

Trase data sources:

SEI-PCS Brazil soy (v.2.3)

SEI-PCS Paraguay soy (v.1.1) and Paraguay Beef (v.1.0)

Update: May 2019

The table below summarises the data sources used for the Brazilian and Paraguayan soy and Paraguayan beef supply chains mapped to sub-national scales, and associated sustainability indicators.

Suggested citations for the use of Trase data

For the Brazilian soy supply chain:

- Transparency for Sustainable Economies (Trase) 2018 SEI-PCS Brazil soy (v.2.3) trase.earth

For the Paraguayan soy supply chain:

- Transparency for Sustainable Economies (Trase) 2019 SEI-PCS Paraguay soy (v.1.1) trase.earth

For the Paraguayan beef supply chain:

- Transparency for Sustainable Economies (Trase) 2019 SEI-PCS Paraguay soy (v.1.0) trase.earth

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BRAZIL		
DATA	Description	Source
Agricultural indicators		
Soy production	Municipal soy production (tonnes)	Brazilian Bureau of Statistics (IBGE) (https://sidra.ibge.gov.br)
Soy yield	Average municipal soy yield (tonnes/ha) from annual municipal production survey	Brazilian Bureau of Statistics (IBGE) (https://sidra.ibge.gov.br)
Agricultural land used for soy	Percentage of agricultural land in the municipality that is soy	Brazilian Bureau of Statistics (IBGE) (https://sidra.ibge.gov.br)
Socio-economic indicators		
Human development index (HDI)	Municipal Human Development Index (/1) based on 2013 analysis	Atlas do Desenvolvimento Humano, PNUD (http://www.atlasbrasil.org.br/2013/en/)
GDP per capita	GDP per capita per year (US\$)	Brazilian Bureau of Statistics (IBGE) (https://www.ibge.gov.br/estatisticas-novoportal/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=o-que-e)
GDP from agriculture	Percentage of the municipal GDP that corresponds to the farming sector	Brazilian Bureau of Statistics (IBGE) (https://www.ibge.gov.br/estatisticas-novoportal/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=o-que-e)
Smallholder dominance	Density of smallholders, defined as proportion of total property area in the hands of legally defined family farmers versus the total area of all properties. Based on 2006 IBGE census data.	Medina et al (2014) (http://www.sciencedirect.com/science/article/pii/S0305750X15001412)
Reported cases of forced labour	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 of land conflicts per municipality	Comissão Pastoral da Terra (http://www.cptnacional.org.br/); Retrieved from LAPIG (http://maps.lapig.iesa.ufg.br/lapig.html)
Population	Population per municipality (2010 Census)	Brazilian Bureau of Statistics (IBGE) (https://sidra.ibge.gov.br)
Territorial governance		

Legal Reserve deficit	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/)
Protected vegetation in private land	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	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 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)
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/)

Environmental Indicators		
Territorial deforestation	<p>Total deforestation per municipality for a given year (ha). 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.</p>	<p>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>
Soy deforestation	<p>Average annual deforestation for the past 5 years due to conversion for soy (ha) (currently only in the Amazon and Cerrado). Calculated by crossing per-pixel annual deforestation alerts 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/tonne of soy.</p>	<p>Soy crop area from Agrosatelite (http://agrosatelite.com.br/) Territorial deforestation data (see above)</p>
Soy deforestation risk	<p>Soy deforestation risk (ha) is defined as the total deforestation and habitat clearance in the previous 5 years that is associated with soy expansion (currently only in the Amazon and Cerrado), averaged across a five-year period to give an annual rate. This measure of deforestation risk is 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.</p>	<p>Derived from soy deforestation</p>

	<p>Deforestation 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.</p>	
Land based CO ₂ emissions	<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	<p>Carbon dioxide emissions (tonnes of CO₂ emissions per year) attributable to soy deforestation (five-year average, as explained above), 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 risk from soy deforestation	<p>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.</p> <p>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.</p>	<p>Derived from CO₂ emissions from soy deforestation</p>
Water scarcity	<p>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</p>	<p>Flach et al (2016) (http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta)</p>

	water. Based on data from the Brazilian National Water Agency ANA (2013)	
Actor 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	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)
Trade Data		
Customs declarations	Tax documents recording shipments compiled by the Brazilian government	Various sources
Bills of lading	Maritime contracts between exporters and importers guaranteeing volume, value and destination of shipments	Various sources
Crushing facility data	Soy crushing and processing facilities	ABIOVE (http://www.abiove.org.br/)
Silos	Silo records	CONAB SICARM (http://www.conab.gov.br/detalhe.php?a=1078&t=2)
CNPJs	Brazilian Tax Identification numbers linking companies with municipalities and authorized commercial activities.	Various sources

PARAGUAY		
DATA	Description	Source
Agricultural indicators		
Soy production	Departmental production of soy (tonnes) from agricultural surveys.	Paraguayan Ministry of Agriculture (MAG), Department of Statistics (DCEA), Paraguay http://www.mag.gov.py/index.php/institucion/dependencias/sintesis-estadistica
Soy yield	Average departmental soy yield per year.	Paraguayan Ministry of Agriculture (MAG), Department of Statistics (DCEA), Paraguay http://www.mag.gov.py/index.php/institucion/dependencias/sintesis-estadistica
Territorial governance		
Ecoregions	Boundaries of the five ecoregions in Paraguay	The Nature Conservancy (http://maps.tnc.org/gis_data.html)
Indigenous territories	Indigenous territories in Paraguay. Does not include uncontacted tribes.	Federación por la Autodeterminación de los Pueblos Indígenas (FAPI) (https://www.tierrasindigenas.org//Mapa)
Protected areas	Areas with restricted human use as designated by the Paraguayan government.	Paraguayan Ministry of the Environment and Sustainable Development (MADES) (http://201.217.59.143:8065/visor_asp/)
Environmental indicators		
Territorial deforestation	Total deforestation per department for a given year (ha) in the Dry Chaco, Humid Chaco, and Alto Paraná Atlantic forests. The year 2017 only covers the Chaco ecoregion.	WWF (http://www.wwf.org.py/que_hacemos/sig2/monitoreo_satelital_de_la_deforestacion/) Guyra Paraguay via Global Forest Watch (http://data.globalforestwatch.org/datasets/3d668cf0fbc415bbatec00bc6263877_5)
Soy deforestation risk	Annual deforestation and habitat clearance (ha) associated with soy expansion per department. Calculated by crossing per-pixel annual deforestation data and soy crop maps, includes a one-year time lag between detected deforested area and soy export. Note: the map displays the soy deforestation for the selected year.	Deforestation data (see above) Soy crop area for South American provided by the University of Maryland GLAD team (https://glad.umd.edu/).
Actor commitments		

Forest 500 score	Score of the company commitments according to GC's Forest 500 assessments 2018	Global Canopy's Forest 500 score (http://forest500.org/)
Trade Data		
Customs declarations	Tax documents recording shipments compiled by the Paraguayan government	Various sources
Bills of lading	Maritime contracts between exporters and importers guaranteeing volume, value and destination of shipments	Various sources
Soy: crushing facilities	Company ownership, capacity and district of soy processing plants in Paraguay	JJ Hinrichsen S.A.
Soy: silos	Location of exporters' self-declared silos	Company websites
Beef: exporting slaughterhouses	Name, throughput and location of slaughterhouses and beef processing facilities which are licenced for export	Paraguayan Service for Animal Health and Quality (SENACSA) http://www.senacsa.gov.py/application/files/3314/7861/0332/161102-SENACSA_Lista_mat_frigorificos_salas_corte_exportacion.pdf http://www.senacsa.gov.py/index.php/informaciones/estadisticas