

## Trase data sources

### SEI-PCS Brazil soy (v.2.2) and Paraguay soy (v.2.1)

October, 2017

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

BRAZIL		
DATA	Description	Source
<b>Agricultural Indicators</b>		
Production of Soy	Municipal production of soy in tons from the Brazilian Bureau of Statistics (IBGE)	<a href="http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm">http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm</a>
Average soy yield	Municipal yield (Tn / ha ) from the Brazilian Bureau of Statistics (IBGE) annual municipal production survey	<a href="http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm">http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm</a>
% soy of total farming land	Percentage of agricultural land in the municipality that is soy.	<a href="http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm">http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm</a>
<b>Socio-economic Indicators</b>		
GDP per capita	GDP per capita in USD 2010 - 2013	<a href="http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/default_xls.shtm">http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/default_xls.shtm</a>
% GDP from agriculture	% of the municipal GDP that corresponds to the farming sector	<a href="http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/default_xls.shtm">http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/default_xls.shtm</a>
Population	Population per municipality 2010 - 2013	<a href="http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/de">http://ibge.gov.br/home/estatistica/economia/pibmunicipios/2010_2013/de</a>

		fault_xls.shtm
Human development index (HDI)	Municipal Human Development Index 2013, Atlas do Desenvolvimento Humano, PNUD	<a href="http://www.atlasbrasil.org.br/2013/en/">http://www.atlasbrasil.org.br/2013/en/</a>
Land conflicts	Number of land conflicts per municipality according to the Comissão Pastoral da Terra ( <a href="http://www.cptnacional.org.br/">http://www.cptnacional.org.br/</a> )	Retrieved from <a href="http://maps.lapig.iesa.ufg.br/lapig.html">http://maps.lapig.iesa.ufg.br/lapig.html</a>
Reported Cases of Forced Labour	Number of people involved in lawsuit of forced labor or made subjects to degrading working conditions. Comissão Pastoral da Terra ( <a href="http://www.cptnacional.org.br/">http://www.cptnacional.org.br/</a> )	Retrieved from <a href="http://maps.lapig.iesa.ufg.br/lapig.html">http://maps.lapig.iesa.ufg.br/lapig.html</a>
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 census data.	Medina et al (2014) <a href="http://www.sciencedirect.com/science/article/pii/S0305750X15001412">http://www.sciencedirect.com/science/article/pii/S0305750X15001412</a>
<b>Territorial Governance</b>		
Forest Code deficit	Area of land in permanent protected areas and legal reserves that must be restored or compensated for (legal reserve only) to achieve compliance with the Brazilian Forest Code - as a percentage of the total area of private land. Based on 2017 analysis.	Brazilian Agricultural Atlas, <a href="http://www.imaflora.org/atlasagropecuario">www.imaflora.org/atlasagropecuario</a>
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 2017 analysis.	Brazilian Agricultural Atlas, <a href="http://www.imaflora.org/atlasagropecuario">www.imaflora.org/atlasagropecuario</a>
Permanent Protected Area (PPA) deficit	Area of Permanent Protected Areas (ha) that must be restored to achieve compliance with the Brazilian Forest Code. Based on 2017 analysis.	Brazilian Agricultural Atlas, <a href="http://www.imaflora.org/atlasagropecuario">www.imaflora.org/atlasagropecuario</a>
Number of Environmental Embargos (2015)	Number of fines and embargos associated to environmental infractions per municipality.	<a href="https://servicos.ibama.gov.br/ctf/publico/areasembargadas/ConsultaPublicaAreasEmbargadas.php">https://servicos.ibama.gov.br/ctf/publico/areasembargadas/ConsultaPublicaAreasEmbargadas.php</a>
<b>Environmental Indicators</b>		
Territorial	Total deforestation per municipality for a given year (ha). Calculated only	

Deforestation	for forested and wooded biomes - the Amazon, Cerrado and Atlantic Forest. Clearance of native vegetation in Brazil's other biomes (Caatinga, Pantanal and Pampas) is not considered as deforestation in this indicator.	
	INPE-PRODES deforestation estimates in the Amazon Biome and municipalities on the border between the Amazon and Cerrado Biomes	<a href="http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php">http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php</a>
	LAPIG deforestation alerts for the Cerrado Biome, including the Legal Amazon portion and municipalities bordering the Atlantic Forest	<a href="http://maps.lapig.iesa.ufg.br/lapig.html">http://maps.lapig.iesa.ufg.br/lapig.html</a>
	SOS-MataAtlantica deforestation estimates for the Atlantic Forest biome	<a href="http://mapas.sosma.org.br/">http://mapas.sosma.org.br/</a>
Soy Deforestation	Annual deforestation due to direct conversion for soy (ha) (currently only in Cerrado biome, 2010-2013). Calculated based on overlay of LAPIG deforestation alerts and soy field land cover classifications from AGROSATELITE produced from MODIS images (MCD45A1).	<a href="http://agrosatelite.com.br/">http://agrosatelite.com.br/</a>
Maximum Soy Deforestation	Maximum potential soy-related deforestation (ha). Calculated as the maximum deforestation in the year prior to soy being harvested that could be attributable to soy expansion for that harvest. As an example, in a municipality with 1000 ha of soy expansion between 2014-2015, but only 400 ha of deforestation in 2014, the potential soy-related deforestation during 2014 could not be more than 400 ha. The remaining 600 ha of soy, at a minimum, expanded onto non-forest land, typically cattle pasture. This expansion may contribute towards the displacement of other land uses into forest land, a phenomenon known as indirect land-use change. Calculated only for forested and wooded biomes - the Amazon, Cerrado and Atlantic Forest. Clearance of native vegetation in Brazil's other biomes (Caatinga, Pantanal and Pampas) is not considered as deforestation in this indicator.	Planted area from <a href="http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm">http://www.ibge.gov.br/home/estatistica/economia/pam/2015/default.shtm</a> . Deforestation calculated as above.
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) <a href="http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta">http://iopscience.iop.org/article/10.1088/1748-9326/11/7/075003/meta</a>

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 land conversion. Only available for the Cerrado.	World Conservation Monitoring Centre, developed under the project CONTACTED with funding from the Luc Hoffman Institute and WWF UK. Author Paz Duran
Indigenous areas	Locations of Indigenous territories from FUNAI, National Indian Foundation (Brazil)	<a href="http://www.funai.gov.br/">http://www.funai.gov.br/</a>
Protected areas	Protected areas of all designations within Brazil	Environmental Ministry of Brazil (Ministério do Meio Ambiente: MMA)
<b>Actor Commitments</b>		
Forest 500 score	Score of company commitments according to GCP's Forest 500 score – based on 2015 data.	Global Canopy Programme's Forest 500 <a href="http://forest500.org/">http://forest500.org/</a>
Member of RTRS	Status of a company regarding membership in the Roundtable on Responsible Soy (RTRS)	<a href="http://www.responsiblesoy.org/about-rtrs/members/?lang=en">www.responsiblesoy.org/about-rtrs/members/?lang=en</a>
Zero deforestation commitment	Whether a company has declared a commitment to zero deforestation in a given geography. Includes both the Amazon Moratorium signatories and New York Declaration on forests.	Compiled from company websites, including ABIOVE and ANEC trader associations in the Amazon and New York Declaration of Forests ( <a href="http://forestdeclaration.org/">http://forestdeclaration.org/</a> )
% of soy under zero deforestation commitments	Per municipality, the percentage of soy exports from a company with a zero deforestation commitment for that region.	Compiled from company websites and New York Declaration of Forests ( <a href="http://forestdeclaration.org/">http://forestdeclaration.org/</a> )
Member of TFA	Company member of the Tropical Forest Alliance TFA	<a href="https://www.tfa2020.org/en/about-tfa/partners/">https://www.tfa2020.org/en/about-tfa/partners/</a>
<b>Trade Data</b>		
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	ABIOVE Soy crushing and processing facilities	<a href="http://www.abiove.org.br/">http://www.abiove.org.br/</a>
Silos	CONAB SICARM silo records	<a href="http://www.conab.gov.br/detalhe.php?a=1078&amp;t=2">http://www.conab.gov.br/detalhe.php?a=1078&amp;t=2</a>
CNPJs	Brazilian Tax Identification numbers linking companies with municipalities and authorized commercial activities.	Various sources

## PARAGUAY

DATA	Description	Source
<b>Departmental Statistics</b>		
Soy Production	Municipal production of soy in tons from the Paraguayan Department of Statistics (DCEA) from agricultural surveys, 2016.	<a href="http://www.mag.gov.py/index-b-nuevo.php?pag=sintesis-estadistica.html">http://www.mag.gov.py/index-b-nuevo.php?pag=sintesis-estadistica.html</a>
<b>Environmental Characteristics</b>		
Territorial Deforestation	Annual rate of clearance of native vegetation in ha, with respect to previous year.	<a href="http://www.wwf.org.py/que_hacemos/sig2/monitoreo_de_la_deforestacion/">http://www.wwf.org.py/que_hacemos/sig2/monitoreo_de_la_deforestacion/</a>
Maximum Soy Deforestation	<p>Deforestation rate in a given year restricted by the amount of new planted area for a commodity. For planted area <math>A</math> of a commodity, total departmental deforestation <math>D</math>, in year <math>y</math>, commodity deforestation <math>C</math>, in hectares, is defined:</p> $C_y = \delta A_y \quad \text{if } D_y > \delta A_y$ $C_y = D_y \quad \text{if } D_y < \delta A_y$ <p>Where</p> $\delta A = \max(0, A_y - A_{y-1})$	

<b>Actor Characteristics</b>		
Forest 500 score	Score of the company commitments according to GCP's Forest 500 score	Global Canopy Programme's Forest 500 <a href="http://forest500.org/">http://forest500.org/</a>
Member of RTRS	Member of RTRS (yes/no)	<a href="http://www.responsiblesoy.org/about-rtrs/members/?lang=en">www.responsiblesoy.org/about-rtrs/members/?lang=en</a>
Zero deforestation commitment	Zero deforestation commitment by company (yes/no)	Compiled from company websites and New York Declaration of Forests
Member of TFA	Member of the Tropical Forest Alliance TFA (yes/no)	<a href="http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf">http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf</a>
<b>Trade Data</b>		
Customs Declarations	Tax documents recording shipments compiled by the Paraguayan government	Various sources
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