Regen10 – Landscape Transition Pathways - Overview

- Regen10 has developed landscape-level transition pathways across five significant agricultural regions.
- A transition pathway represents a switch from the conventional agricultural practices common in the landscape to regenerative ones, that helps restore and rebuild natural systems.
- A key element of this process is understanding the economics of transitioning to regenerative agricultural practices as well as the potential environmental and social outcomes of such transitions at landscape level.
- The combination between countries and agricultural products was made based on geographical representation, impacts of production, data availability, and applicability of results. The choice of landscapes was primarily driven by their national-level importance in the production and export of the specific products.
- Regen10 recognizes that there is more than one way to create a regenerative food system. The proposed approaches are not prescriptive, and practices were selected after careful contextual analysis of their relevance and evidence of their intended outcomes.
- Broader evidence linking practices and outcomes is still greatly needed and highlights the importance of developing an outcomes-based framework, which Regen10 is currently doing.

Selected Landscapes

Country	Landscape	Focus Ag Product
Brazil	Querência City	Soy & Beef
India	Punjab State	Rice
United States	North Dakota	Wheat & Maize
United Kingdom	East England	Potato
New Zealand	Waikato Region	Dairy

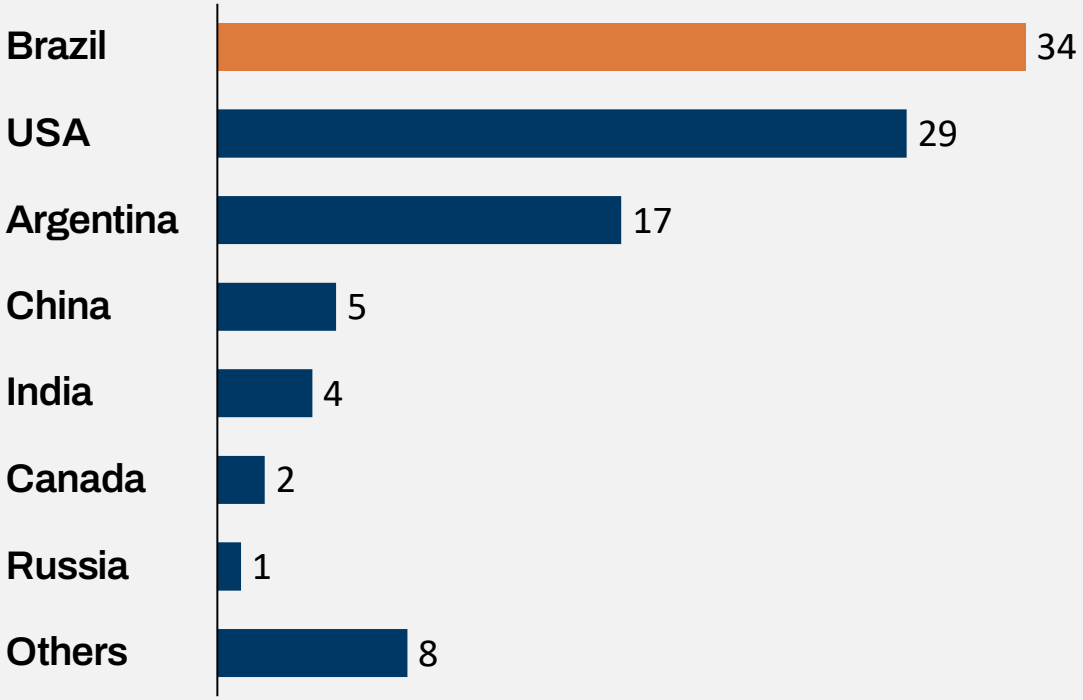
Source: Systemiq analysis.

Querência – Brazil – Soy & Beef

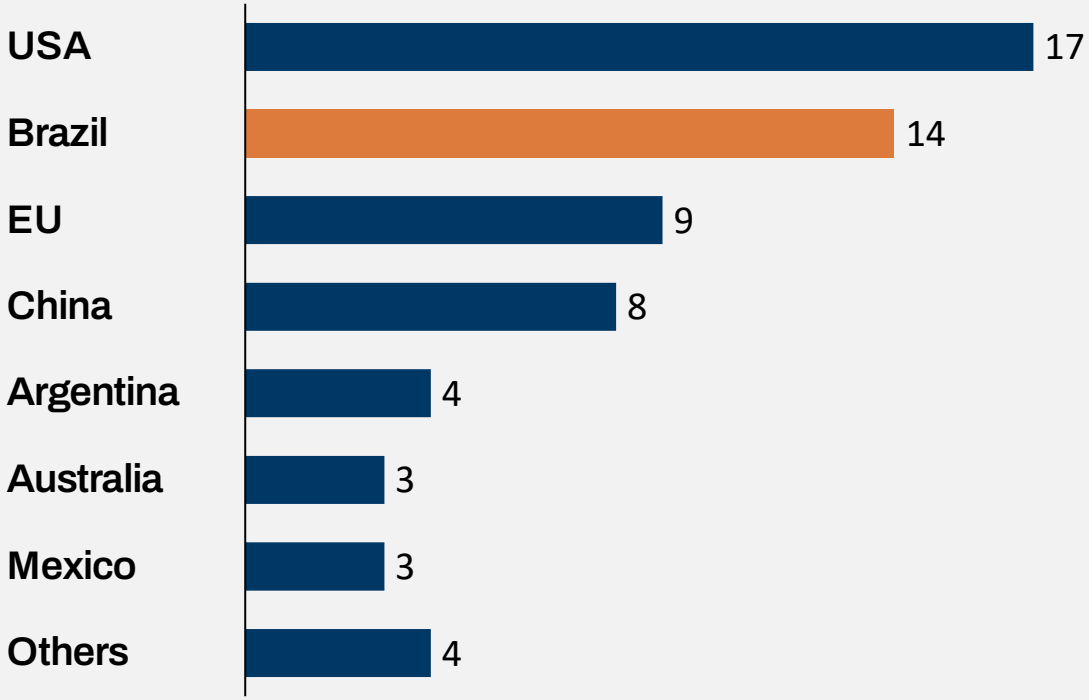
Brazil together with the US dominates the soy and beef industries

- Brazil contributes 34% of global soybean production and 14% of global beef production.
- The country's significant role as a global soybean producer and exporter has bolstered economic growth and job creation.

Soybeans Production (%)



Beef cattle Production (%)



Source: FAOStat 2021, OEC

In Querência City, large soy and beef farms meet indigenous territories at the Amazon frontier

Querência produces 1.2 million tons of soybeans annually, even though 40% of the city area falls within the Xingu and Wawi indigenous territories

Landscape information

- Geographical Area: 1.8M ha
- Agricultural Area: 0.52M ha
- Population: 0,026M (54% rural)
- Land holdings: 678
- Average farm size: 1230 ha
- Indigenous Territories: 0.7M ha (Wawi and Xingu)

Current Challenges

Environmental:

- Monocrop dominance of soybeans and cattle systems
- Degraded pastureland from multiple years of low-tech extensive cattle ranching
- Significant legal forest reserve deficits in rural settlements and ongoing deforestation

Economic:

- Stricter regulations from importing countries
- Revenues highly concentrated in three main products
- Limited profitability resilience in existing cattle management model

Social:

- Tensions over Indigenous land rights and agricultural expansion
- Rapid populational growth driven by expanding agricultural production

Extensive beef cattle ranching

Figure: Everton Queiroz. Extracted from Acrimat (2023)
https://acrimat.org.br/portal/com-novo-recorde-mt-se-mantem-na-lideranca-com-o-maior-rebanho-bovino-do-pais/

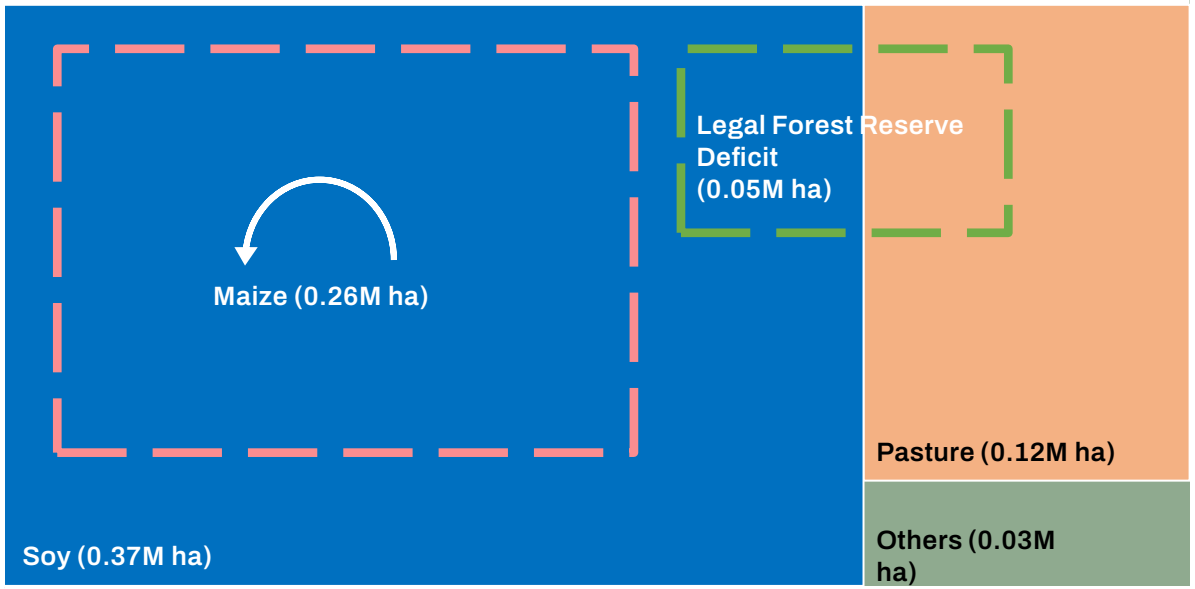
Large soybean cultivation fields

Figure: Kamikia Kĩsêdjê. Extracted from Mongabay (2021)
https://news.mongabay.com/2021/07/as-soy-frenzy-grips-brazil-deforestation-closes-in-on-indigenous-lands/

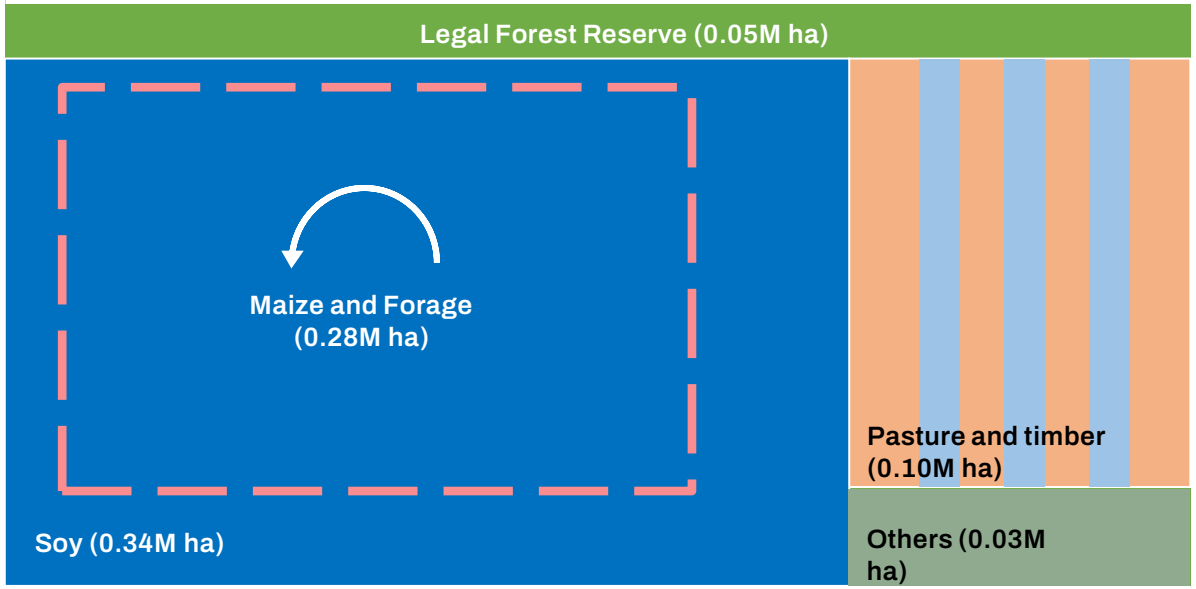
Sources: : IMEA, IBGE, P4F, IPAM, Embrapa, USDA

An alternative approach in Querência includes crop, livestock and forestry integration systems

Current land-use at agricultural landscape level



Alternative land-use at agricultural landscape level



Transition pathway hypothesis

- Implementation of integrated livestock and forestry systems, along with enhanced pasture management, aims to increase cattle productivity[1] and animal welfare[2], diversify incomes with timber, and reduce pressure for new agricultural land for pasture.
- Adoption of integrated crop and livestock systems in the soy area using maize sequencing in association with forage, permitting animal weight gains during the dry season, lower synthetic input use, and healthier soils with better soy yields.
- Restoration of legal forest reserves as 'ecological corridors' to connect reforested and native areas, supporting biodiversity conservation and Forest Code compliance.

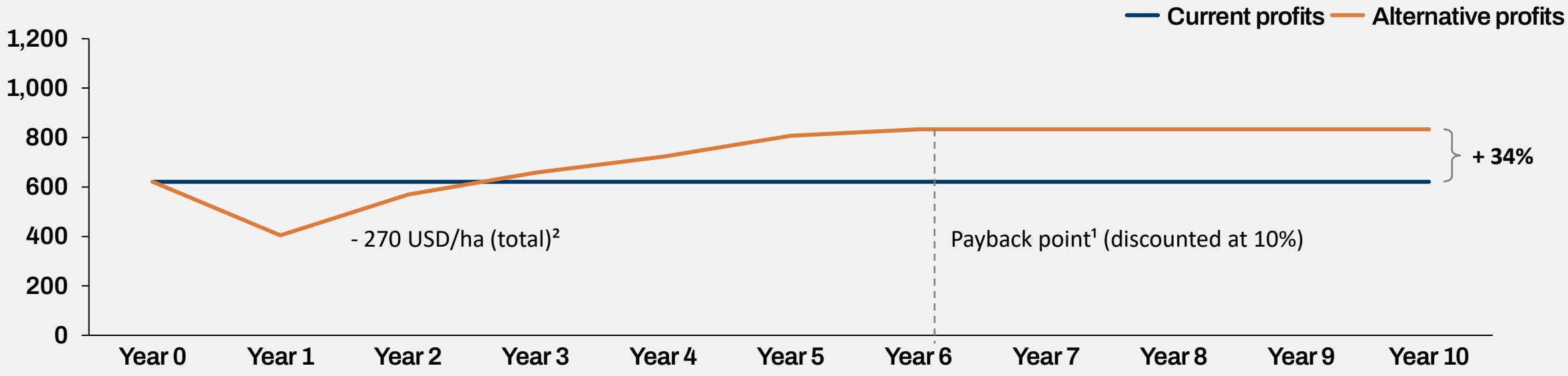
Set of changes used

- Forestry/trees: silvo-pasture systems and native forest restauration
- Livestock/grazing: integration into crop sequencing, intensification and better pasture management
- Cover crops: forage for animal feed in consortium with maize
- Crop diversification: amplification of maize sequencing post-soy

Notes: [1] Higher stoking rate (up to 2.5 heads/ha in summer) and weight gains per animal from better pasture management systems. [2]From tree shadowing, shelter and enhanced grazing options during dry season.
Sources: MapBiomas, IBGE, Embrapa, Systemiq analysis, Expert interviews

By year 3 of the transition farmers are expected to achieve levels of profitability similar to the current state

Comparison between yearly net income: current vs alternative state, undiscounted cash (USD/ha)

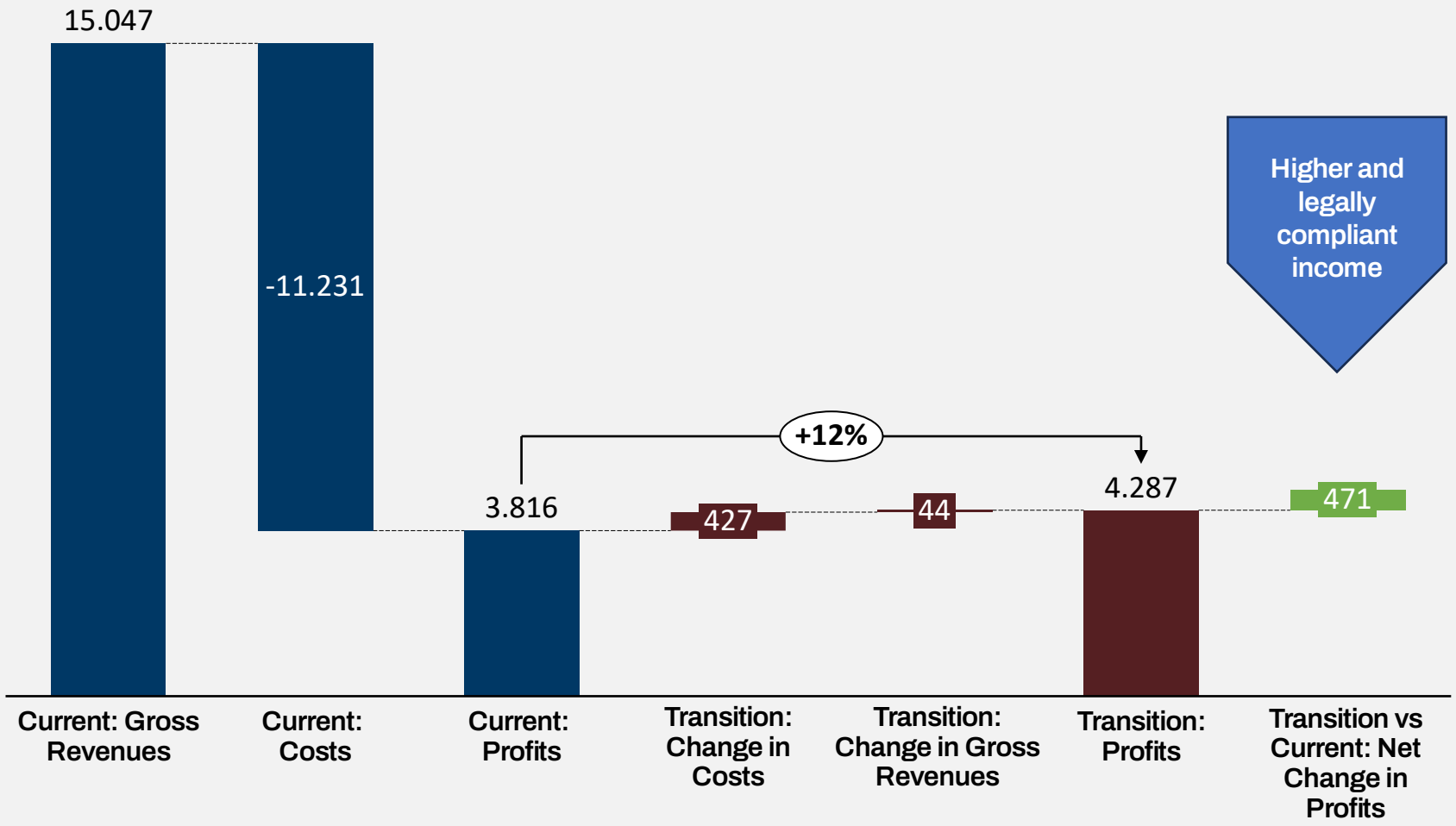


- Farmers' profitability decreases during an interim transition period and reaches a point of equilibrium 34% higher in the alternative state after year 6.
- The initial drop in profitability is mostly due to reforestation costs, introduction of timber trees and investments in enhanced pasture management.
- The revenue decline from converting agricultural land back to natural areas is balanced by increased livestock and soy productivity through crop and forestry integration, along with additional timber gains starting from year 6.
- Farmers would forgo 270 USD/ha in cumulative profits before profitability returns to current state levels (undiscounted cash).
- For an average 1230 ha farm, a short-term cost of ~$300k (profit lost in years 1-3) is offset by expected additional profits of ~$1.4M in years 4-10, resulting in a net gain of ~$1.1M over the 10-year period (undiscounted cash).[3]

Note: [1]When accumulated profits from alternative state surpasses those from current state. [2]Model focuses on the agricultural landscape (aggregation of farms) and do not contemplate costs for new landscape level infrastructure or market channels. Conservatively assumes no carbon revenues, green premiums, or increase in land value, and a cyclic approach for earlier timber harvesting. Landscape transition happens all at once. [3]Costs and returns will vary significantly based on the farm's portfolio with animal growers experimenting higher costs on average. Source: Systemiq analysis

A positive net change in profitability indicates an economically attractive transition for Querência in 10 years

10-year CUMULATIVE income and expenditures – NPV[1] discounted with 10% rate (USD/ ha)



- Implementing integrated crop-livestock and silvopasture systems is a profitable transition with 471 USD/ha or ~250 Million USD for the landscape in Net Present Value.
- Post-transition cumulative profitability is 12% higher in NPV terms, more diversified and legally compliant with the Brazilian Forest Code.
- Lower Opex[2] from a smaller agricultural area (due to forest restoration) and cost savings on soy synthetic inputs are the main contributors to the reduction in overall costs.
- The positive change in gross revenues from transition is smoothed in NPV terms by the delayed revenues from silvopasture.

Notes: [1]Net Present Value [2]Operating Expenses
Source: Systemiq analysis

Regenerative systems also offer improved environmental and social outcomes for the landscape

Regen10 Framework landscape-level outcomes[1]	Indicative impact from transition
Increase economic diversification and resilience	Positive
Increase landscape value creation	Positive
Optimize landscape biodiversity & habitat functionality	Positive
Minimize water, soil and air pollution	Positive
Improve water availability	Positive
Minimize GHG emissions	Positive
Optimize carbon sequestration and storage	Positive
Enhance inclusivity and empowerment of local communities	Neutral
Enhance well-being of local communities	Positive
Increase employment, knowledge and education	Positive
Optimize access to safe and nutritious food	Neutral

Economic Environmental Social

Negative Neutral Positive

Key implications and recommendations

- Integrating crops, livestock and forestry systems can increase farmers income by 34% after the transition (nominal terms).
- Farmers can diversify income through forestry and reduce vulnerability to market shifts, as timber acts as a stabler financial asset.
- Transition is viable even with legal forest reserve restoration, easing compliance burdens and improving environmental outcomes.
- For the transition to be possible, we need:
- Rural credit and financing options that permit initial investments in the transition with repayment terms that match delayed revenues.
- Farmers, particularly in the city's rural settlements, to be assisted with affordable technical aid and land tenure regularization.
- Overcome cultural resistance to change.

Notes: [1]Regen10 Outcome Framework Indicators for Landscapes from zero-draft version. Qualitative base analysis.
Source: Systemiq analysis

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