

Trase data sources:

SEI-PCS Brazil soy (v.2.3) and Paraguay soy (v.1.0)

Release date: December 2018

The table below summarizes the data sources used for Brazilian and Paraguayan soy 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) 2018 SEI-PCS Paraguay soy (v.1.0) trase.earth

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BRAZIL		
DATA	Description	Source
Agricultural Indicators		
Production of soy	Municipal production of soy (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 lawsuit of forced labour or made subjects 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 according to the 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 (LR) 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	The map displays all public and private land holdings in Brazil and is 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; where 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	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-	INPE-PRODES Amazon (http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php) INPE-PRODES Cerrado

	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.	(http://www.dpi.inpe.br/fipcerra-do/dashboard/cerrado-rates.html) SOS-MataAtlantica (http://mapas.sosma.org.br/) SOS-Pantanal (https://www.sospantanal.org.br/)
Soy deforestation	Average annual deforestation (ha) of the previous five years that is associated with soy expansion and averaged across the five year period (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. Note: The allocation of soy deforestation to territories that border more than one biome is only calculated for the area of the territory within the Cerrado and Amazon boundaries.	Soy crop area from Agrosatelite (http://agrosatelite.com.br/) Deforestation data (see above)
Land based CO ₂ emissions	CO ₂ emissions (tonnes of CO ₂ per year) attributable to deforestation, including from above and below-ground biomass and litter.	Carbon map from FUNCATE (https://www.funcate.org.br/pt/)
CO ₂ emissions from soy deforestation	CO ₂ 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. Note: The allocation of emissions attributable to soy deforestation to territories that border more than one biome is only calculated for the area of the territory within the Cerrado and Amazon boundaries.	Carbon map from FUNCATE (https://www.funcate.org.br/pt/)
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 et al (2016) (http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta)
Loss of biodiversity	Loss of suitable habitat for 234 amphibian, 846 bird, 288 mammal and 648 plant species due to soy expansion aggregated for the period 2010-2014 and by municipality. Marginal value of suitable habitat is defined as the change in species' local persistence when a cell comprising suitable habitat is converted to non-suitable habitat, due to	World Conservation Monitoring Centre, developed under the project CONTACTED with funding from the Luc Hoffman Institute and WWF UK. Author Paz Duran.

	land conversion. Only available for the Cerrado.	
Actor Commitments		
Forest 500 score	Score of company commitments according to Global Canopy's Forest 500 scores.	Global Canopy's Forest 500 score (http://forest500.org/)
Member of RTRS	Status of a company regarding membership in the Roundtable on Responsible Soy (RTRS) (yes/no)	RTRS (www.responsiblesoy.org/about-rtrs/members/?lang=en)
Zero deforestation commitment	Whether a company has declared a commitment to zero deforestation in their supply chain in a given geography. These commitments include the Amazon Soy Moratorium, multi-stakeholder commitments (e.g. the New York Declaration on Forests), and company commitments (the latter two are grouped together in the map and Sankey diagram).	Compiled from company websites, including ABIOVE and ANEC trader associations in the Amazon and New York Declaration of Forests (http://forestdeclaration.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
Departmental Statistics		
Soy Production	Municipal production of soy (tonnes) from agricultural surveys (2016).	Paraguayan Department of Statistics (DCEA) (http://www.mag.gov.py/index-b-nuevo.php?pag=sintesis-estadistica.html)
Environmental Indicators		
Territorial deforestation	Annual rate of clearance of native vegetation (ha), with respect to previous year.	WWF (http://www.wwf.org.py/que_hacemos/sig2/monitoreo_de_la_deforestacion/)
Maximum soy deforestation	Deforestation rate in a given year restricted by the amount of new planted area for a commodity. For planted area A of a commodity, total departmental deforestation D, in year y, commodity deforestation C, in hectares, is defined: $C_y = \delta A_y \quad \text{if } D_y > \delta A_y$ $C_y = D_y \quad \text{if } D_y < \delta A_y$ Where $\delta A = \max(0, A_y - A_{y-1})$	
Actor Commitments		
Forest 500 score	Score of the company commitments according to GC's Forest 500 score	Global Canopy's Forest 500 score (http://forest500.org/)
Member of RTRS	Status of a company regarding membership in the Roundtable on Responsible Soy (RTRS) (yes/no)	RTRS (www.responsiblesoy.org/about-rtrs/members/?lang=en)
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