

FINAL DEMAND EFFECTS ON DEFORESTATION IN BRAZILIAN BIOMES: AN INPUT-OUTPUT ANALYSIS

Topic: Input-Output Analysis: Trade and Global Value Chains policies (1)

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Since colonization, Brazil has experienced extensive deforestation and natural resource exploitation. Initially driven by the extraction of brazilwood and later by agricultural and livestock expansion, these activities have led to the degradation of vast areas of tropical forests. This process has not only reduced biodiversity but has also contributed to the release of large quantities of greenhouse gases (GHGs) into the atmosphere, thereby intensifying global warming.

Land plays a dual role in the GHG cycle, functioning both as a source and as a sink of these gases. Human activities, such as the burning of fossil fuels and unsustainable agricultural practices, release GHGs into the atmosphere, reinforcing the greenhouse effect and global warming. Conversely, natural ecosystems—including forests, soils, and oceans—act as carbon sinks by absorbing and storing atmospheric CO₂, thus helping to mitigate climate change (IPCC, 2019).

Over the centuries, public policies and economic development models have encouraged agricultural expansion and the occupation of new lands in Brazil, often without adequately considering environmental impacts. This expansion has resulted in deforestation across several biomes, including the Amazon and the Cerrado, increasing GHG emissions.

In the last decade, deforestation in Brazil has reached alarming levels, intensifying threats to the Cerrado and resulting in the destruction of more than fourteen thousand km² of native forest (Cerrado and Amazon combined) in 2024 alone (INPE, 2025). Between August 2021 and July 2022, the Amazon lost 10,781 km² of forest cover, largely due to agricultural expansion, which has driven the expansion of the extractive agrarian frontier in the country (Sauer, 2024). Data from the Brazilian Greenhouse Gas Emissions and Removals Estimation System (SEEG, 2025), which monitors the trajectory of national emissions, indicate that the Agriculture and Land Use Change sectors are the largest contributors to total CO₂ emissions in Brazil.

One of the major contributors to both deforestation and Brazilian emissions is the livestock sector, particularly beef cattle production. According to SEEG (2023), since the 1990s the beef cattle herd has increased by approximately 63%, while GHG emissions from livestock have risen by 51.8%. In 2021 alone, beef cattle accounted for 96.5% of emissions associated with meat production. Land-use change also ranks among the largest sources of GHG emissions in Brazil, as emissions arise from the conversion of forests and other forms of vegetation into pasture and/or cropland. Consequently, more than half of Brazilian emissions related to agriculture and livestock are associated with deforestation (Alencar et al., 2023).

Another factor that intensifies environmental degradation concerns international economic relations, particularly in a country with a strongly agro-export-oriented economy such as Brazil. External demand acts as a key driver of the transformation of domestic agricultural production. As international commodity prices rise, producers tend to redirect investments and efforts toward meeting global market requirements, fostering the intensification and modernization of production. This dynamic leads to a reallocation of productive resources toward export-oriented activities, promoting technological adoption and expanding productive capacity in the most competitive areas. However, dependence on external markets may generate imbalances, contributing to the concentration of investments in specific regions and deepening disparities in the national productive structure (Sessa et al., 2021).

Within this context, the present study aims to identify how domestic and foreign demand affect deforestation levels across different Brazilian biomes, using an interregional input-output approach. Through the decomposition of the input-output matrix, we quantify the deforested area attributable to the final demand of each of Brazil's 27 states as well as to international markets.

The results indicate that livestock production is the primary economic activity associated with deforestation across all biomes, and that Brazil's Southeast region, due to its strong production linkages with other regions, exerts significant pressure on environmental degradation. External demand also plays a substantial role, particularly in the Amazon and Cerrado biomes. We conclude that deforestation mitigation policies must consider both domestic production dynamics and international pressures, with particular emphasis on supply chains such as extensive cattle ranching.