

Soy and environmental compliance in Brazil: an undervalued risk for global markets

Methodological Note

Datasets

- Rural Environmental Registry (CAR in Portuguese) database (accessed through Serviço Florestal Brasileiro (SFB) [website](#) in December 2018)
- Amazon and Cerrado soybean maps from Agrosatélite¹, 2017
- Soy deforestation, 2016 – [Trase](#)
- Soy supply chain mapping from [Trase, 2017](#) (SEI-PCS v1.3)

Calculating the total area of soy plantation on unregistered farms

All spatial procedures were based on map algebra operations and were carried out in ArcGIS 10.4. The CAR rural properties and the soybean map were converted to rasters with spatial resolution of 30m.

Soybean maps were overlaid with the boundaries of the rural properties registered in the CAR system and reclassified to show two categories: soybean plantations on registered properties and on unregistered rural properties. The reclassified map was overlaid with a municipality boundaries map to quantify these two categories for each Brazilian municipality.

In this study we focused only on the Cerrado and Amazon biomes. This is because:

1) nearly all recent deforestation linked to soy expansion has been in these two biomes; 2) the soybean map (2017) used in this study (from Agrosatelite) is only available for these biomes.

¹ GROSATÉLITE GEOTECNOLOGIA APLICADA LTDA. (CORDS.) RUDORFF, B.; RISSO, J. Análise Geoespacial da Dinâmica da Soja no Bioma Cerrado 2014/2017. Florianópolis, Santa Catarina. Available at: <https://agrosatelite.com.br/cases/#expansao-agricola>

Correlation between soy deforestation and soy area on unregistered farms

We calculated correlations between areas of deforestation for soy and soy plantations on unregistered farms at the municipality level to investigate potential links. We first assessed any potential correlation between these two variables for all the municipalities in Amazon and Cerrado biomes. We then ran the same analysis just for the municipalities in the Matopiba region, an agricultural frontier where deforestation associated with soy is particularly high².

Market exposure to soy grown on unregistered farms

To evaluate the exposure of traders and consuming countries to soy grown on unregistered farms we used Trase data. Trase provides a comprehensive map of Brazil's soy supply chain, systematically linking soy buyers to individual production regions (municipality level) and export markets. To see the methodology in more details visit <https://trase.earth/about/how-does-trase-work>.

All of the analyses were performed at a municipality level and therefore do not show direct links between soy grown on unregistered farms and importing countries or traders, rather they provide an estimate of the exposure of these countries/companies to soy grown on unregistered farms.

The following steps were taken to assess the exposure of countries/regions to soy grown on unregistered farms.

- 1.From Trase data, we calculated the proportion of soy that was exported in 2017 to each of the regions of interest (China, EU) per municipality.
- 2.We calculated the amount of soy exported in hectares by converting volume to land use area (hectares) according to soy yield per municipality.
- 3.We then multiplied the proportion of soy exported from each municipality to each export destination country by the area of soy grown on unregistered farms aggregated per municipality. This result allows for an estimate of exposure of import markets to soy produced on unregistered farms per municipality.
- 4.We then divided the total area of soy on unregistered farms for each municipality linked to China or the EU by the total area of soy allocated to all countries (step 1).
- 5.Using Trase data, we then identified the companies most exposed to the trade in soy from unregistered farms selling to markets in China and the EU, focusing on the 15 municipalities with the largest area of soy from unregistered farms estimated to be going to China and EU.

² GROSATÉLITE GEOTECNOLOGIA APLICADA LTDA. (CORDS.) RUDORFF, B.; RISSO, J. Análise Geoespacial da Dinâmica da Soja no Bioma Cerrado 2014/2017. Florianópolis, Santa Catarina. Available at: <https://agrosatelite.com.br/cases/#expansao-agricola>