

BRAZIL

DATA	Description	Source
Agricultural Indicators		
Production of soy (t)	Municipal soy production (tonnes)	Brazilian Institute of Geography and Statistics (IBGE) https://sidra.ibge.gov.br
Soy yield (t/ha)	Average municipal soy yield (tonnes/hectare) from annual municipal production survey	Brazilian Institute of Geography and Statistics (IBGE) https://sidra.ibge.gov.br
Agricultural land used for soy (%)	Percentage of agricultural land in the municipality that is used for soy production	Brazilian Institute of Geography and Statistics (IBGE) https://sidra.ibge.gov.br
Pasture area (ha)	Area (hectares) of land used as pasture.	Lapig (2018) Atlas Digital das Pastagens Brasileiras: https://pastagem.org/atlas/map
Cattle stocking rate (heads/ha)	Number of heads of cattle per hectare of pasture according to the preliminary results of 2017 IBGE agricultural census. Municipalities with rates higher than four heads/ha were excluded from this measure, in addition to the 53 municipalities originally without data.	Brazilian Institute of Geography and Statistics (IBGE) https://sidra.ibge.gov.br/tabela/6783#notas-tabela
Beef products	Specific cattle products aggregated into live cattle, processed, un-processed and frozen beef	Trade data
Pigs slaughtered (heads)	Number of pigs slaughtered (heads)	Sistema de Informações Gerenciais do Serviço de Inspeção Federal (SIGSIF), Ministério da Agricultura, Pecuária e Abastecimento (SIGSIF/MAPA), Brasil http://sigsif.agricultura.gov.br/primeira_pagina/extranet/SIGSIF.html
Chickens slaughtered (heads)	Number of chickens slaughtered (heads)	Sistema de Informações Gerenciais do Serviço de Inspeção Federal (SIGSIF), Ministério da Agricultura, Pecuária e Abastecimento (SIGSIF/MAPA), Brasil http://sigsif.agricultura.gov.br/primeira_pagina/extranet/SIGSIF.html
Soy volume for feed	Soy volume (tonnes) required for feed	Derived from Sindrões https://sindiracoes.org.br/
Soy area for feed	Soy area (hectares) required to grow feed	Derived from Sindrões https://sindiracoes.org.br/
Socio-economic indicators		
Human development index (/1)	Municipal Human Development Index (/1) based on 2013 analysis	Atlas do Desenvolvimento Humano, PNUD http://www.atlasbrasil.org.br/2013/en/
GDP per capita (USD/capita)	GDP per capita per year (US\$)	Brazilian Institute of Geography and Statistics (IBGE)

		https://www.ibge.gov.br/estatisticas-novoportal/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=oque-e
GDP from agriculture (%)	Percentage of the municipal GDP that corresponds to the farming sector	Brazilian Institute of Geography and Statistics (IBGE) https://www.ibge.gov.br/estatisticas-novoportal/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=oque-e
Smallholder dominance (%)	The proportion of total property area in the hands of legally defined family farmers versus the total area of all rural properties.	Atlas of Brazilian Agriculture http://atlasagropecuario.imaflora.org/
Reported cases of forced labour (Number)	Number of people involved in legal cases concerning forced labour or subjected to degrading working conditions	Comissão Pastoral da Terra http://www.cptnacional.org.br/ ; Retrieved from LAPIG http://maps.lapig.iesa.ufg.br/lapig.html
Reported cases of land conflicts (Number)	Number of land conflicts per municipality	Comissão Pastoral da Terra https://www.cptnacional.org.br/ ; Retrieved from LAPIG http://maps.lapig.iesa.ufg.br/lapig.html
Population (Number)	Population per municipality (2010 Census)	Brazilian Institute of Geography and Statistics (IBGE) https://sidra.ibge.gov.br
Territorial Governance		
Legal Reserve deficit (ha)	Area of Legal Reserves (ha) that must be restored or compensated off-farm to achieve compliance with the Brazilian Forest Code. Based on 2018 analysis. The Legal Reserve deficit is also expressed as a percent of total private land.	Imaflora, Atlas of Brazilian Agriculture http://atlasagropecuario.imaflora.org/
Legal Reserve deficit as a % of private land (%)	Area of Legal Reserves that must be restored or compensated off-farm to achieve compliance with the Brazilian Forest Code – as a percentage of total private land. Based on 2018 analysis.	Based on Legal Reserve deficit
Protected vegetation in private land (ha)	Protected vegetation is defined as native vegetation in Legal Reserves (ha). Does not include Areas of Permanent Preservation. Based on 2018 analysis.	Imaflora, Atlas of Brazilian Agriculture http://atlasagropecuario.imaflora.org/

Unprotected vegetation in private land (ha)	Unprotected vegetation is defined as native vegetation area that surpasses the requirements of the Legal Reserves (ha). Does not include Areas of Permanent Preservation. Based on 2018 analysis.	Imaflora, Atlas of Brazilian Agriculture (http://atlasagropecuario.imaflora.org/)
Number of environmental embargoes (Number)	Number of fines and embargoes associated with infringements of environmental legislations per municipality in a given year.	IBAMA (https://servicos.ibama.gov.br/ctf/publico/areasembargadas/ConsultaPublicaAreasEmbargadas.php)
Environmental indicators		
Territorial deforestation (ha)	Total deforestation per municipality for a given year (hectares). Calculated only for forested and wooded biomes - the Amazon (INPE-PRODES Amazon), Cerrado (INPE-PRODES Cerrado), Atlantic Forest (SOS-MataAtlantica) - and the Pantanal (SOS-Pantanal). Clearance of native vegetation in Brazil's other biomes (Caatinga and Pampas) is not considered as deforestation in this indicator.	INPE-PRODES Amazon: (http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php) INPE-PRODES Cerrado (http://www.dpi.inpe.br/fipcerrado/dashboard/cerrado-rates.html) SOS-MataAtlantica (http://mapas.sosma.org.br/) SOS-Pantanal (https://www.sospantanal.org.br/)
Soy deforestation (ha)	Average annual deforestation for the past five years due to conversion for soy in hectares (currently only in the Amazon and Cerrado). Calculated by crossing per-pixel annual deforestation and soy crop maps, includes a minimum one-year time lag between detected deforested area and soy export. Recommended for plotting a time series of deforestation risk per tonne of soy.	Soy crop area from Agrosatélite, Brazil (https://agrosatelite.com.br/); Territorial deforestation data (see above)
Soy deforestation risk (ha)	Soy deforestation risk (hectares) is the soy deforestation allocated to the actors along the supply chain in proportion to the volume of soy that they export from a given jurisdiction, relative to the total production of soy (by all producers) in the same jurisdiction. Deforestation risk for a given year of export is based on deforestation that occurred in the previous five years, during which time the soy that is being exported was planted and harvested.	Derived from soy deforestation

<p>Soy deforestation risk for feed (ha)</p>	<p>Soy deforestation risk (hectares) is the soy deforestation of feed allocated to the actors along the supply chain in proportion to the volume of livestock product that they export from a given jurisdiction, relative to the total production (by all producers) in the same jurisdiction.</p>	<p>Derived from domestic consumption</p>
<p>Pasture deforestation (ha)</p>	<p>Annual deforestation (hectares) associated with pasture expansion. Deforestation is categorised as pasture expansion if soy is not detected on that land in the subsequent five-year period (in which case it is “soy deforestation”).</p>	<p>Lapig (2018) Atlas Digital das Pastagens Brasileiras: https://pastagem.org/atlas/map; INPE-PRODES Amazon: http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php INPE-PRODES Cerrado http://www.dpi.inpe.br/fipcerrado/dashboard/cerrado-rates.html SOS-MataAtlantica http://mapas.sosma.org.br/ SOS-Pantanal https://www.sospantanal.org.br/</p>

<p>Cattle deforestation per tonne</p>	<p>Calculated by dividing pasture deforestation over a five-year period by the municipal cattle production. Cattle production per municipality (tonnes of carcass and offal per year) is calculated by multiplying the number of cattle per municipality by the state-specific slaughter rates and carcass weights. Calculated over a five-year cattle lifecycle (i.e. 2013–2017 for exports in 2017).</p>	<p>Derived from pasture deforestation (see above) and FAO 2018 Technical Conversion Factors for Agricultural Commodities (www.fao.org/fileadmin/templates/ess/documents/methodology/tcf.pdf) IBGE 2015 Pesquisa Pecuária Municipal (PPM) (https://sidra.ibge.gov.br/pesquisa/ppm/quadros/brasil/2015) IBGE 2019 Pesquisa Trimestral do Abate de Animais (https://www.ibge.gov.br/estatisticas/economicas/agricultura-e-pecuaria/9203-pesquisas-trimestrais-do-abate-de-animais.html?=&t=downloads) Informa Economics IEG FNP 2019 ANUALPEC - Anuário da Pecuária Brasileira 2019 (São Paulo–SP: Informa Economics IEG FNP) Instituto de Economia Agrícola 2017 Estimativa da Produção Animal no Estado de São Paulo para 2017 (http://www.iea.sp.gov.br/out/LerTexto.php?codTexto=14370) Instituto de Economia Agrícola 2018 Estimativa da Produção Animal no Estado de São Paulo para 2018 (http://www.iea.sp.gov.br/out/TerTexto.php?codTexto=14514) MAPA - Ministério da Agricultura, Pecuária e Abastecimento 2018 Quantidade de Abate Estadual por Ano/Espécie (http://sigsif.agricultura.gov.br/sigsif_cons/lap_abate_estaduais_cons?p_select=SIM)</p>
<p>Cattle deforestation risk (ha/yr)</p>	<p>The area (in hectares per year) of cattle deforestation linked to the cattle exports by a company or a jurisdiction. Calculated over a five-year cattle lifecycle (i.e. 2017 exports are linked to deforestation risk from 2013–2017, to account for cattle living multiple years).</p>	<p>Derived from cattle deforestation per tonne</p>
<p>Land based CO₂ emissions (t CO₂)</p>	<p>Carbon dioxide emissions (tonnes of CO₂ per year) attributable to deforestation, including from above and below-ground biomass and litter.</p>	<p>Carbon map from FUNCATE (https://www.funcate.org.br/pt/)</p>

CO ₂ emissions from soy deforestation	Carbon dioxide emissions (tonnes of CO ₂ emissions per year) attributable to soy deforestation (five-year average, as explained above), including from above and below-ground biomass and litter.	Carbon map from FUNCATE (https://www.funcate.org.br/pt/)
CO ₂ emissions risk from soy deforestation	Carbon dioxide emissions attributable to annual rate of soy deforestation risk (averaged across the previous five years, and only available for Amazon and Cerrado), including from above and below-ground biomass and litter. As for deforestation, emissions are allocated to the actors along the supply chain in proportion to the volume of soy that they export from a given jurisdiction, relative to the total production of soy (by all actors) in the same jurisdiction. Emissions risk for a given year of export is based on deforestation that occurs in the previous five years, during which time the soy is being exported was planted and harvested.	Derived from CO ₂ emissions from soy deforestation
CO ₂ emissions risk from soy deforestation for feed	Carbon dioxide emissions attributable to annual rate of soy deforestation risk for feed (averaged across the previous five years, and only available for Amazon and Cerrado), including from above and below-ground biomass and litter. As for deforestation, emissions are allocated to the actors along the supply chain in proportion to the volume of livestock product that they export from a given jurisdiction, relative to the total production (by all actors) in the same jurisdiction. Emissions risk for a given year of export is based on deforestation that occurs in the previous five years, during which time the soy is being exported was planted and harvested.	Derived from CO ₂ emissions from soy deforestation

CO ₂ emissions from pasture deforestation	Carbon dioxide emissions from pasture deforestation (tonnes CO ₂ per year) were obtained by converting pasture deforestation to deforestation-associated greenhouse gas emissions (tonnes CO ₂) by intersecting pasture deforestation polygons with above-ground biomass data.	Carbon map from FUNCATE (https://www.funcate.org.br/pt/)
CO ₂ emissions per tonne from cattle deforestation	Carbon dioxide emissions from pasture deforestation (tonnes CO ₂ per year), divided by municipal cattle production.	Carbon map from FUNCATE (https://www.funcate.org.br/pt/). See “Cattle deforestation per tonne” for sources of cattle production data.
CO ₂ emissions risk from cattle deforestation	Carbon dioxide emissions (tonnes CO ₂ per year) linked to cattle exports for a company or a jurisdiction. As for deforestation, emissions are allocated to the companies along the supply chain in proportion to the volume of cattle products that they export from a given jurisdiction, relative to cattle production (by all actors) in the same jurisdiction.	Derived from CO ₂ emissions from cattle deforestation per tonne.
Water scarcity	Levels of criticality of water stress on a scale of 1-7. Aggregated to the median water stress level per municipality weighted by percentage of available water. Based on data from the Brazilian National Water Agency ANA (2013)	Flach R et al 2016 Towards more spatially explicit assessments of virtual water flows: linking local water use and scarcity to global demand of Brazilian farming commodities <i>Environ. Res. Lett.</i> 11(7): 075003, doi: 10.1088/1748-9326/11/7/075003 (http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta)
Company Commitments		
Forest 500 score	Score of company commitments according to Global Canopy’s Forest 500 assessment 2018	Global Canopy’s Forest 500 score (http://forest500.org/)
Round Table on Responsible Soy (t)	Volume of soy (tonnes) produced per municipality that was certified according to the Round Table on Responsible Soy (RTRS) Standard for Responsible Soy Production. No conversion of natural vegetation is permitted after June 2016 under the RTRS Principles and Criteria.	RTRS (www.responsiblesoy.org)
Zero deforestation commitments	Soy: zero deforestation commitments (ZDCs) are either “Soy Moratorium” if the trader has signed on to the Soy Moratorium in the Amazon, or “company commitments” outside of the Amazon when the trader has a company specific ZDC	Soy Moratorium (http://abiome.org.br/relatorios/); G4 (https://www.greenpeace.org/usa/research/minimum-criteria-for-i/); and individual company websites.

	<p>Beef: Exports were classified as being traded under a ZDC if they originated from a slaughterhouse that had signed a Terms of Adjustment of Conduct (“TAC”), a commitment to avoid illegal deforestation, or if they originated from a slaughterhouse that signed the zero-deforestation “G4” agreement. Similar to soy, “Company commitments” are assigned to traders with a company specific ZDC.</p>	
Soy traded under zero deforestation commitment (%)	Percentage of the exported soy that is exported by a trader with a zero deforestation commitment, including traders with company commitments to zero deforestation across their global supply chains, as well as companies that are signatory to the Soy Moratorium and therefore have a zero deforestation commitment on all soy sourced from the Amazon biome.	Calculated from the zero deforestation commitments in the soy supply chain.
Cattle products traded under zero deforestation commitment (%)	Percentage of exported beef that is covered by a zero deforestation commitment, including traders with company commitments to zero deforestation, as well as exports sourced from slaughterhouses that had signed a Terms of Adjustment of Conduct (“TAC”) or the zero deforestation “G4” agreement.	Calculated from the zero deforestation commitments in the supply chain of cattle products.
Contextual Layers		
Indigenous areas	Locations of Indigenous territories from FUNAI, National Indian Foundation (Brazil).	FUNAI (http://www.funai.gov.br/)
Protected areas	Protected areas of all designations within Brazil. Does not include Areas of Permanent Protection.	Environmental Ministry of Brazil (Ministério do Meio Ambiente: MMA) (http://mapas.mma.gov.br/i3geo/datadownload.htm)
Land tenure	Public and private land holdings in Brazil derived from a number of public government datasets. Private land is derived from the CAR and SIGEF databases. Public lands were obtained from the Terra Legal Program; designated public lands include Sustainable Conservation Units and undesignated public lands include 'terras devolutas'. Based on 2018 analysis.	Imaflora, Atlas of Brazilian Agriculture (http://atlasagropecuario.imaflora.org/)
Land cover	Land cover classes from MapBiomas (V1)	MapBiomas (http://mapbiomas.org/)

Water scarcity	Level of criticality of water stress (1-7) by micro-basin	Flach et al (2016) http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta
Deforestation polygons	Deforested areas in the Amazon, Cerrado, Atlantic Forest and Pantanal biomes (2017)	INPE-PRODES Amazon and Cerrado (http://terrabrasilis.dpi.inpe.br/) SOS-MataAtlantica (http://mapas.sosma.org.br/) SOS-Pantanal (https://www.sospantanal.org.br/)
States	Boundaries of Brazil's 26 states and the federal district (Distrito Federal, Brasilia)	Brazilian Institute of Geography and Statistics - IBGE (2017) https://cidades.ibge.gov.br/
Biomes	Boundaries of the six Brazilian continental biomes	Brazilian Institute of Geography and Statistics - IBGE (2004) https://www.ibge.gov.br/geociencias/informacoes-ambientais/estudos-ambientais/15842-biomas.html?=&t=downloads
Geocodes	Spatial code given to municipalities as BR-XXXXXXX	Instituto Brasileiro de Geografia e Estatística (IBGE) municipality boundaries (2017), https://www.ibge.gov.br/