geo-referenced web system where landowners can register their properties, after which their name and a clear map of their property become publicly available.

A third key stakeholder in financing a Brazilian food sector transformation is the public sector. Brazil has been a pioneer of public policies that have enabled the agribusiness sector in its current form to thrive. The state-owned Brazilian Agricultural Research Corporation (Embrapa) has spearheaded scientific research, technological solutions and knowledge transfer, generating $12 billion in 2020 – an $18 return for each dollar invested in 152 technologies and 220 cultivars.[149] The government's environmental regulation and enforcement policy between 2004 and 2012 effectively kept deforestation at bay, reducing the deforestation rate by 20%. Moreover, the government has some of the most cohesive and pioneering anti-deforestation policies globally (Box 9).

State and international governments are also crucial to change. The state of Pará produced a public digital platform called SeloVerde,[150] which buyers can use to find out if cattle were raised in deforested areas or on farms that have not complied with environmental regulations. On the international front, new export market regulations can also start to shift incentives in Brazil's food system. For example, the European Union, United Kingdom and United States are preparing or considering deforestation due-diligence requirements for imports.[151] This legislation will make it harder to sell commodities produced on illegally deforested land, reduce the opportunity cost of transformation and decrease future product market risk.

However, there is much more for the public sector to do if Brazil is to successfully transform its food system.

This chapter discusses the prizes, barriers and solutions that the public sector stands to gain, currently faces and should adopt.

I. PRIZE

If Brazil transitions to a nature-positive food system, the public sector will reap significant benefits. A food system transformation will generate (i) a reduction of the $300 billion in hidden costs shouldered by the government each year discussed in Chapter 1, (ii) a share of the $70 billion prize from new sustainable business opportunities outlined in Chapter 2 and (iii) 8.5 million new jobs by 2030, as discussed in Chapter 3.

The public sector also will benefit from:

- **Additional tax revenues** – A nature-positive food system will create new kinds of economic activity and new formal jobs. This growth, diversification and increased economic formalisation will spur revenue growth from state-level and local taxes (e.g., VAT, vehicle taxes and property taxes). This will help states and municipalities diversify their sources of revenue beyond government transfers: currently, almost 60% of the state of Pará's income consists of transfers from the federal government, for example.

- **Reduced health costs through improved nutrition** – The food production system in Brazil has become increasingly concentrated in some geographical regions. In municipalities with a high concentration of monoculture crops, food must be transported long distances, which drives up costs and increases the consumption of more durable but less nutritious food. This is especially true in states like Mato Grosso, where crops like maize and soya are destined mainly for export or animal feed, monopolise local lands and drive out food for human consumption.

  Transitioning to more integrated, diversified and biodiverse food production could improve nutritional outcomes locally by making more items available. Native food sources, in particular, can be highly nutritious,[152] helping to provide sustainable solutions that diversify diets and tackle malnutrition and health problems. To guarantee that part of the food supply reaches rural families, government programmes such as School Feeding, which establishes that a minimum of 30% of food offered in public schools is sourced from family farming,[153] are critical.

- **Enhanced social inclusion and poverty reduction** – The transition will create 8.5 million new formal jobs that will pay better than many existing informal occupations that currently provide livelihoods for many people in Amazonia. This will reduce incentives to conduct illegal activities such as illegal deforestation, mining and land grabbing[154] and reduce opportunities for the associated criminal networks. This also should release more resources for education and medical care to improve literacy, living standards and life expectancy in a sustained way.[155] The reduction in the wage gap between agricultural earnings and national average earnings in Brazil also could diminish rural-urban migration and the subsequent pressure on urban infrastructure. Altogether, the shift to a nature-positive food system could contribute strongly to a more inclusive growth path for Brazil. There are many existing examples of farmers and family enterprises building inclusive, forest-based value chains, which can be scaled (Box 10).

Box 10. *How nature and people-positive agriculture are mutually reinforcing*

Non-timber forest products (NTFPs) in the Atlantic Forest: Emerson and Viviane in the Santa Teresa municipality of Espírito Santo promote the conservation of the juçara palm tree. They build on the state's legislation that allows smallholders to generate income from NTFPs. They also receive training from government entities to get certified in juçara tree management and $77 per hectare from Reflorestar, the state's payment for environmental services. With these benefits, the couple purchases the equipment to process and freeze the juçara fruit into a pulp that they sell for $6 per kg. Juçara also plays a vital role in biodiversity conservation. When other fruit harvests are depleted in winter, the palm tree gives its fruits – feeding toucans, parakeets and other birds alike.

Agroforestry in the Amazonia Rainforest: The Soares family in the Juruti municipality of Pará is changing the traditional slash and burn practice for cassava monoculture that has degraded their land. In 2018, the family received support from Terra Preta to set up agroforestry units of 1 hectare where farmers who avoid burning the area can integrate cassava with mango, açai and other trees. In a family of five, the father relies on his daughters' knowledge from technical school to improve soil fertility. Through agroforestry practices, the family expanded to sell fruits, oils and grains, which has boosted their food security, earnings and resilience. The family now alternates native trees with fruit trees to generate more income per hectare without deforesting and eroding the land.

Seed restoration in an integrated livestock-crop system in the Cerrado Savanna: Eduardo Campos and his son restored 21 hectares of degraded legal reserve in the municipality of São Carlos in the state of São Paulo to expand cattle production. They use direct seeding, known as *muvuca*, a restoration method using a mixture of high-density tree seeds that are sown in pits, rows or lines. The Campos family used a tractor to spread the seeds together with fertilisers and green manure. Seven years later, the areas have continued to develop, and direct seeding has become the primary method for restoring the farm after other unsuccessful methods. They continue to improve the technique by planting seeds in pits, as it does not expose the soil. In addition to expanding cattle ranching, the family is now considering selling sustainable wood and beans, which enable the growth of newly planted species because they shield plants during winter and provide shade during summer.

II. BARRIERS

Despite this prize, the concerted action needed from the public sector has not yet materialised, with some action going in the opposite direction. The current federal government passed 1,112 administrative decrees that changed environmental legislation to facilitate the exploitation of the forest, biodiversity and indigenous territories.[156] The federal government also has weakened law enforcement (cited among the most frequent issues in this report's consultations).

Barriers to the transition include land tenure issues, unenforced Forest Code (Box 9), public lending unfit for sustainability, and small-scale production. While some of these barriers, such as small-scale production, are related to the private sector and farmers, these can be addressed only in coordination with local authorities at different levels. In turn, some benefits accrue to the public sector only if private stakeholders participate at scale.

- **Land tenure issues** – Speculative land grabbing – i.e., the swift acquisition of property by fraud or force in expectation of selling it at a higher price – is one of the main factors driving deforestation in Brazil. This illegally obtained and subsequently cleared land may lack a title, leaving people who acquire the land with uncertain property rights. Imazon, a Brazilian research institute, estimates that this applies to 53% of land in the Legal Amazon.[157]

Uncertain property rights have further effects on crime and violence as land disputes escalate. Over the past 20 years, 15,000 land-related conflicts have taken place, with 700 people losing their lives as a result.[158] A Climate Policy Initiative report correlates a 10% decrease in land insecurity – measured by the number of takeovers and homicides related to land conflicts – with a 7% decrease in Brazil's annual deforestation rate.[159]

This risk of losing land or facing conflict deters producers from managing, protecting and improving their land to its fullest capacity.

- **Unenforced Forest Code (Box 9)** - Landholders may not see economic returns from complying with the Forest Code regulation if the government is not actively enforcing compliance on other landholders. The newest version of the Code established transitional rules that set phases for rural producers' obligations. The final deadline to fully comply with Code requirements is 2032, which is a long time to wait, considering the urgency for forest protection. Over time, the Code's evolution has led to significant complexity, making actual enforcement difficult and leading to widespread non-compliance. Today, almost half of landowners in the Cerrado biome and Amazonia are non-compliant with the Code requirements,[160] but the law allows most of them to postpone compliance with this regulation.[161]

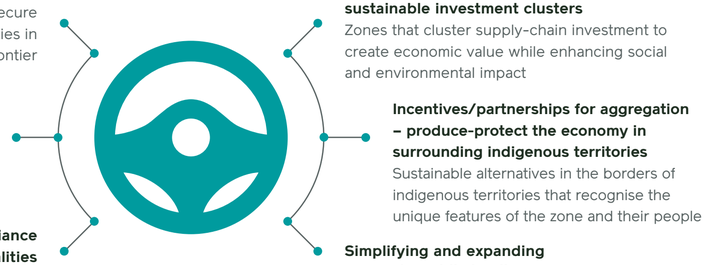
- **Public lending unfit for purpose** - The Brazilian rural credit policy includes 24 lines of agricultural credit such as PRONAF for family farming, PRONAMP for middle-sized producers and FUNCAFÉ for coffee producers.[162] However, few of these include financing for agroforestry or integrated cattle farming businesses. These credit lines are frequently adjusted, added to and removed, with their conditions changing over time. This complexity of funding sources and their associated bureaucratic requirements introduces unnecessary transaction costs and variation in understanding loan conditions, which generates disparity among borrowers.[163] Smallholders in particular also may lack access to credit advisors to explain the different credit instruments available. On the other hand, commercial banks have limited know-how about credit risk in agroforestry systems, despite an increasing appetite to allocate credit.

- **Small-scale production** - Food traders who buy and sell raw commodities like coffee or soya beans do not always have the economies of scale to justify investing in sustainable value chains or geographical areas. They may lack the volumes to source their product, the technical partners to increase productivity or the access to suppliers at scale to reduce costs that justify the purchase. The absence of aggregated volumes makes it hard for traders to attract investors and establish an entirely sustainable supply chain. Furthermore, some regions may lack storage facilities or a trained labour force to help sustainable commodity producers gain scale. This limited infrastructure and skills make it hard for traders to attract partners to share logistics and sourcing costs. In 2019, among the top 100 cities to invest in in Brazil, only eight were in the Legal Amazon region, where 13% of the population lives.[164]

III. SOLUTIONS

These barriers are not insurmountable, and the public sector will play a key role in overcoming them. Figure 12 shows some of the main levers that could support change. Some of these levers have already been successful in Brazil, and some are already being put in place.

Figure 12. *Public sector steering role*



Re-funding law enforcement
Enable and reinforce policies to secure land rights for traditional communities in the forest frontier

Stronger penalties for non-compliance – individuals and firms
Penalties for individuals and firms found guilty of participating in illegal deforestation, land grabbing, and mining

Stronger penalties for non-compliance – states and municipalities
Fines for jurisdictions with high deforestation rates to incentivise local authorities to enforce environmental law

Incentives/partnerships for aggregation – sustainable investment clusters
Zones that cluster supply-chain investment to create economic value while enhancing social and environmental impact

Incentives/partnerships for aggregation – produce-protect the economy in surrounding indigenous territories
Sustainable alternatives in the borders of indigenous territories that recognise the unique features of the zone and their people

Simplifying and expanding access to public lending
Leverage public funds to target and allocate rural credit successfully towards nature-positive agriculture

Source: *Team analysis*

Internally, Brazil will need to better coordinate policies across the federal, state and municipal levels. What is good for the country – a more sustainable development, despite being slow to mature – may not be best for the municipality. Municipalities may want to generate taxes and jobs quickly, and if allowed to choose, municipalities may be inclined to stimulate unsustainable economic activities to the detriment of a longer development path. To create an enabling environment that attracts private capital, governments across the state and national levels need to re-fund law enforcement, strengthen penalties for non-compliance with the Forest Code, simplify and expand access to public lending for sustainability purposes, and create incentives and partnerships to encourage aggregation.

Food system transformation requires adequately funding the enforcement of existing environmental regulations for penalties to become credible and reduce the opportunity costs of land grabbing.

- **Re-funding law enforcement** - The federal government must reverse the budget cuts that enforcement entities like the Brazilian Institute of the Environment and of Renewable Natural Resources (IBAMA) suffered for their forest monitoring and enforcement programmes. IBAMA regularly used a near-time deforestation detection system to generate deforestation alerts and allow the rapid deployment of enforcement agents on the ground, often confronting offenders while they were clearing the field. Studies have shown this environmental monitoring and law enforcement effectively reduced deforestation in the Amazon rainforest, helping prevent the loss of more than 2 million hectares per year.[165] The policy also proved to be cost-effective and did not interfere with agricultural production.[166]

These enforcement entities must also regain their independence and convening power to coordinate the fight against land speculation through credible threats. In Brazil, several land registries exist at various administrative levels, leaving room for ownership overlap and land conflict, which disincentivises investment. In this respect, funding should require more communication and coordination between state land institutes and land registry offices. Integrating and updating the public and private land databases under a unique platform, including the environmental rural registry[167] information, can help address land conflict faster and help provide security for investment.

With enforcement properly funded, stronger penalties for illegal deforestation will send the right signals to land grabbers looking to invade properties. These penalties made a difference in the past when they were implemented instead of granting the pardons that occur today.

- **Stronger penalties for non-compliance** - The government can target and fine jurisdictions based on their deforestation rates using "name and shame" lists to incentivise local authorities to enforce the Forest Code and be removed from the list. In 2008, the Ministry of Environment of Brazil published a list of municipalities responsible for 50% of deforestation in the Amazon Rainforest. The list entailed a series of punitive measures (e.g., restrain credit access, the sale of products and the trade of properties) that would be applied if municipalities did not comply with targets established by the Ministry. To remove their names from the list, municipalities had to reduce deforestation by up to 40 km2 and promote the inclusion of at least 80% of the rural properties in the rural environmental registry or better monitoring. Amazonia municipalities on priority lists saw reduced forest clearings without affecting agricultural production and created positive spill-over effects in neighbouring municipalities.[168]

Once stronger penalties and enforcement guarantee land tenure and collateral for credit, public lending can be made more accessible and fit for purpose. Public authorities can reduce burdensome applications, make nature-positive business models eligible for funding, and train business correspondents in rural areas to expand access.

- **Simplifying and expanding access to public lending** - The public sector has always led the engagement in green finance in Brazil. The Central Bank of Brazil's (CBB) condition of granting rural credit only to producers in Amazonia who comply with environmental regulations reduces the deforestation impact of rural credit. A study estimated that the deforested area of municipalities in Amazonia that benefit from credit was 60% smaller than comparable municipalities bordering the biome.[169] According to CBI, for every $190 million in rural credit given, there is an increase in 55 hectares in the harvested area but a rise in 200 hectares in forest land and a reduction in 150 hectares of pastureland.[170] Rural credit eases producers' capital constraints to buy agricultural equipment and fertilisers to intensify production while reducing pressure for deforestation. Recently, the CBB opened a public consultation to draft new regulations that define additional sustainability criteria to be applied to rural credit operations.[171]

  In 2010, Brazil's federal government launched a specific credit line for low-carbon agriculture (ABC Plan). The credit line sought to accelerate the adoption of sustainable production technologies for medium and large producers through the provision of 4.5–6% interest rates. However, the credit line has been consistently undersubscribed, with a further 30% fall in loan approvals over the last three years.[172] Assessments from the Laboratory of Financial Innovation pointed to challenges in the technical capacity of the business correspondents, oscillation in the interest rates and strict requirements on rural producers in order to obtain credit.[173] To increase the allocation of funding, it recommended that the ABC Plan (i) improve the quality and availability of technical assistance for business correspondents, (ii) reduce the bureaucracy of the ABC Plan, (iii) better explain the conditions attached to the credit and (iv) include low-carbon agricultural practices such as agroforestry – currently not financed by rural credit – in the framework.[174]

With these enablers in place, public authorities must use their convening power to create viable alternatives to deforestation to ensure inclusive growth for Brazil's current smallholder farmers – who represent two thirds of the rural workforce.[175] Public policies can provide incentives to create sustainable investment corridors and clusters.

- **Incentives/partnerships for aggregation through sustainable investment clusters (SICs)** - Policy to encourage clustering of commercial activities and support trade that includes export zones, innovation hubs, trade corridors, special economic zones, industrial parks and more. SICs are those clusters of supply chain components that seek to drive enhanced social and environmental impact alongside economic value.

  SICs can help scale sustainable production by reducing sourcing costs for producers and incentivising higher production volumes. They also can create better financing conditions and allow product differentiation – and premium prices – through the enforcement of higher labour standards, zero illegal deforestation agreements and collective traceability of the value chain. Figure 13 sets out an example of how a SIC can be applied to the cocoa sector in the southeast of Pará, with estimates of the benefits it can generate.

Figure 13. *Cocoa can serve as an example of a Sustainable Development Cluster in Pará*

Collective governance structure

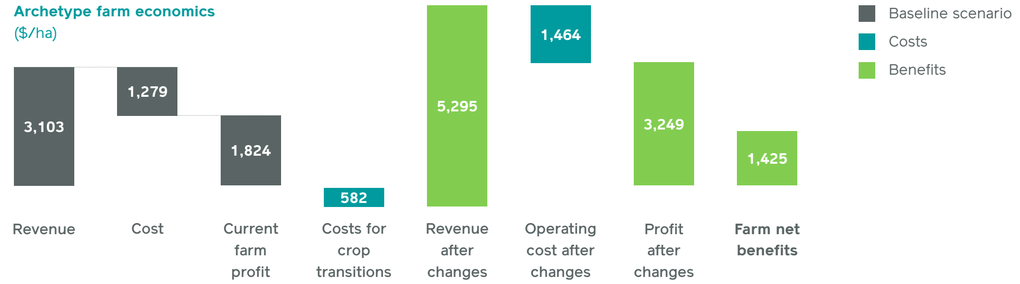
Context:

- Despite cocoa beans being a native species of the Amazonia, Brazil imported more than it exported, leaving a trade balance of $100 million
- Pará has surpassed Bahia since 2018 as the leading producer of cocoa in Brazil owing to increased productivity: 920 kg per ha vs 450 kg per ha, which is the national average

Economic and environmental viability

- Cocoa thrives alongside fruits like bananas, hardwoods and other trees
- Agroforestry systems that include cocoa recover investment in 6 years with a 10-year NPV of $3,249/ha, creating alternatives for farmers who depend on ranching
- Cocoa agroforestry can be 2.5–4 times more profitable than ranching and retain 3 times more aboveground carbon stock than natural regeneration from abandoned pasture*

Archetype farm economics
($/ha)



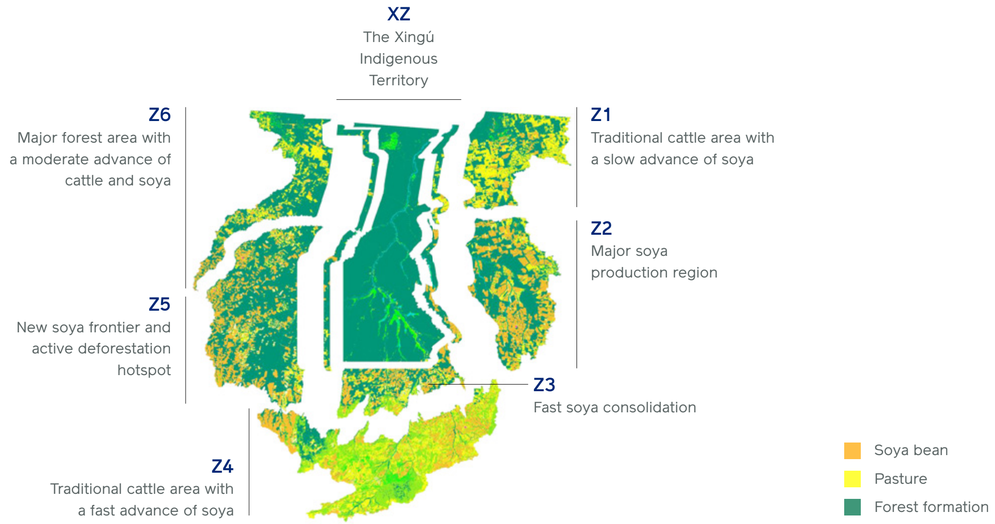
Source: *Team analysis and authors' calculations*

**WB, 2017. Note: All values are in net present value (10 years), which is calculated considering an 8% discount rate. Generic agroforest system based on a Cocoa farm in Pará. For this analysis, costs for technical assistance were not considered. Assumed 2020 average US Dollar (USD) to Brazilian Real (BRL) exchange rate (1 USD = 5.156 BRL).*

- **Incentives/partnerships for aggregation through protect-product economy initiatives** - Indigenous people are by far the best guardians of the forests, but their territories have become increasingly threatened. A study showed that the deforestation rates inside indigenous territories are significantly lower than in areas right outside their borders, but only when their property rights are certified.[176] In Brazil, an ongoing trial in the Supreme Federal Court is set to redesign the boundaries of 300 indigenous territories that are currently under a demarcation process.[177] To stop deforestation in surrounding areas and create a "green shield", the public sector, industry players and NGOs can promote more sustainable business models such as that set out in the Xingú 2030 Strategy.

  The Xingú Strategy proposes (i) a project development facility to incubate and accelerate projects in the surrounding areas of the Indigenous Territory of Xingú and (ii) a philanthropic scale-up fund. The facility promises to support a pipeline of projects (Figure 14) ready for scale-up, such as payments for ecosystem services, wild forest production, ecotourism and integrated crop-livestock-forestry systems (ICLFS). The scale-up fund promises to provide the investment capital to scale initiatives and maximise the impact of incubated projects. The strategy aims to work with relevant stakeholders who can drive change, obtain the support of local people, government and institutions, and address the needs of communities in and around the territory.

Figure 14. *The Xingú 2030 strategy*



Proposed Initiatives

Z1
- Support cattle intensification coupled with Forest Code compliance
- New soya areas developed under integrated crops-livestock-forestry systems (ICLFS)
- Potential sustainable beef hub

Z2
- Acceleration of Forest Code compliance
- Conversion from grains monoculture to ICLFS
- Secure conservation of forest areas through payments for environmental services (PES)

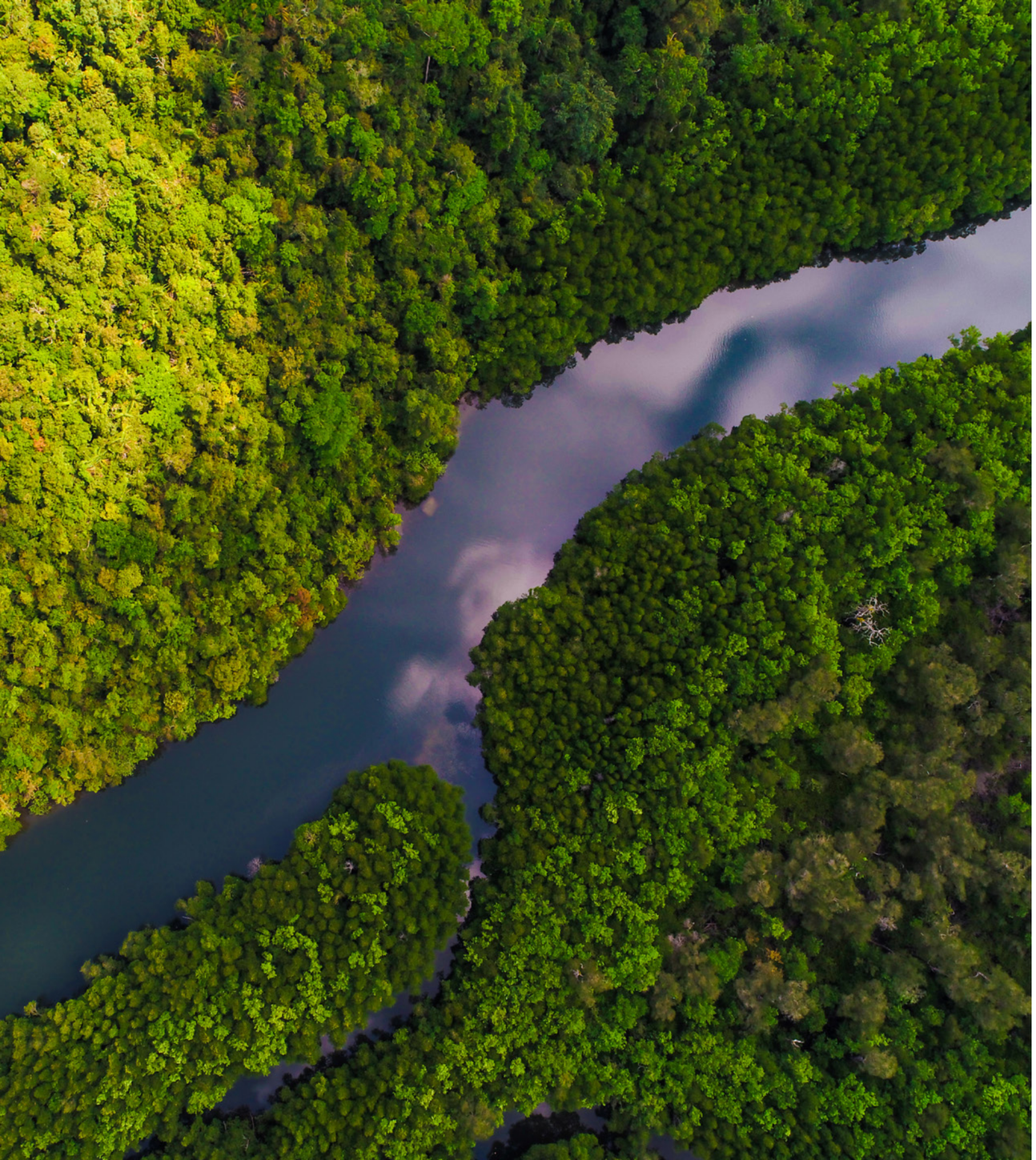
Z3
- Accelerate restoration of Permanent Preservation Areas (PPAs)
- Prospect tourism models driven by indigenous communities
- New soya areas developed under ICLFS

Z4
- Accelerate the restoration of PPAs
- Promote intensification under regenerative business practices (ICLFS, Agroforestry)

Z5
- Development of PES
- Strengthen reduced impact logging
- Command and control

Z6
- Conservation through PES
- Potential agroforestry hub
- Strengthen reduced impact logging
- Command and control

Source: *Team analysis*

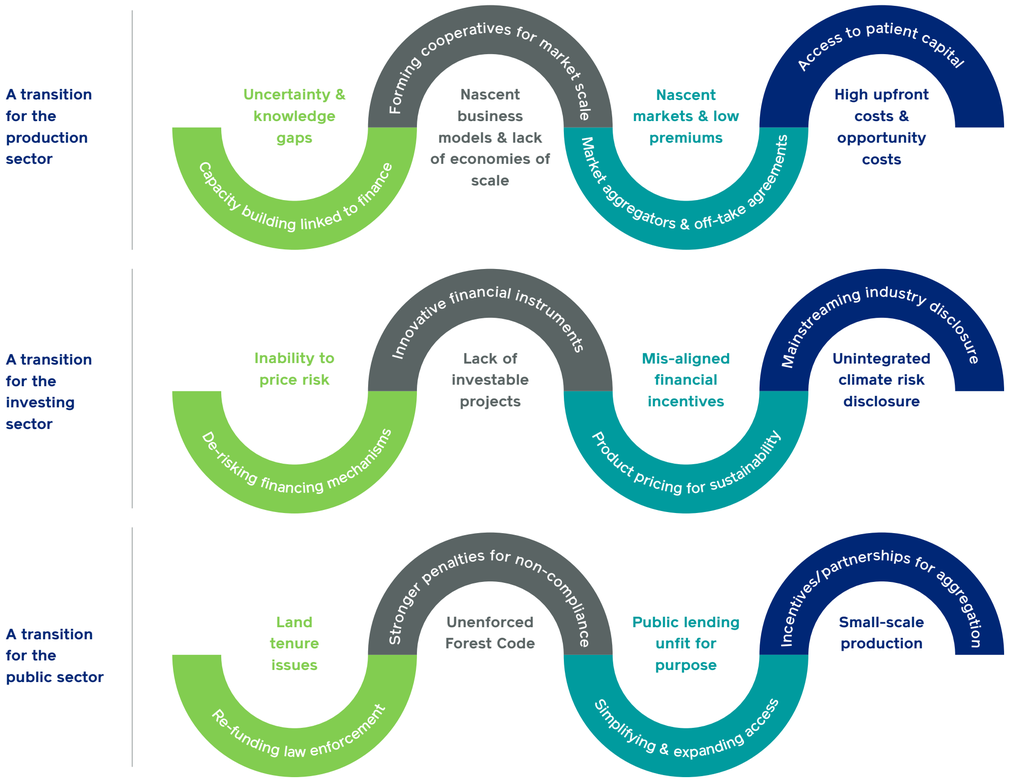


CHAPTER 6

Recommendations: a call to value one of the world's most precious assets – Brazilian nature

A transition for the finance and public sectors is possible if stakeholders factor in the prize of a transformation while designing solutions to help overcome barriers (Figure 15). For producers, this translates into engaging in hands-on capacity building and forming cooperatives to gain scale. It also means creating partnerships to gain market access and obtaining patient capital to grow. For investors, this means leveraging philanthropic, public and development capital to de-risk investment while designing innovative financial instruments to help build investable projects. It also entails correctly pricing sustainability products to shift financial incentives and disclosing climate risk at industry level to integrate disclosure. Finally, for the public sector, it involves re-funding and strengthening enforcement methods that made a difference in the past when they were implemented. But it also means creating alternative economic activities that can reduce the opportunity costs of illegal activities through the expansion of fit-for-purpose public lending and incentives for aggregation.

Figure 15. *A transition for the production, finance, and public sectors*



Source: *Team analysis*

Brazil has what it takes. The country has the established business models, the financial appetite and the proven policy tools to make a transition happen. It also has the Amazonia brand, market size, supporting technical institutions and innovative financial instruments.

Most importantly, Brazil has the natural capital. The Amazon is the largest tropical rainforest in the world – the size of the contiguous United States. It is home to 1 in 10 species known on Earth.[178] It holds one quarter of the global carbon storage, and 70% of Latin America's GDP is produced in areas receiving water from the Amazon.[179] Without it, the world's mean temperature would increase by 0.25°C.[180]

To make a transition possible, hands-on coordination among stakeholders is called for. If an effective enabling environment is in place, the sustainable food system in Brazil could become a significant driver of (i) investment, (ii) jobs, (iii) economic recovery post-COVID-19 and (iv) profit generation and cost reduction for governments.

To this end, we propose eight high-priority recommendations for key stakeholders (Figure 16). These recommendations draw on the analysis throughout the report and the key actions to transform a food system model where producers, financiers and consumers can optimise resources individually to a food system where key stakeholders work together to value one of the world's most precious assets – Brazilian nature.

Figure 16. *Eight recommendations for key stakeholders*

	STAKEHOLDER	RECOMMENDATIONS
1	For family/corporate foundations, philanthropists, and the donor community	Provide better de-risking in early-stage project development to support nascent business models
2	For development finance institutions (DFIs) and donor-funded vehicles	Channel long-term financial instruments more catalytically to crowd in private capital at scale
3	For Brazilian economic decision-makers, public and international private banks	Integrate subsidised public credit lines and double-down the provision of green credit
4	For food processing, distribution, trading and wholesale firms, corresponding lenders, and conservation NGOs	Strengthen pre-competitive sectoral collaborations to grow market opportunities faster
5	For coalitions of corporates, governments, climate funds, and conservation NGOs	Ensure and accelerate the high-integrity of carbon market development
6	For heads of sustainability units, government innovation labs, entrepreneurs and fintechs	Support market aggregators to transfer tech packages and unlock credit more efficiently
7	For farmers and producers looking to make a transition in Brazil	Join forces to create cooperatives to build capacity and access credit, markets, and training
8	For the federal government, state land institutes, and land registry offices	Enable and enforce policy to secure land rights for communities in the forest frontier

Source: *Team analysis*

Recommendation 1

For family/corporate foundations, philanthropists and the donor community

Provide better de-risking strategies in early-stage project development to support nascent business models throughout their expansion stages. The lack of proof of concept and high-risk misperception of sustainable farming practices, commercial models and markets deter farmers and financiers from embarking on new ventures. De-risking in the early stages of project development to build demonstrative models that mobilise private investment can show that nature-positive business models are investable and scalable.

Funding from family and corporate foundations, philanthropists and the donor community can provide early-stage de-risking to incubate and accelerate nature-positive project pipelines. This can be done through reimbursable and non-reimbursable grants and first-loss capital and loan guarantees to support the development of nascent models. They also can offer venture windows to invest in expanding companies and growth windows targeting more mature firms with positive cash flows. These projects should be easily replicable by farmers and funded by other donors to create a critical mass of ventures. They also should include sustainable, centuries-old practices, including small-scale fishing, gathering nuts and using *muvuca* – a traditional restoration method that sows a mix of high-density tree seeds in pits, rows or lines.

This is starting to happen. The Fundo JBS pela Amazônia has committed $50 million[181] to support forest conservation and restoration, the socioeconomic development of communities and technological advances. The fund has already mobilised $450,000 from another donor, Elanco Foundation, to support agroforestry systems[182] and aims to provide reimbursable grants to more mature businesses eventually.

Recommendation 2

For development finance institutions (DFIs) and donor-funded vehicles

Channel long-term investment capital that is patient, risk-tolerant, concessionary and flexible to crowd in private capital at scale. The combination of development and donor finance for mobilising commercial funding towards nature-positive agriculture businesses is still at a nascent stage in Brazil. While domestic DFIs have started exploring blended finance in sustainable inputs and biotechnology, only 25% of the respondents to a DFIs association survey claimed to have actually engaged in blended operations.[183] DFIs and donors in Brazil face a limited evidence base of the success of blended finance in the country and few incentives – such as less reliance on government funding – to target mobilisation of commercial capital.

International development banks and donor-funded vehicles can capitalise on their access to longer-term capital and catalytical funding to provide blended finance. They can channel these resources through regional development banks that have proven more efficient in channelling finance due to their proximity to regional markets, sectoral expertise and issuing debt in local currency. They can do so through a mix of multi-year credit lines with a guarantee fund, technical cooperation for project preparation and syndicated loans for project execution, for example. These instruments can require targets of private capital mobilisation – additional commercial capital that would not have been mobilised otherwise – rather than indicators of disbursements or debt to equity proportions. In doing so, they can work with market aggregators to demonstrate successful cases and build markets that can attract private capital from food processing, distribution, trading and wholesale firms.

For example, Mirova Natural Capital's Althelia Biodiversity Fund in Brazil aims to provide $100 million in blended finance to sustainably managed agroforestry, farming, protected areas and biodiversity-friendly service providers. The fund provides a credit guarantee from the Development Credit Authority, backed by USAID, covering up to 50% of a loan. It also offers senior shareholders a $15 million first-loss protection from The International Centre for Tropical Agriculture (CIAT).[184] The fund claims to have structured three deals already since its creation in 2019, with 10 more in development.[185]

Recommendation 3

For Brazilian economic decision-makers, public and international private banks

Strengthen the provision of public and private green credit, simplify its application and reduce knowledge gaps through business correspondents that share information and better assess risk. Existing public credit lines can be challenging to access for producers not used to dealing with complex application procedures. At the same time, the concentration of public bank branches in the most developed cities[186] and the absence of business correspondents in rural areas make the transaction costs high and moral hazards hard to assess. This is especially relevant for private banks that do not have a close relationship with the producer or cannot monitor their production.

Brazilian economic decision-makers and public and private banks can reduce complex public credit lines and simplify application procedures to lower administrative costs and accelerate transactions. Enhancing the marketing of existing credit lines and their financial conditions and improving the quality and availability of technical assistance of business correspondents can help farmers take more risks. These players also can work with private actors such as microfinance institutions, credit cooperatives and rural savings funds to penetrate rural areas and include financing agroforestry businesses, currently ineligible for rural credit. Finally, private banks can provide innovative financial products with competitive conditions to clients that rigorously meet ESG standards. They also can conduct ESG due diligence on their investees to help them prepare for green market requirements, shifting their behaviour while creating new opportunities for the bank as more clients get interested.

Recommendation 4

For food processing, distribution, trading and wholesale firms, corresponding lenders and conservation NGOs

Strengthen pre-competitive sectoral collaborations to build sectoral coalitions that enable information sharing and market research to grow business opportunities faster. Food industry players and their corresponding lenders do not fully appreciate the risks they face, so they are not directing capital that can help them reduce those risks. At the same time, they lack the economies of scale to justify the costs of investing in and buying from nature-positive businesses.

Food processing, distribution, trading and wholesale firms can strengthen pre-competitive sectoral collaborations to unlock cost-sharing investments that can enlarge the market size of regenerative agriculture. These players should work in conjunction with corresponding lenders and conservation NGOs interested in producing while protecting nature. These collaborations can be classified as to whether they have open (e.g., agricultural corridors) or restricted (e.g., joint ventures) participation and open (e.g., moratorium agreements, financial disclosures) or restricted (e.g., technical hubs) outputs. Collaborations can have three sets of goals that are not mutually exclusive:

1. **To build enabling platforms** that can create certification standards, incubate traceability technology and work with suppliers to facilitate compliance with environmental legislation that will allow entry into new niche markets.
2. **To share information** relevant to nature and climate risk and to engage internal and external stakeholders around mainstreaming climate issues in business and finance strategies.
3. **To conduct research** that can generate and aggregate industry data, create knowledge to analyse market trends and carry out product development to market-test new business lines.

There are some examples already taking place. The Soy Working Group (GTS) have made efforts to map agricultural properties that are not in conformance with the Amazon Soy Moratorium, using a monitoring method that traces the land use of properties through satellite images.[187] FEBRABAN also started helping Brazilian banks adopt the recommendations of the TCFD,[188] outlining a roadmap for individual and collective action.

Recommendation 5

For coalitions of corporates, governments, climate funds and conservation NGOs

Help improve the integrity of carbon markets through offtake agreements, standardisation of internationally recognised certifications and project delivery facilities. The opportunity cost of commercial crops to producers will remain high, mainly due to short-sighted valuation and elevated commodity prices. And while carbon credits could reduce this cost, the carbon market is still nascent, and the value paid is small. To take off, the carbon market requires (i) willingness from buyers to pay for environmental services historically perceived as free services, (ii) portfolios from suppliers of the highest quality to ensure revenues are well spent and (iii) trust towards contract delivery to diminish reluctance to trade credits out of fear of non-compliance. The absence of these elements makes the carbon market slow to emerge and the scale of revenue streams uncertain for farmers.

Coalitions of corporates, governments, climate funds and conservation NGOs can accelerate the high integrity of carbon market development. High-integrity credits refer to emissions reductions and removals (ERRs) that (i) result from projects employing credible baselines, (ii) cannot be reversed, (iii) would not exist without the payments and (iv) are only counted once, among others.[189] To accelerate their market, investor alliances can start by committing to offtake project developers, especially those that validate the land rights of indigenous communities and pay a high price floor to generate an ample supply of credits.

They also can assist in the credit certification process and fund development facilities of high-integrity projects to build trust. Converting existing standards into high-integrity certifications such as The REDD+ Environmental Excellence Standard (TREES) can ensure that credits meet the quality demanded by market-based mechanisms. Finally, development facilities can ensure revenues are re-invested in projects around avoided deforestation and degradation, afforestation and reforestation that can keep generating ERRs. Doing so can create a pipeline of more high-quality credits that can become self-financed faster. These reinvestments can ultimately create end-to-end value chains that attract corporates looking to source their carbon from farmers engaged in a long-term transition as part of their impact portfolio.

Recommendation 6

For heads of sustainability units, government innovation labs, nascent market-access entrepreneurs and financial technology firms

Support market aggregators that can transfer technological packages and unlock credit more efficiently. Poor access to markets and credit, as well as business and market risks, make it hard for farmers to connect with buyers looking to source their products from sustainable producers. Even those producers keen to learn may require more technology in soil management, business skills and long-term credit to enter a new market they may be unfamiliar with. In fact, according to the 2017 agricultural census, 86% of smallholders do not have access to finance in part because they do not have land title collateral to borrow against.[190] The lack of access to credit forces smallholders to rely on expensive retailers where they purchase seeds, fertiliser and other inputs.

Thus, heads of sustainability units, government innovation labs, market-access entrepreneurs and fintech companies can support market aggregators like market-access players and off-takers to provide farmers with technological transfer, technical skills and fintech. On the one hand, the heads of sustainability units of food and agriculture companies can pool resources to enhance the scope of market aggregators to provide biotech packages and extension services for their own suppliers.

- **Biotech packages** can include on-farm inputs such as (i) genetically enhanced seeds and seedlings, (ii) agricultural biologicals like biostimulants, biopesticides and biofertilisers and (iii) synthetic biology-enabled chemicals like biofuels, among others.
- **Extension services** can be in-person farmer field days supplemented with phone-based follow-ups for higher outreach and cost-effectiveness. These include (i) advisory SMS promoting the use of nature-positive agricultural practices, (ii) visual aids and weekly push calls to promote customised recommendations on soil fertility and (iii) audios with fertiliser tips to improve farmer comprehension.

On the other hand, fintech firms can act as business correspondents and form partnerships with regional public and private banks and microfinance institutions to provide financial education, customise financial instruments and unlock working capital for smallholders.

- **Fintech** can be in the form of financial monitoring services to reduce moral hazard and information asymmetry and to help lenders test models for guarantees, credit recovery and working capital loans at a lower cost. For example, the fintech TerraMagna uses machine learning and monitoring technology to better estimate farmers' collateral value and generate a more accurate credit score. Using satellite images, the firm tracks the state of farmers' crops in real time, using that information as an asset collateral to better measure the default risk and offer lower-cost loans. TerraMagna leverages partnerships with local retailers to monitor and fund their loans rather than lending directly to farmers.[191]

Recommendation 7

For farmers and producers

Set up or join cooperatives that can build capacity and increase collective bargaining power to access better credit, markets and training. Farmers face high capital costs and limited market access, given their geographical dispersion and proximity to logistics centres. Producers also are often reluctant to invest in a new business model due to their risk aversion or limited capacity to do so.

To address these issues, farmers and producers can create cooperatives to increase their capacity and access credit, markets and training. Cooperatives have proven efficient in transferring knowledge and technology by setting up demonstration units (i.e., offering hands-on experience to adapt low-carbon agricultural practices using learn-by-doing to provide lasting impressions) and food processing units (plants where farmers gather to transform agricultural products into food at a scale). Farmers' associations and cooperatives can also increase the bargaining power of their members to influence the terms and conditions of capital costs, credit and product value in their favour. But cooperatives can only gain economies of scale if they become attractive. For this reason, the governance and transparency of cooperatives are essential – to build trust, recruit other producers and induce them to adopt more responsible, biodiverse and low-carbon farming practices.

Cooperatives can also play a role to provide livelihoods to indigenous and traditional communities in the forest frontier. Coopavam (Box 1) is a clear case of a cooperative that buys Brazil nuts from indigenous communities and smallholders, providing local employment and alternatives to activities that previously degraded and depleted forest areas.[192]

Recommendation 8

For the federal government, state land institutes, and land registry offices

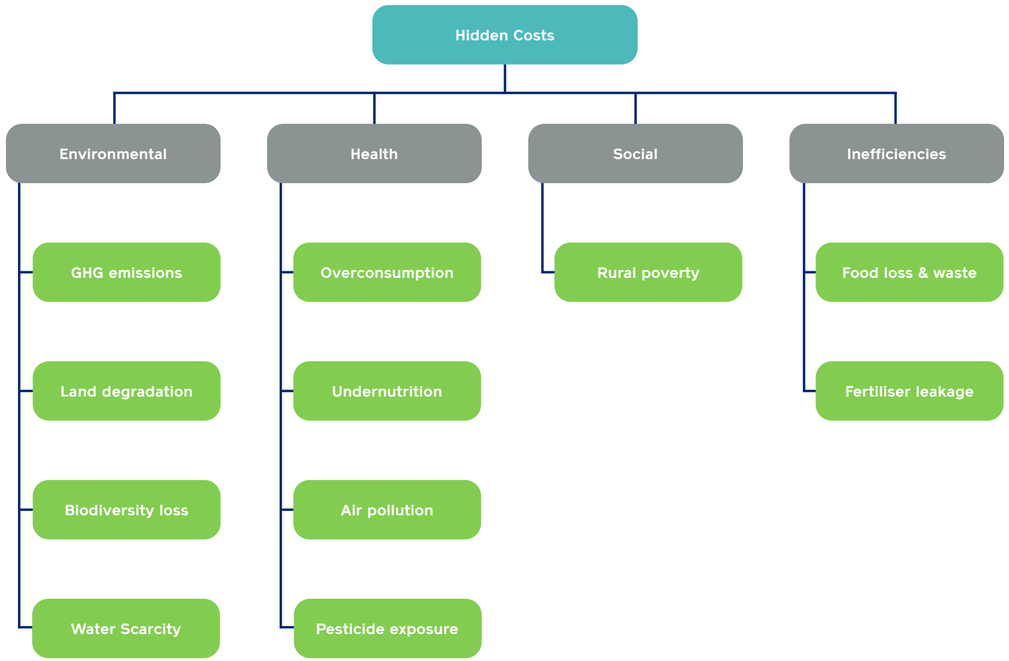
Enable and enforce policies to secure land rights for traditional communities in the forest frontier. One of the significant factors driving deforestation in Brazil is land grabbing in the forest frontier – operators who illegally claim government land and later subdivide it for sale to ranchers. Land grabbing has been exacerbated by decrees aiming to facilitate land exploitation and reduce enforcement entities' budgets. These two elements combined bring uncertainty in land tenure and violence between groups disputing land. Between 1994–2014, for instance, there was an average of 30 homicides per year related to land conflicts.[193]

To reverse these developments, the federal government, state land institutes and land registry offices must enable and enforce policy to secure land rights for communities in the forest frontier state. To begin with, the budget of enforcement authorities such as the Brazilian Institute of the Environment and of Renewable Natural Resources (IBAMA) and institutions managing land rights such as the National Indian Foundation (Brazil) (FUNAI) for indigenous people should be reinforced. The reinforced budget should require more communication and coordination between these institutions. It should aim to integrate and update the public and private land databases under a unique platform, including the environmental rural registry[194] information. It also should involve accelerating the registration in CAR for smallholders, possessors and traditional communities, which is lagging. Finally, policies that had successfully reduced deforestation in the past at both the individual level (command and control) and municipality level (list of high-deforestation jurisdictions) should be either reinstated or strengthened.

TECHNICAL ANNEX

Hidden costs

Hidden costs refer to the negative externalities that arise from Brazil's current means of production and consumption of food. This includes inefficiencies and social, health and environmental costs. The complete list of categories considered is shown in the diagram below.



This analysis does not adopt a strict economic definition of externalities. Instead, it includes the top sources of lost value or human and social costs related to global food and land-use systems. Depending on the specific issue, this could consist of estimates of abatement costs, social costs, productivity losses or the lost economic value from inefficient resource use. In addition, the extent to which other losses or costs could be effectively quantified varies significantly across the three dimensions considered. As a result, this exercise provides a reasonably reliable indicative measure of the order of magnitude of hidden costs, but not in any way a conclusive answer. A key aim is to inform debate on this subject and inspire future research.

The key steps for calculating the costs for each category in Brazil are summarised below. Estimates and assumptions have been corroborated by third-party sources and expert interviews whenever possible to validate estimation approaches, key metrics and scope.

Table 1. *Summary of the calculations for the hidden costs analysis*

Category (USD/yr)	Cost (USD/yr)	Value A	Unit A	Explanation A					Source
				Value B	Unit B	Explanation B			
						Value C	Unit C	Explanation C	
Environmental (137bn)	GHG emissions (88bn)	0.88	Gt CO2 eq/yr	GHG emissions from agriculture, land use, land-use change and forestry					SEEG and FAO stat
		x							
		100	USD/ tonne/ CO2 eq	Average range of marginal abatement costs for Brazilian GHG emissions from 2020-2050					CPLC 2017
	+								
	Land degradation (10bn)	6.2bn	USD	Value of yield loss from soil erosion of cropland					↓
				57m	ha	Total area of degraded cropland in Brazil			↓
						666m	ha	Total area of global degraded cropland	GLASOD
						x			
						0.1	%	Brazil's share of global degraded land	GLASOD & CGEE
				x					
				1,300	USD/ha	Average annual value of cropland output per ha in Brazil			↓
						64m	ha	Total area of cropland in Brazil	FAOSTAT 2018
						x			
						83bn	USD	Total annual value of cropland output in Brazil	FAOSTAT 2018
				x					
				8	%	Reduction in yield from soil degradation			Panagos et al. 2017
		+							
		2.1bn	USD	Value of yield loss from soil erosion of pastureland					↓
				78m	ha	Total area of degraded pastureland in Brazil			↓
						913m	ha	Total area of global degraded pastureland	GLASOD
						x			
						0.1	%	Brazil's share of global degraded land	GLASOD & CGEE
				x					

Category (USD/yr)	Cost (USD/yr)	Value A	Unit A	Explanation A					Source
				Value B	Unit B	Explanation B			
						Value C	Unit C	Explanation C	
Environmental (137bn)	Land degradation (10bn)	2.1bn	USD	323	USD/ha	Average annual value of pastureland output per ha in Brazil			FAOSTAT 2018
						173m	ha	Total area of pastureland in Brazil	FAOSTAT 2018
						/			
						56bn	USD	Total annual value of livestock production in Brazil	FAOSTAT 2018
				x					
						8	%	Reduction in yield from soil degradation	Panagos et al. 2017
		+							
		1.4bn	USD	Value of yield loss from lost cropland					↓
				1m	ha	Area of Brazilian cropland lost to land degradation			IPBES
				x					
				1,300	USD/ha	Average annual value of cropland output per ha in Brazil (total cropland area in Brazil in ha/total annual value of cropland output in USD)			FAOSTAT 2018
	+								
	Biodiversity loss (36bn)	6bn	USD	Value of lost ecosystem services from deforestation					↓
				5,324	USD/ha	Average annual value of tropical forests per ha			De Groot et al. 2012
				x					
				1.1m	ha	Annual amount of deforestation in Brazil caused by agriculture			PRODES
		+							
		30bn	USD	Value of biodiversity lost from land degradation					↓
				135m	ha	Total area of degraded land in Brazil			CGEE
				x					
				897	USD/ha	Value of soil ecosystem services			Jónsson & Davíðsdóttir 2016
				x					
				25	%	Reduction in soil biodiversity from land degradation			Expert opinion
	+								

Category (USD/yr)	Cost (USD/yr)	Value A	Unit A	Explanation A					Source
				Value B	Unit B	Explanation B			
						Value C	Unit C	Explanation C	
Environmental (137bn)	Water scarcity (3bn)	40	Km3/yr	Total annual freshwater withdrawals for agriculture in Brazil					FAOSTAT
		x							
		1.15	USD/ m3/yr	Global average annual scarcity cost of water					FAO 2015
		x							
		6	%	Share of global freshwater withdrawals for agriculture that are unsustainable or at risk of becoming unsustainable in Brazil					GLOBIOM
+									
Health (99bn)	Over-consumption (40bn)	5.8m	DALYs	Loss of productive life from obesity Proxied by DALYs related to high-BMI risk factor					IMHE GBD 2019
		x							
		6,796	USD PPP	GDP/capita for Brazil					World Bank 2020
	+								
	Under-nutrition (13bn)	1.0m	DALYs	Loss of productive life from under-consumption Proxied by DALYs related to child growth failure, including child stunting, child wasting and child underweight					IMHE GBD 2019
		x							
		6,796	USD PPP	GDP/capita for Brazil					World Bank 2020
		x							
		0.6m	DALYs	Loss of productive life from nutritional deficiencies Proxied by DALYs related to protein-energy malnutrition, iodine deficiency, vitamin A deficiency, dietary iron deficiency, and other nutritional deficiencies					IMHE GBD 2019
		x							
		6,796	USD PPP	GDP/capita for Brazil					World Bank 2020
	+								
	Air pollution (2bn)	1.3m	DALYs	Loss of productive life from air pollution Proxied by DALYs related to ambient particulate matter and ozone pollution					IMHE GBD 2019
		x							
		6,796	USD PPP	GDP/capita for Brazil					World Bank 2020
		x							
		23	%	Proportion of total global GHG emissions from food and land use systems					IPCC 2019
	+								

Category (USD/yr)	Cost (USD/yr)	Value A	Unit A	Explanation A					Source
				Value B	Unit B	Explanation B			
						Value C	Unit C	Explanation C	
Health (99bn)	Pesticide exposure (46bn)	0.02	DALYs/kg	Loss of productive life from pesticide exposure Proxied by DALYs caused by application of pesticides					Fantke & Joliet 2016
		x							
		377m	kg	Total annual pesticide application in Brazil					FAOSTAT
		x							
		6,796	USD PPP	GDP/capita for Brazil					World Bank 2020
+									
Social (2bn)	Rural poverty (2bn)	5.5	USD/day	Poverty line for high-income countries					World Bank 2020
		x							
		8	%	Mean shortfall from the poverty line					World Bank POVCAL 2019
		x							
		11m	people	Total rural population in Brazil living below US$5.5/day					↓
				211m	people	Total population of Brazil			World Bank POVCAL 2019
				x					
				13	%	Share of Brazil's population living in rural areas			World Bank 2020
				x					
				40	%	Share of rural Brazilians living in poverty			World Bank 2020
+									
Inefficiencies (56bn)	Food loss and waste (48bn)	32	%	Total rural population in Brazil living below US$5.5/day					WRI 2013
		x							
		143bn	USD	Total value of agricultural production in Brazil					FAOSTAT
	+								

Category (USD/yr)	Cost (USD/yr)	Value A	Unit A	Explanation A					Source
				Value B	Unit B	Explanation B			
						Value C	Unit C	Explanation C	
Inefficiencies (56bn)	Fertiliser leakage (8bn)	4.3bn	USD	Global value of leaked nitrate fertiliser					↓
				60	%	Average leakage rate of nitrates			Hirel et al. 2011
				x					
				5.1m	tonnes	Total annual application of nitrate fertilisers in Brazil			FAOSTAT 2019
				x					
				135	USD/ tonne	Global average price of nitrates			World Bank 2019
		+							
		3bn	USD	Global value of leaked phosphate fertiliser					↓
				90	%	Average leakage rate of phosphates			Hirel et al. 2011
				x					
				5.1m	tonnes	Total annual application of phosphate fertilisers in Brazil			FAOSTAT 2019
				74	USD/ tonne	Global average price of phosphates			World Bank 2019

Business opportunities

The methodology of sizing business opportunities employs a top-down approach to keep Brazil figures comparable to regional and global estimates (Table 2). While the national market for sustainable food may be considerable and a bottom-up, market sizing approach could make sense, its agricultural sector is embedded in global value chains, and its sustainable products have significant export potential.[195] Moreover, it seemed pertinent to follow a top-down approach as this report builds on the Growing Better data from the Food and Land Use Coalition (FOLU),[196] which identifies global opportunities for 10 critical transitions to transform food systems.

This study borrows two critical transitions from FOLU's report: regenerative agriculture and protecting and restoring nature. The business models identified here revolve around these two transitions and include (i) wild forest products, (ii) forest ecosystem services, (iii) agricultural development in cleared land, (iv) semi-intensive cattle farming, (v) sustainable inputs, (vi) agroforestry systems, (vii) restoration of degraded land, and (viii) technology enablers. Together they represent annual business opportunities worth $70 billion per year by 2030 (Table 2), using 2019 US dollar figures and rounded to the nearest $5 billion.

These business opportunities reflect the economic savings of introducing new farming practices (e.g. land cost savings for less extensive cattle ranching) and the market size of new business niches (e.g. selling traceable deforestation-free commodities). To include the most up to date global figures, the report employs data from the Methodology Note of the World Economic Forum (WEF) 2020 report titled The Future of Nature and Business.[197] WEF's report estimates the incremental opportunity from a "nature-positive business" scenario versus a "business-as-usual" scenario following more historical trends. Their 2030 estimates for the business models identified in our report build on methodologies derived from the Business and Sustainable Development Commission (BSDC)[198] and FOLU[199] using data from FAO World Soil, Market Line, Market Watch, Oxford Economics and Bronson Griscom et al. (2017), among others.

To calculate Brazil's estimate and keep it comparable to regional numbers, our report uses Brazil's global share of cropland (4%), agricultural land (5%), pastureland (5%), forest land (14%) and fresh water (5%) from FAO Stats following a similar approach used in Nicholas Stern's 2021 "G7 leadership for sustainable, resilient and inclusive economic recovery and growth – An independent report requested by the UK Prime Minister for the G7".[200] For instance, when estimating the business opportunity for Forest Ecosystem Services, we assume that Brazil's share of the total global market for ecosystem services ($85 billion) is roughly proportional to its share of the world's forest land – 14%. In other words, Brazil's potential for ecosystem services is around $10 billion.

Our calculations could overestimate the actual market numbers 10 years down the road given the fast-evolving environmental and market drivers such as shifts in diet patterns, precipitation, soil fertility and anthropogenic disturbances like fires. When possible, we cross-checked the market share potential of Brazil was in line with its actual potential or market size. Finally, it is essential to note that business opportunities are not mutually exclusive. For instance, components of ecosystem services may overlap with wild forest products. Also, components of sustainable cattle farming may coincide with land restoration. The purpose of this annex is not to go into the details of when this happens. Instead, it aims to explain how the different calculations for each business opportunity were estimated, recognising the intrinsic evolution of nature-positive businesses towards more integrated farming practices whose market size will be harder to estimate with time.

Table 2. *Estimated annual business opportunities and related assumptions in 2030*

Business model	Aggregated economic activity	Sub-activity in AlphaBeta methodological note	Global market size	Brazil's market share potential	Business opportunity (rounded to the nearest $5 billion)	Assumption	Source
Standing forests	Forest ecosystem services	Natural climate solutions	$85 billion	14%	$10 billion	The value of five natural climate solutions is considered low-cost, namely, (1) reforestation, (2) land restoration, avoided (3) grassland and (4) forest conversion, and (5) avoided peatland impacts. Of the total cost-effective potential of natural climate solutions to avoid 7 GtCO2e per year, only 2.5 GtCO2e per year is considered "low-cost". The value of these solutions is estimated to be worth $85 billion per annum by 2030 at a price below $50 per tonne.	Bronson Griscom et. al. (2017)[201]
	Wild forest products	Non-timber forest products (NTFP)	$65 billion	14%	$10 billion	The global market for NTFP increases at a CAGR of 5% through 2030, reaching $145 billion globally annually.	Hexa Research (2017)[202] ITTO (2020)[203]
		Nuts and seeds	$60 billion	14%	$10 billion	The required intake of nuts and seeds according to reference levels matches the best-in-class region (North America), reaching $210 billion in 2030 per year worldwide.	EAT-Lancet Commission (2018)[204]
Sustainable intensification	Sustainable inputs	Sustainable inputs	$105 billion	5%	$5 billion	Market opportunities for biopesticides, biofertilisers and organic fertilisers avoided excessive nutrient loading and fertiliser runoff through improved application and soil nutrient management. • The market size for biopesticides is based on an accelerated CAGR of 17%. • The market size for biofertilisers is based on an accelerated CAGR of 14%. • The market size for organic fertilisers is based on an accelerated CAGR of 14%. Avoided nitrogen loading through reduction of over-application of fertilisers without decreasing crop yield. These business opportunities combine to create a market worth $105 billion per year worldwide by 2030.	Markets and Markets (2016)[205] TechSci Research (2018)[206] Markets and Markets (2019)[207] Grand View Research (2018)[208] Technavio (2018)[209] Bronson Griscom et al. (2017)[210]

Business model	Aggregated economic activity	Sub-activity in AlphaBeta methodological note	Global market size	Brazil's market share potential	Business opportunity (rounded to the nearest $5 billion)	Assumption	Source
Sustainable intensification	Sustainable inputs	Bio-innovation	$125 billion	5%	$5 billion	Market value for agricultural biotechnology of $125 billion annually by 2030 with an accelerated CAGR of 11% contingent on higher R&D spending, regulatory approval of products and increased consumer acceptance.	Markets and Markets (2016)[211]
	Semi-intensive cattle farming	Livestock intensification	$65 billion	5%	$3 billion	An estimated $58 per year per hectare of cost savings from sustainable cattle grazing is expected in a nature-positive scenario. Combined with improved animal health, a market size worth $65 billion annually by 2030 is created.	TNC, Cattle intensification in Pará (2015)[212]
Restoration & conservation	Agricultural development in open land	Certified sustainable foods	$20 billion	4%	$1 billion	The market opportunity is based on historical growth rates in certified sustainable products across deforestation-linked commodities like soya beans. The value per tonne for the latest full year of available market prices and premium assigned for sustainable produce sourced from non-deforested land is considered. The value of the sustainable soya market is expected to be worth $7 billion per annum by 2030.	Round Table for Sustainable Soy (2020)[213] IDH/KPMG (2013)[214]
	Restoration of degraded land	Restoring degraded land	$75 billion	4%	$3 billion	It is assumed that 45% of degraded land can be restored globally and that only those interventions with returns higher than 10% are worth pursuing. That generates revenues worth $75 billion globally per year by 2030.	MGI Resource Revolution (2011)[215]
	Agroforestry systems	Agroforestry	$20 billion	14%	$3 billion	It is assumed that three discrete forms of trees in cropland, namely windbreaks, alley cropping and farmer-managed natural regeneration, can generate cost-benefits worth $20 billion per year worldwide by 2030.	Bronson Griscom et. al. (2017)[216]
Technology enablers	Technology enablers	Technology on small farms	$110 billion	5%	$5 billion	Yield enhancements on small farms to produce the same amount of food will save 75–105 million hectares, generating cost-savings values worth $110 billion per year by 2030.	MGI Resource Revolution (2011)[217]
Technology enablers	Technology enablers	Technology on large farms	$195 billion	5%	$10 billion	Yield enhancements on large farms to produce the same amount of food will save 180 million hectares, generating cost-savings values worth $195 billion per year by 2030.	MGI Resource Revolution (2011)[218]
		Micro-irrigation	$90 billion	5%	$5 billion	Value of costs savings generated from a more efficient use of water in irrigation systems through the use of sprinkler or drip irrigation. Water savings range between 250 to 300 cubic kilometres, resulting in costs savings of $90 billion per year by 2030.	MGI Resource Revolution (2011)[219]

Source: *Methodological Note of AlphaBeta to the World Economic Forum's New Nature Economy Report II – The future of nature and business, 2020*

Investment requirements

The methodology to estimate the investment requirements for Brazil follows the method employed in Nicholas Stern's 2021 "G7 leadership for sustainable, resilient and inclusive economic recovery and growth – An independent report requested by the UK Prime Minister for the G7".[220] The methodology estimates the global natural capital investment requirements by 2030, building on FOLU's Growing Better data.[221] For simplicity, the calculation in this report uses only the lower-bound estimates from FOLU's Growing Better data[222] adjusted for Stern's report.

This report only considers current investment requirements for two transitions: productive and regenerative agriculture and protecting and restoring nature. Within regenerative agriculture, the report only accounts for the requirements of (i) the implementation of regenerative farming practices, (ii) closing the productivity gap, (iii) improved irrigation efficiency and (iv) irrigation expansion. It does not consider investments necessary for the digital revolution, urban farming, composting and R&D, which are beyond the scope of this report. For the transition related to protecting and restoring nature, the report only includes investment requirements for forest restoration, REDD+ programmes for forest conservation and forest management. It excludes investment requirements related to the restoration of mangroves, seagrass and saltmarshes.

The total global investment requirements amount to $63 billion for the selected activities within regenerative agriculture, and $44 billion for protecting and restoring nature. To estimate Brazil's share of current global investments for regenerative agriculture, our methodology multiplies current global investment requirements by Brazil's percentage of the world's cropland (4%) for investments in farming practices and irrigation efficiency. For investments related to closing the productivity gap and irrigation expansion, the report uses the share of cropland vis-à-vis emerging and developing markets (5%), assuming that these are the countries Brazil needs to catch up with in terms of productivity and irrigation. We then add up the equivalent of Brazil's total shares

and divide it by global figures. This calculation generates a percentage representing the proportion of global investment requirements for productive and regenerative agriculture in Brazil today (5%). This percentage is the share of requirements that Brazil needs to invest of the total global requirements, amounting to $3 billion per year in 2030.

Our methodology proceeds as follows for estimates of Brazil's share of current global investments for protecting and restoring nature. It takes the mitigation potential in MtCO2e for forest conservation (24%) and forest management (11%) in Brazil as well as the afforestation potential of Brazil between 2020–2030 (50%) vis-à-vis the world and multiplies it with the investment requirements for forest conservation, management and restoration. We then add up the investment requirements for Brazil and divide them by total global requirements for these three activities. This calculation generates a percentage representing the proportion of international investment requirements for nature protection and restoration required in Brazil today (41%). This share, equivalent to $18 billion, is the amount that Brazil needs to invest per year in 2030 to achieve the transformation in protecting and restoring nature.

It is important to stress that our calculations could overestimate the actual investment requirements in 10 years, given that they are not mutually exclusive. For instance, investments such as land preparation for regenerative farming practices may overlap with investments in forest restoration. Also, investment requirements around closing the productivity gap may partially relate to forest management and conservation investments. This annex aims to explain how the different calculations for each investment requirement were estimated using a top-down approach instead of going into the details of when investments may overlap.

Table 3. *Estimated annual investment requirements for Brazil*

Transition	Cost lines of global investment requirements	Global investment requirements – lower estimates (in $ billion)	Brazil's share	Brazil's global share of the total requirements	Total investment requirements (in $ billion)	Brazil's investment requirements (in $ billion)	Source
Productive and regenerative agriculture	Implementation of regenerative farming practices	4.5	4%	5%	63	3	FOLU (2019)
	Improved irrigation efficiency	21.9	4%				FOLU (2019)
	Closing the productivity gap	17.2	5%				FOLU (2019)
	Irrigation expansion	19.4	5%				FOLU (2019)
Protecting and restoring nature	Forest restoration	29	50%	41%	44	18	FOLU (2019)
	REDD+ programmes for forest conservation	14	24%				FOLU (2019)
	Forest management	1.1	11%				FOLU (2019)

Source: *Technical Note of FOLU to Nicholas Stern's "G7 leadership for sustainable, resilient and inclusive economic recovery and growth, 2021"*

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ABOUT THE PARTNERS

Better Food, Better Brazil was supported by a group of partners including Partnerships for Forests, the Blended Finance Taskforce, the Food and Land Use Coalition and SYSTEMIQ.

Partnerships for Forests catalyses investments in which the private sector, public sector and communities can achieve shared value from sustainable forests and sustainable land use. We do this by creating market-ready “Forest Partnerships” that offer an attractive balance of risks and benefits. The programme also supports demand-side measures that strengthen demand for environmentally friendly commodities, and activities to create the right enabling conditions for sustainable investment. The eight-year scheme is funded by the Foreign, Commonwealth & Development Office and the Department for Business, Energy & Industrial Strategy. It currently operates in Central, East and West Africa, South East Asia and Latin America.

The Blended Finance Taskforce was established to help mobilise largescale capital for the UN Sustainable Development Goals. Launched by the Business & Sustainable Development Commission in 2017, the Taskforce identified key barriers to the effective use of blended finance and called for action from leaders in the investment and development finance community in its flagship report “Better Finance, Better World”. The Taskforce is now implementing an ambitious Action Programme to increase mainstream private investment for high-impact sectors, with a focus on emerging markets. It is supported by a steering committee of more than 35 experienced practitioners and experts that brings together leaders from finance, business, development and policy. We work with private-sector champions across the investment community, including pension funds, sovereign wealth funds, insurers, asset managers, project developers, foundations and think tanks. The Taskforce gains deep expertise from the public-sector institutions that have shaped the blended finance market, including development banks and aid agencies. All this is done in close collaboration with existing initiatives, notably those led by the Organisation for Economic Co-operation and Development, the Multilateral Development Banks/Development Finance Institutions’ working groups, the World Economic Forum, the New Climate Economy, the GIIN, the THK Forum on Sustainable Development and many others, to make sure efforts are complementary and coordinated.

SYSTEMIQ is an innovative, pragmatic, optimistic company with purpose at its heart. We catalyse positive disruptions in economic systems that will speed the achievement of the UN Global Goals and the Paris Agreement. Everything we do drives change faster. We build coalitions with the influence and ambition to set a new course for global industry. We incubate new ventures with the potential to benefit people and the planet. We mobilise large-scale capital for climate action and the Sustainable Development Goals. And we evolve new sustainable business models that will outperform the old. From helping to turn the tide of ocean plastics to creating businesses that safeguard Indonesia’s rainforest, SYSTEMIQ is reshaping the connections between economic and natural systems. We address the world’s biggest challenges with new solutions that benefit business, society and the planet. And they are in reach now.