June 2022

SEI-PCS Argentina crop commodities methodology version 1.1

Trase maps supply chains for agricultural commodities, making it possible to link products and supply chain actors with specific areas of production and associated deforestation risks. It uses an approach called Spatially Explicit Information on Production to Consumption Systems (SEI-PCS) (Godar et al 2015) as the basis for this work. This document describes the data and methods that Trase has used to map the supply chain for Argentinian crop commodities, generating data called 'SEI-PCS Argentina crop commodities v1.1'. This data covers both soy (current) and corn[1] (upcoming) supply chains.

The soy supply chain map allocates exports of soy (as bean, oil and cake products) to departments of production by (1) making connections between individual shipments leaving Argentinian ports and crushing facilities typically located at these ports; and (2) linking these crushing facilities to departments of production using Argentinian grain movement information (Siogranos). Table 1 provides an overview of key statistics for Argentina's soy industry during 2015-2019.

Together with the map of the commodity supply chain, Trase offers a variety of sustainability indicators showing the environmental, economic, social and territorial impacts of commodity production in the supply chain. Trase's core indicators include commodity production, deforestation, land-based emissions and trader zero-deforestation commitments, with additional indicators added on a case-by-case basis depending on demand and availability.

[1] maize (*Zea mays*)

Table 1: Summary statistics for Argentina's soy industry, 2015-2019

	2015	2016	2017	2018	2019
Soy exports (million tonnes*)	53.4	54.5	46.6	37.4	53.6
Soybean production (million tonnes)	62.3	56.1	56.4	36.1	53.3
Number of exporting companies	102	106	85	88	106
Number of destination countries	102	93	94	88	90
Estimated soybean from "Imports + stock"**	9.3	12.9	8.0	10.7	17.9
Exports for which a department of origin cannot be established (labelled as "Unknown")	9.8	8.4	9.8	8.7	1.4

**metric tonnes in soy equivalents based on commodity equivalence factors (see Table 4)*
***"Imports + stock" is the combination of soy imports into Argentina and soybean production that is part of Argentina's stock. See Section "Intra-regional commodity movement (Siogranos)"*

Trase's sustainability indicators for Argentina have been updated for the 2015-2019 period and include soybean production (Table 1), area of planted soy, yield, territorial deforestation and associated land-based emissions (Chaco only), soy deforestation and associated land-based emissions (Chaco only) and the percent of soy traded under a zero-deforestation commitment (Table 2). The Human Development Index is now updated and available from 2015 to 2019.

Table 2: Summary of key indicators (2015-2019)

	2015	2016	2017	2018	2019
Soy area (million ha*)	19.293	18.460	17.652	15.266	15.847
Soy yield (tonnes per hectare)	3.229	3.040	3.195	2.365	3.363
Territorial deforestation (Chaco) (hectares)	116,855	132,099	171,630	132,682	210,819
Land based CO_2 emissions (Chaco) (million tonnes CO_2-eq)	28,746	29,957	39,052	31,160	52,574
Soy deforestation risk (Chaco) (hectares)	64,514	51,240	45,775	40,643	47,436
CO_2 emissions risk from soy deforestation (million tonnes CO_2-eq)	4,035	5,114	8,302	5,418	7,563
Percentage of soy traded under zero deforestation commitment (average per department)	-	24%	33%	38%	42%

Changes from previous versions

Version 1.1. of the data represents an improvement from v.1.0 due to the following changes:

- Export data has been revised to account for volumes unreported for several months between 2017 and 2018. Given the lack of publicly available information on these trade flows, the origin of these exports have been labelled as "Unknown" to highlight that the department of origin cannot currently be established. Export years 2015 and 2019 have also been added.
- The intra-national trade of soybean and corn across Argentinian regions available from Siogranos (see Section "Intra-regional commodity movement (Siogranos)") is more complete. This revised dataset allows for better connections between regions of production and ports of export. The revised Siogranos data used to generate the new dataset accounts for 87-92% of volumes of soybean and corn movements between 2015 and 2019.
- A publicly available list of crushing facilities is now used to make links with ports and exports of soy cake and oil. We no longer make links between ports and potential silos or other soybean storage facilities, rather we use the Siogranos information to connect these ports to potential departments of origin.
- In some years and regions there may be an imbalance between Argentina's soybean production, its domestic demand for crushing, and exports. Argentina has increased its international imports of soybean to increase the country's crushing capacity (e.g from Paraguay, Brazil, and even the US). Our method now accounts for a stock of soybean from "Imports + stock" that is estimated for mass balance purposes, and is meant to represent both soybean imports and use of annual stocks in Argentina.
- The minimum amount of soy that can be sourced from a department is 28 tonnes (representing a single truck's worth). Any fraction of soybean < 28 tonnes has been labelled as "Unknown" meaning that the department of origin cannot be established.

Data version history

Table 3: Version history for Argentina's soy data

Version	Publication date	Change
1.1.0	June 2022	Revised methodology to identify departments of production linked to export; extension of time series to include 2015 and 2019. Deforestation data was reviewed with a new source. Removed soy deforestation. Soy deforestation risk annualization method improved. HDI is reviewed and added to the whole time series
1.0.1	June 2020	Soybean production updated with revised production maps also used to determine soy deforestation risk in the Chaco
1.0.0	December 2019	First Release

How to cite this document

Trase. 2022. Trase 'SEI-PCS Argentina crop commodities methodology version 1.1' supply chain map: Data sources and methods. Available at supplychains.trase.earth. https://doi.org/10.48650/hftg-mc84

How to cite the data

Lathuillière, M. J., Suavet, C., Biddle, H., Su, N., Carvalho, T., Ribeiro, V., & Feierman, A. (2022). Argentina soy supply chain (2015-2019) (Version 1.1) [Data set]. Trase. https://doi.org/10.48650/DY8T-0S49

Supply chain mapping

Data and sources

Production data

Soybean production was derived by combining satellite imaging information from Song et al (2021) with official yield data from the Argentinian Ministry of Agroindustry. This combination allowed for full coverage of soy production for all departments, including those for which the Ministry only provided a Province estimate. In cases where a department-level yield was not available from the official Ministry data, the average provincial yield was used; and in cases where a province-level yield was not available, the average national and annual yield was used.

Trade data

Trade data includes exports of the main soy products that are described by the Harmonized System (HS). We use mass-based commodity-equivalence factors to convert different products to a standard commodity equivalent (e.g. tonnes of soy cake into tonnes of soybean, Table 4). Commodity equivalence factors are derived annually from the FAOSTAT Supply Utilization Accounts (FAOSTAT 2021).

Results of per shipment trade data are also compared against official sources (Table 5) to assess the quality of the data.

Table 4: Soy product HS codes and commodity equivalence factors (to soy equivalents) (2015-2019)

HS code	Description	Commodity equivalence factor				
		2015	2016	2017	2018	2019
120110	Soya beans, whether or not broken	1.000	1.000	1.000	1.000	1.000
120190	Soya beans, other than seed, whether or not broken					
120810	120810 Flours and meals; of soya beans					
150710	Vegetable oils; soya bean oil and its fractions, crude whether or not degummed, not chemically modified	1.034	1.072	1.095	1.125	1.067*
150790	Vegetable oils; soya-bean oil and its fractions, other than crude, whether or not refined, but not chemically modified					
230400	Oil cake and other solid residues; whether or not ground or in the form of pellets, resulting from the extraction of soya bean oil					

**derived as the 2015-2017 average due to missing FAOSTAT data at the time of release; data for 2018 was not included in the average as it was an atypical year.*

Table 5: Trade data comparison against official reports (UN COMTRADE)

	Soy (million tonnes of soy equivalents)	
Year	Trase	UN COMTRADE
2015	53.4	45.0
2016	54.5	46.3
2017	46.6	43.8
2018	37.4	34.5
2019	53.6	44.3

Crushing facilities

The complete list of crushing facilities in Argentina was obtained from the Cámara de la Industria Aceitera de la República Argentina (CIARA, http://ciaracec.com.ar/ciara) and were assigned to a Siogranos zone (see below) based on verified locations available from company websites and Google Maps.

Intra-regional commodity movement (Siogranos)

Both soybean and corn movements within Argentina for the 2015-2019 period were derived using the Siogranos data (https://www.siogranos.com.ar/). This dataset provides a list of individual contracts for the delivery of products between a locality in Argentina and a Siogranos zone. A Siogranos zone is represented by a combination of departments within Argentina (see map), some of which are linked directly to ports of export. We used approximate string matching of locality with the BAHRA (see section entitled "Spatial Boundaries" below) using OpenRefine. With this method, we match a locality name to a department in Argentina to derive the total amount of product moving between a Siogranos zone of origin and a zone of destination. The total volume matched was 87-92% of total volume reported in Siogranos for soybean and corn movements between 2015 and 2019.

The Siogranos data selection process was as follows:

- 'Fecha de Declaración' as the year of interest associated with 2015-2019 exports
- 'Soja' or 'Maiz' as the product of interest
- 'Contrato', 'Ampliación', 'Fijación', 'Anulación', or 'Anulación Fijación' as the operation of interest

- 'En destino' as the destination type
- 'Es final : SI' to focus on final destinations only

The resulting datasets were then filtered by harvest ('Cosecha') to match the export years, i.e. 'Cosecha 14/15' and 'Cosecha 2015' were both linked to export year 2015. We also removed connections between zones that represented < 1% of total volume of movement to a specific zone or < 10 trips to that zone in any given year. Additional special zone connections were removed following in-country consultation (see "Special Rules" Section below).

The total resulting volume of soybean and corn compared to official production from the Ministry of Agroindustry are shown in Table 6. Data is available upon request.

The resulting Siogranos data for both soy and corn is available upon request.

Geographic boundaries

We used the latest BAHRA (http://www.bahra.gob.ar/) (v.2.0) with corresponding geocodes to map supply chain results and links to indicators. We applied the following minor changes to the list:

- Geocodes for the City of Buenos Aires were merged into one jurisdiction (geocode 02000)
- Geocodes of Lezama with Chascomus (Buenos Aires province) were merged into one department (geocode 06218)

Table 6: Sum of soybean and corn traded in Siogranos (post-processed) compared to production reported by the Ministry of Agroindustry

Year	Soybean production reported by the Ministry of Agroindustry	Soybean traded in Siogranos	Corn production reported by the Ministry of Agroindustry	Corn traded in Siogranos
	million tonnes			
2015	61	43	34	18
2016	59	35	40	17
2017	55	30	50	21
2018	38	22	43	18
2019	55	39	57	33

Domestic demand

Soybean domestic demand was estimated per department and per year by combining demand for soy cake for animal feed (cattle stocks, pig and chicken slaughter), and processed eggs (see sources in Table 7). We used a correction factor applied at the department level to correct the demand for soy cake to values reported by FAOSTAT. Domestic demand is not displayed in the Trase results but is used in the allocation step (see below).

Table 7: Data sources used to derive soy and corn demand at the departmental level in Argentina

Data	Source	Transformation, processing
Cattle	SENASA	We converted numbers of animals to live weight using annual live weight for each cattle sub-category from Datos Abiertos. Both beef cattle and milking cows included.
Pigs	SENASA	We converted the animal population to live weight using annual live weight for each pig sub-category from the Ministry of Agriculture's annual reports.
Chicken	Combination of sources	The number of slaughtered animals was obtained from CAPIA and crossed with slaughterhouse information from SENASA to derive the department of chicken production.
Processed eggs	Combination s of sources	The number of processed eggs was obtained from CAPIA and crossed with facility information from SENASA to derive the department of egg production.
Seed	INASE	Demand for seed was determined in kilograms per hectare (kg/ha) of soy and corn cropland and applied to harvested area in all departments: • Soy: 64 kg/ha (2015), 55 kg/ha (2016), 52 kg/ha (2017), 45 kg/ha (2018), 54 kg/ha (2019) • Corn: 79 kg/ha (2015), 66 kg/ha (2016), 65 kg/ha (2017), 49 kg/ha (2018), 70 kg/ha (2019)

Supply chain mapping method (SEI-PCS)

The SEI-PCS supply chain mapping method is the approach we use to link international exports to departments within Argentina, via individual trading companies. The soy supply chain is constructed by combining per shipment soy trade data (as per commodity HS codes, Table 4) together with trader information, crushing facilities and ownership with intra-Argentinian soy trade (Siogranos), and balances both soybean production and demand (see below).

The method consists of two steps discussed in turn, which are (1) a logic-based decision tree; and (2) a departmental allocation step.

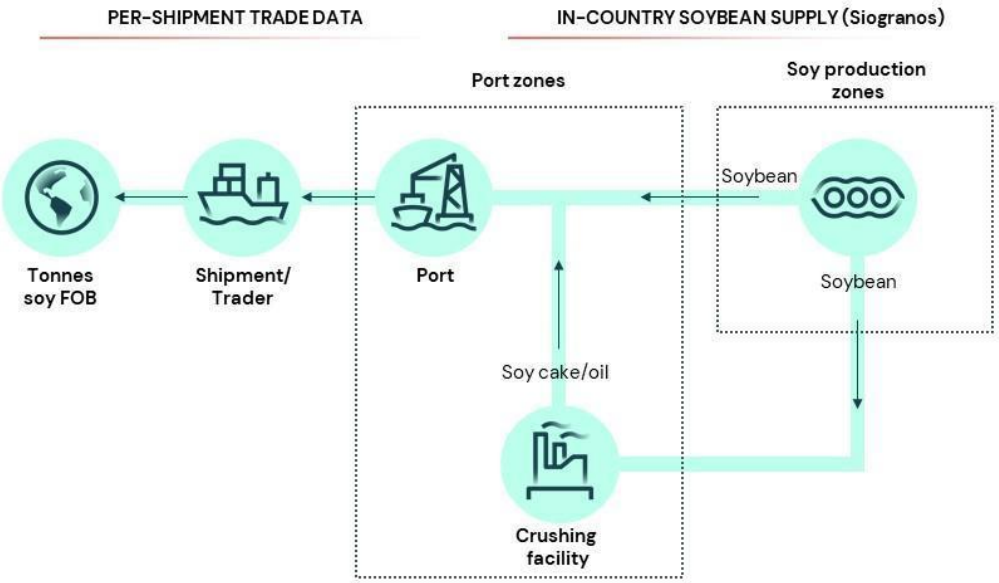

Figure 1: SEI-PCS approach for deriving the Argentina soy supply chain

Logic-based decision tree

A logic-based decision tree allows for the categorization of per-shipment trade data into groups that include supply chain information (e.g. product exported, trader, country of destination, port of export, crushing facility location, etc.). These groups are then linked to a port of exports and its corresponding Siogranos zone before an allocation step links each port of export to a probable department of origin (identified by its Siogranos zone). The decision tree contains six branches, two of which categorise the trade information as having an "Unknown" origin (branch 0, branch 3), and the remaining branches differentiating between products (bean in branch 1, cake and oil in branch 2) and the need to link to a crushing facility (branches 2.1, 2.2) (Figure 2).

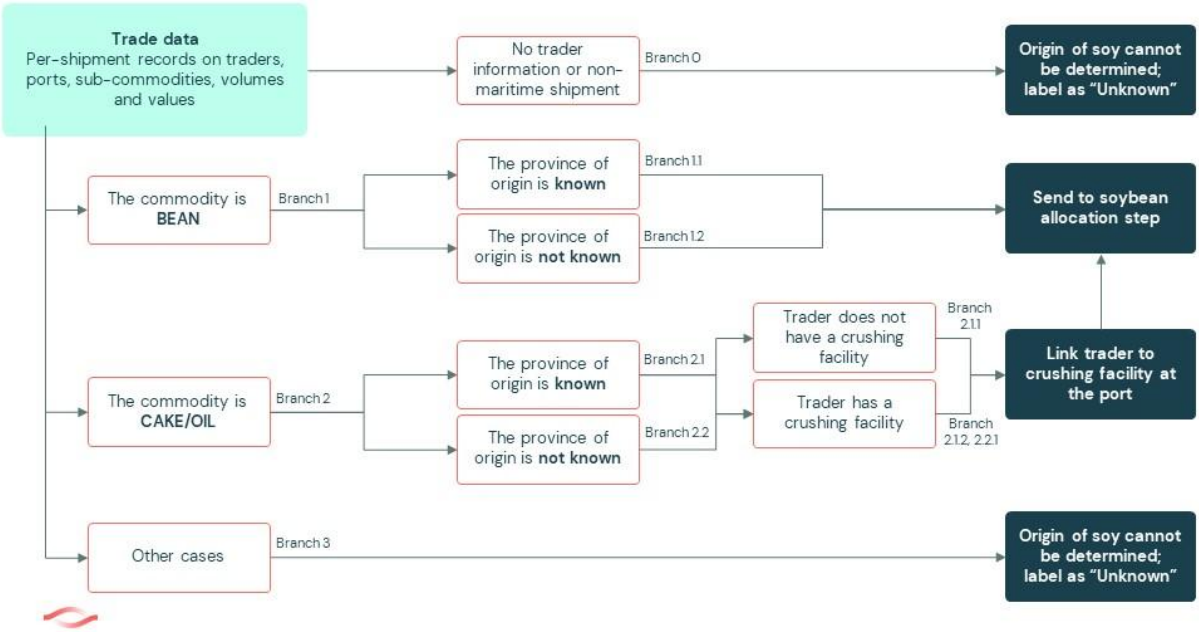

Figure 2: Logic-based decision tree used in SEI-PCS Argentina soy v.1.1

Results of the categorization of trade flows per decision tree branch are shown in Table 8. Note that in branches 2.1.2 and 2.2.1 we assume that the products of soybean crushing (soy oil and cake) are exclusively sourced from the Siogranos port zone.

Soybean allocation step

Once each category of shipments is identified using the decision tree, soybean volumes are allocated to Argentinian departments of production. This step is based on the export volumes (bean, cake and oil) needed to meet the exports identified in the trade data as well as the domestic demand estimated at the departmental level. This allocation is carried out for each product-exporter-port combination together with:

- Knowledge on the province of origin of the product being exported (available in the per-shipment trade data, and identified in decision tree branches)
- Intra-national movement of soybean between zones identified in the Siogranos data
- The mass ratio of soy oil and cake resulting from soybean crushing
- A minimum total amount of 28 tonnes (representing one truck's worth of soybean) that can be sourced from any department in Argentina. Any fraction of soybean < 28 tonnes has been labelled as "Unknown" to mean that the department of origin cannot be established.

Table 8: Results of implementation

Branch	Relative volume in each trade year (%)				
	2015	2016	2017	2018	2019
0 Export is non-maritime (i.e. via road, air) or exporter is not identified	1	1	8	17	<1
1.1 The commodity is soy bean and the province of origin in the trade data is known	2	2	2	3	4
1.2 The commodity is soy bean and the province of origin in the trade data is not known	15	12	10	7	14
2.1.1 The commodity is soy oil or cake and the province of origin in the trade data is known; the exporter has a crushing facility at the port.	5	7	5	7	10
2.1.2 The commodity is soy oil or cake and the province of origin in the trade data is known; the exporter does not have a crushing facility at the port. Assume that the product was sourced at the port	1	1	1	1	<1
2.2.1 The commodity is soy oil or cake and the province of origin in the trade data is not known; the exporter has a crushing facility at the port. Assume that the product was sourced from this crushing facility	40	47	41	46	45
3. All other cases, flagged as "Unknown"	13	11	7	1	1

In some cases, there was not enough soybean produced regionally to meet the demand for both domestic demand and exports (typically in the case of oil and cake). We therefore included additional soybean to meet the mass balance. This additional soybean does not have any traceable sources but is a combination of both soybean imports and stocks of soybean within the country. Argentina acts as a main hub for soybean crushing for the export of soy oil and cake made from soybean produced in Paraguay, Brazil and sometimes the US. The amount of additional soybean was within the range of the Argentinian stocks reported by the USDA-FAS (2017, 2018, 2020) for the 2016-2018 period (Table 9). This additional amount of soybean was labelled as "Imports + stock" in the Trase results.

Table 9: Extra soybean required to meet domestic and export demands compared to soybean stocks in Argentina reported by the USDA (2017, 2018, 2020) and FAOSTAT.

Year	Extra soybean for both exports and domestic demand (Trase "Imports + stock") (million tonnes of soy equivalents*)	Soybean stock in April (USDA-FAS) (million tonnes of soybean)
2015	9.34	10.1
2016	12.89	10.8
2017	7.97	12.4
2018	10.73	11.2
2019	17.92	9.1

**Additional soybean is typically needed to meet soy oil and cake demand, so the values represented here are converted into soybean equivalents following the equivalence factors (Table 4)*

Special rules

We applied some "special rules" which are hard-coded sourcing connections that can improve sourcing patterns where company relationships are known. We identified five company relationships based on internal research (e.g. based on ownership, joint-ventures or known links between infrastructure) to allow links between exporters and crushing facilities (Table 10).

Table 10: Company relationships used for the Special Rules

Exporter	Crushing facility to be linked	Year(s)
Algodonodera Avellaneda S.A.	Vicentin S.A.I.C	2015-2019
Compañías Argentina de Granos S.A	Molinos Cañuelas	2015-2019
Molinos Rio de la Plata	Molinos Agro S.A.	2015-2019
COFCO Argentina S.A.	COFCO International Argentina S.A.	2017-2019
Oleaginosa Moreno Hermanos Sacifia	Renova S.A.	2015-2019
Aceitera General Deheza	Terminal 6 (Rosario)	2015-2019
Bunge	Terminal 6 (Rosario)	2015-2019
Cargill	Quebracho (Rosario)	2015-2019

We note that in 2015/16 there were 14 companies that exported soy that were either not typical soy exporters or that exported very small amounts of product (bean, oil or cake). These companies were combined into an "Other" category to avoid displaying small fractions of soy. These companies were: Acondicionadora Cereales Bahia SA, Agricola el Horizonte SA, Agro Exportación Argentina SA, Alea y CIA SA, America Pampa Agroindustrial SA, Asociados Don Mario SA, Banderitas SA, Bio Grains SA, Claas Argentina SA, Corven Motors Argentina SA, Corven SACIF, FN Semillas SA, JIT Global Services, Viser SA.

In addition to company relationships, we also included preferential sourcing from ports to specific Siogranos zones based on known intra-national trade relationships (Table 11).

Table 11: Priority connections between ports and soy bean source zones (for map of Siogranos zones, please see map). Other Siogranos zones connected to these ports were not included.

Port Siogranos zone (customs office name)	Siogranos zone(s) that should provide priority sourcing to respective port zones
ZONE 13 (Gualeguaychu, Diamante)	ZONE 13, ZONE 18
ZONE 18 (Paraná)	ZONE 13, ZONE 14, ZONE 15, ZONE 18
ZONE 19 (Bahía Blanca)	ZONE 2, ZONE 3, ZONE 7
ZONE 20 (Necochea)	ZONE 20 (QUEQUEN), ZONE 3, ZONE 4
ZONE 6 (San Nicolas, San Pedro)	ZONE 6 (San Nicolas, San Pedro) ZONE 4, ZONE 5, ZONE 6, ZONE 7, ZONE 23 (ROSARIO N), ZONE 24 (ROSARIO S), ZONE 21 (BS AS)

Sustainability indicators

Territorial deforestation

Territorial deforestation (hectares) is the area of native vegetation (or old regrowth) that was removed (clear-cut) in each department and year. We derived this metric from Baumann et al (2022), classifying land use and cover based on satellite imaging (Landsat images; 30 m pixel resolution). The dataset provides land use and land cover classes from which we calculated deforestation by reclassifying the classes "agriculture" and "pasture" to deforestation when each class appeared for the first time, succeeding the natural vegetation class detected between 1985 and 2000. This indicator is only available for the Chaco region.

Land-based emissions from territorial deforestation

Land-based emissions from territorial deforestation (tonnes of CO_2-eq), are calculated from total biomass stored above and below ground, as well as in dead wood and litter. The biomass values were obtained from Baumman et al (2017), describing different biomass storage (in kg CO_2-C) for the humid, dry and super dry Chaco. These values were then converted into CO_2-eq by multiplying them by 3.67, based on the ratio between the molecular weight of C and CO_2.

Soy deforestation risk

Soy deforestation risk estimates how much deforestation is associated with the soy supply chain, addressing specifically the establishment of crops in areas deforested five years prior, and not inclusive, the year of the first harvest. Soy deforestation is obtained by (1) calculating soy deforestation before (2) allocating this deforestation to supply chain actors (traders, countries) (Figure 3).

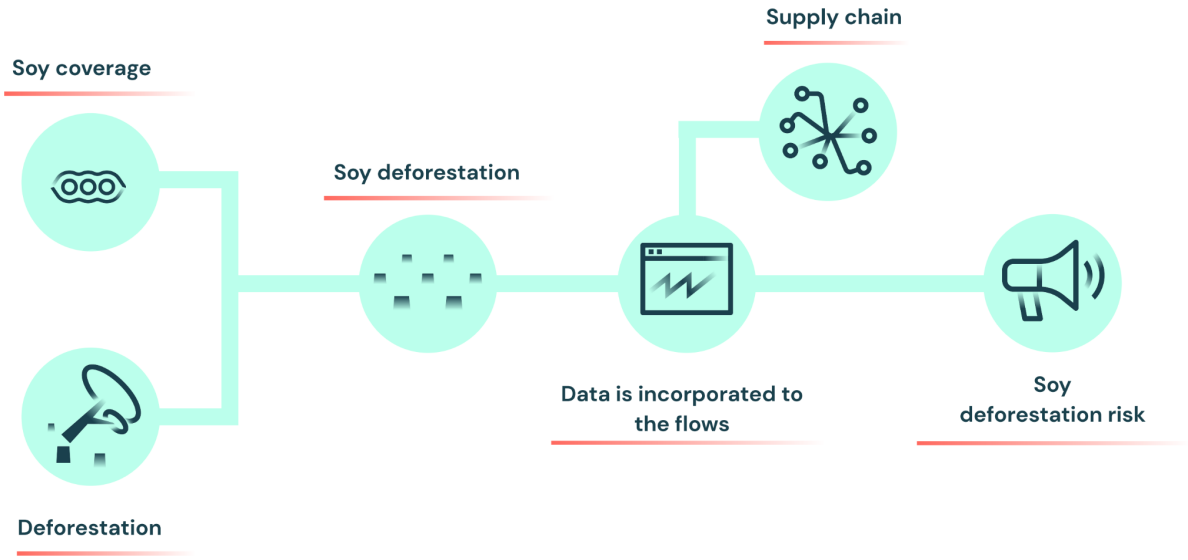

Figure 3. Data sources and steps of the process to calculate soy deforestation risk from the overlap between land used for soy and deforestation.

Soy deforestation estimates the amount of deforestation across a five-year allocation period that is considered to be associated with the harvest of soy in a given export year. We overlapped the annual soy maps from Song et al (2021) with the annual Territorial Deforestation (see above) 5 years prior to the export year to provide a total area of soy deforestation aggregated per department (Figure 3). Results are then annualised to provide annual soy deforestation for the five-year window (Figure 4).

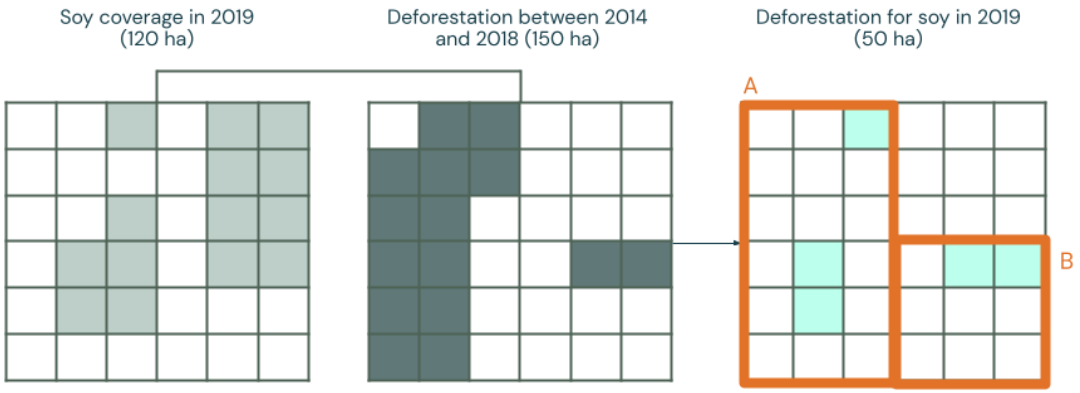

Figure 4: Illustration of the spatial assignment of Territorial Deforestation(2014-2018) to soy cropland coverage in 2019 to derive Soy deforestation (2019) in two departments (A and B).

Soy deforestation risk is then calculated by embedding soy deforestation to the soy supply chain. This is done by sharing the area of soy deforestation proportionally to the volume of soy exported by each department. For example, if a company exports 50% of the production from a department, then 50% of the total soy deforestation will be assigned to that company.

CO_2 emissions risk from soy deforestation

CO_2 emissions risk from soy deforestation (tonnes CO_2-eq) was estimated following the same method as described above for land-based emissions, but now applied to the areas obtained when calculating soy deforestation risk.

Zero-deforestation commitment (ZDC) and soy traded under ZDC

Zero-deforestation commitments (ZDC) are obtained by Global Canopy's annual assessment which determines whether a trader has a commitment to zero deforestation in their supply chain (net or gross deforestation are both acceptable) for a given commodity, covering a specific country and time period. A commitment is accepted as zero deforestation if the trader (or trader group) explicitly uses the phrases "zero deforestation", "zero conversion" or "NDPE" in their sustainability goals or current policies, or has a policy (or target) for 100% certification where the certification is equivalent to a zero-deforestation standard as minimum. We then convert the ZDC in a department to an index, indicating the percentage of traded soy, in a given department, that is covered by these commitments. In Argentina, a ZDC is either a "Company commitment" (if the specific company has a ZDC), "None" (if the company does not have one), or "Not defined" (if the company's ZDC position was not checked; typically the

assessment focuses on the top companies that trade 90% of the commodity volume in a given year).

Forest 500

The Forest 500 indicator scores companies' deforestation commitments according to Global Canopy's Forest 500 assessments (https://forest500.org/). The selection of the Forest 500 score is based on two main criteria: (1) risk of being linked to tropical deforestation through involvement in or potential exposure to forest risk commodity supply chains; and (2) influence within the political economy of tropical deforestation.

Human Development Index

The Subnational Human Development Index (SHDI) (https://globaldatalab.org/shdi/) is a translation of the UNDP's official HDI (hdr.undp.org) to the department level. The SHDI is an average of the subnational values of three dimensions education, health and standard of living.

Glossary

Common terms used in Trase methods.

Term	Definition	Example
Asset	In the context of Trase, a physical or material resource owned by a business or an economic entity that relates to the production, storage or processing of a commodity.	Soy silo, slaughterhouse, refinery, mill, farm.
Commodity equivalent	Measure used to relate the trade flows of different products to a commodity equivalent. This is obtained by using the commodity equivalence factor.	Soy oil and cake products are converted into soybean equivalents.
Commodity-equivalence factor	Factor used to convert the amount of a product into a commodity equivalent.	1 kg of soy meal and oil are equivalent to 1.031 kg of soybeans (3 g are waste).
Decision tree	Outlines the conditional filtering of trade data in order to link commodity exports to a logistic hub.	Each supply chain map manual contains a figure of their respective decision trees.
Distance matrix	The distances between different demand and supply nodes. This is used in the linear programming step to solve the problem of minimising the total distance incurred in meeting all of the demand.	Supply nodes are jurisdictions of production. Demand nodes include exports from ports and domestic demand nodes such as chicken farms for Brazil soy. Distances are based on the available road networks.
HS code	Unique code from the Harmonized System (HS) which describes the nature of the products being traded internationally.	1201: Soya beans, whether or not broken 120110: Soya beans, seed; whether or not broken

Jurisdiction	The territorial administrative units into which a country is divided.	Municipality in Brazil, kabupaten (district) in Indonesia, department in Argentina, department in Paraguay (lower resolution, with departments composed of districts).
Linear programming	Linear programming (LP, also called linear optimisation) is a method to achieve the best outcome (such as maximum profit or lowest cost) in a mathematical model whose requirements are represented by linear relationships.	Use linear program to minimise the distance between logistic hubs and production municipalities.
Logistics	Activities related to the production, storage, processing, transport, trade, etc., of commodities in supply chains.	Chicken rearing, cattle slaughtering, soybean crushing, palm oil bulking, shipping.
Logistics hub	Jurisdiction containing one or more assets that are nodes in the commodity supply chain.	Municipality, department of silo location, slaughterhouse, palm oil mills.
Node	Jurisdiction, asset, trader or country representing a point of aggregation or transfer of a commodity through its supply chain.	
Supply chain	Sequence of nodes linking a jurisdiction of production to a country of import.	

References

Baumann M. et al (2022) Frontier metrics for a process-based understanding of deforestation dynamics. In review.

Baumann M. et al (2017) Carbon emissions from agricultural expansion and intensification in the Chaco. Glob Change Biol, 23: 1902-1916. https://doi.org/10.1111/gcb.13521

FAOSTAT 2021 http://www.fao.org/faostat

Godar J. et al 2015 Towards more accurate and policy relevant footprint analyses: Tracing fine-scale socio-environmental impacts of production to consumption. Ecol. Econ. 112: 25-35. http://doi.org/10.1016/j.ecolecon.2015.02.003

Song X-P et al 2021 Massive soybean expansion in South America since 2000 and implications for conservation Nat. Sustain. 4 784–92 Online: http://dx.doi.org/10.1038/s41893-021-00729-z

UN COMTRADE https://comtrade.un.org/

USDA-FAS 2020 Oilseeds and Products Annual Report AR2020-0010 Link

USDA-FAS 2018 Argentina Oilseeds and Product Update Link

USDA-FAS 2017 Argentina Oilseeds and Product Update Link

Contact us

For further information contact
info@trase.earth