Abstract

Is the EU a Major Driver of Deforestation in Brazil?

Quantification of CO_2-emissions for Cattle Meat and Soya Imports

Where is the problem?

Reducing greenhouse gas emissions to limit global warming to well below 2°C or even to 1.5°C, as emphasised by world leaders in the Paris Agreement reached in December 2015, can only succeed if deforestation is cut dramatically in the next decades because the resulting emissions nearly make up one fifth of all greenhouse gas emissions worldwide.

Most of the world's deforestation is happening in South America and in Africa. Brazil has been the country with the largest deforestation for many years. It is far away from Europe, so can we lean back and put all responsibility for causing the emissions on Brazil? No! We need to look at the drivers of this deforestation to develop effective climate change mitigation policies – and here the EU is clearly involved.

Deforestation in Brazil, especially in the Amazon rainforest and the Cerrado savannah, happens mainly due to the establishment of pastures for cattle as well as cropland to grow soya. Cattle meat and soya – as beans, cake or meal – are very important export goods of Brazil, and this is where international demand, hence the EU as the world's third largest net importer of agricultural products comes into play. This study tries to answer the question "Is the EU a major driver of deforestation in Brazil?" and quantifies the CO_2-emissions resulting from deforestation caused by the production of beef and soya that is imported from there.

This quantification includes an estimation of indirect land use change (iLUC) due to the prevalent pattern that much of the soya is planted on former pastures thus not directly leading to deforestation but indirectly because its expansion is boosting new deforestation for the displaced cattle pastures. For this purpose an own country- and situation-specific method was developed.

Alarming Study Results

Up to 18 % of Brazilian deforestation emissions were caused by the imports of the EU

The results reveal that the EU has been the largest foreign driver of deforestation in Brazil in the years between 2002 and 2006. In 2005, the year with its largest impact, the EU was responsible for 19 % of deforestation which equals about 780,000 ha and consequently for 200 million tons of CO_2-emissions, which corresponds to 18 % of Brazilian deforestation emissions, see Figure 1.

After 2006 the impact of the EU on Brazilian deforestation emissions was reduced. This was due to the sharp decline in Brazilian cattle meat imports in 2007 due to an outbreak of foot-and-mouth

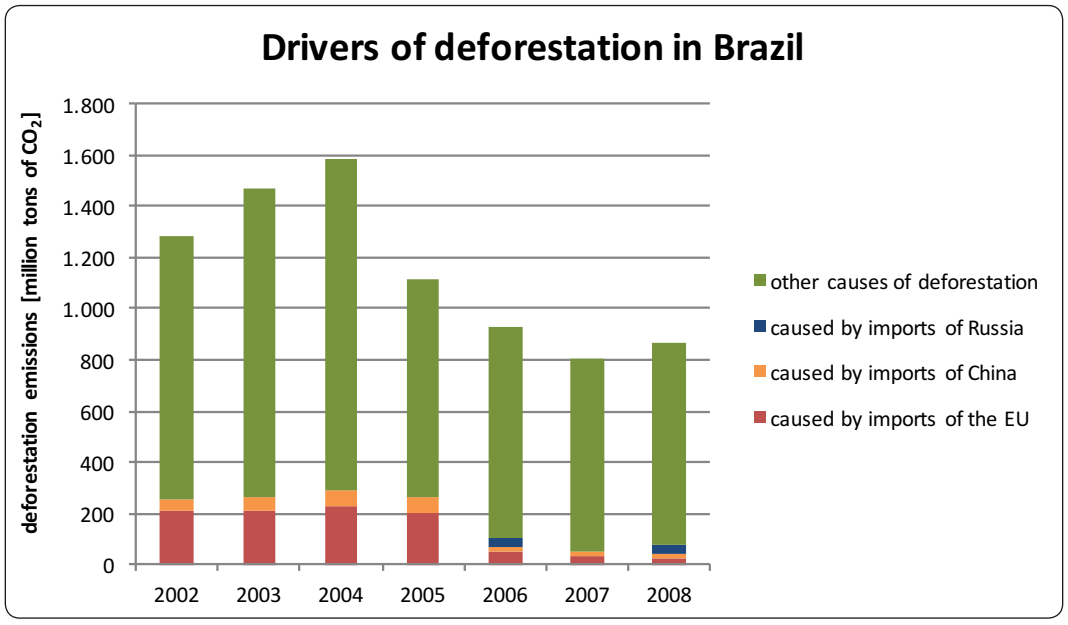

Figure 1: Results from linking Brazilian deforestation emissions with imports of soya and cattle meat by the EU, China and Russia between 2002 and 2008, own figure and calculations.

disease in Brazil and import restrictions of the EU as well as a drop in the estimated rate of deforestation linked to establishing soya plantations from 2006 on.

Other major players: Russia and China

Hence, in 2008, Russia had overtaken the EU with a share of 5 % in Brazilian deforestation emissions while the impact of the EU had decreased to 2 %. At the same time, China's impact increased so that it only ranked very closely below the EU in 2008.

For the EU, soya is the most relevant import commodity causing deforestation in Brazil

Within the calculated deforestation emissions caused by the EU, deforestation due to soya plantations makes up about ¾ whereas deforestation due to cattle pastures makes up ¼. This distribution is the result of including iLUC, which is omitted in many other studies, hence these underestimate the influence of soya. Since a systematic occupation of pastures by soya, on average after eight years, is described in literature (Macedo *et al.*, 2012), the associated deforestation emissions from iLUC could be calculated and were reallocated from cattle to soya.

Overall, the results of this study show that the EU has been a major driver of deforestation in Brazil in the years 2002 – 2008. More recent studies, e.g. by the European Commission on "embodied deforestation" confirm these results (European Commission, 2013).

Recent developments: Improvements but no resolution

At the time this study was written, data (especially for Cerrado deforestation) was only available until 2008. To relate the results to more recent developments, this abstract has been extended and completely updated.

Deforestation: Stagnation at lower levels

Let's have a look at deforestation first. As can be seen in Figure 2, deforestation in the Amazon has been rather constant in the last few years at about 5,000 to 6,000 km² per year. This is only about 1 / 5 of what has been deforested in 2004 but the area is still as large as twice the size of the German federal state of the Saarland.

Quantifying deforestation in the Cerrado remains a problem as there are no good satellite systems

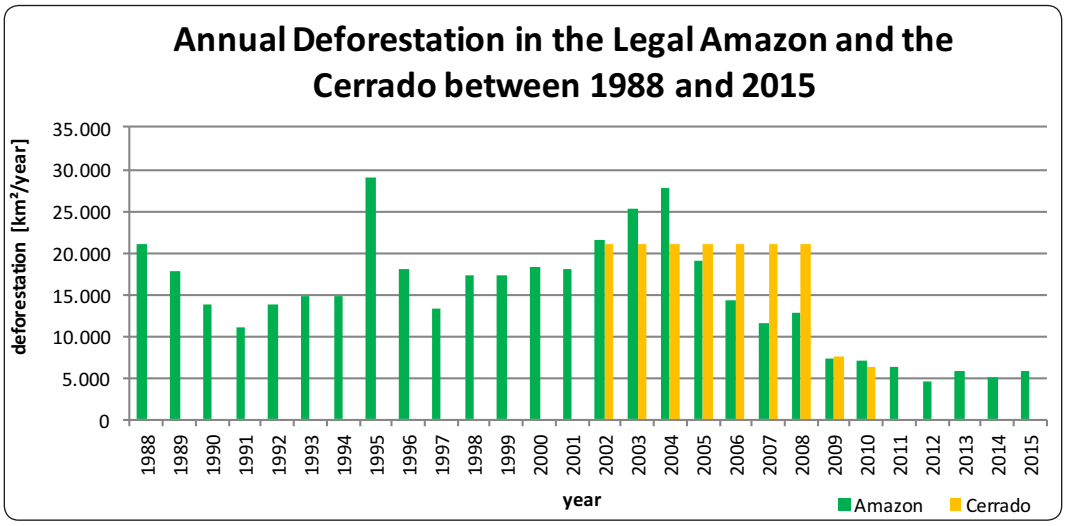

Figure 2: Development of deforestation in the Amazon and the Cerrado. Own figure, data from INPE, Brazilian Government (2009) and Portal Brazil (2012).

yet. That is why besides the information on average deforestation between 2002 and 2008 data could only be updated until 2010. Deforestation in the Cerrado seems to have decreased quite a lot to about 7,000 km^2 per year.

Despite this reduction, Brazil still has the world's largest annual deforestation by area (FAO, 2015). A deforestation hotspot that has not been considered in this study is the Atlantic rainforest, with massive deforestation due to soya as well (WWF, 2014).

Were established policies and measures successful?

The decrease in deforestation in the Amazon and the Cerrado shows that some of the deforestation policies and measures were effective. These are among others improved law enforcement, the Soy Moratorium, which was renewed indefinitely in May 2016, the Forest Code, restrictions for farmers in those counties with the highest deforestation rates to get agricultural credits, satellite monitoring, the increase of protected areas and the restoration of degraded areas.

However, this success is not granted to remain in the coming years: The new Forest Code grants an amnesty for illegal deforestation that took place before 2008 and its trading mechanism for deforestation rights is highly controversial, finally, the size of some protected areas was reduced (Gibbs *et al.*, 2015; Soares-Filho *et al.*, 2014).

Let's have a closer look at what happened in the Amazon in the last years: Soya production increased quite a lot between 2007 and 2012 whereas beef production is more or less stagnating since 2008. At the same time, beef production became more intensive and the number of cattle per area increased. This led to an excess of pastures which were then used for soya production; this contributed to the lower deforestation rates (Nepstad *et al.*, 2014).

Cattle ranching and soya production shift more and more to the Cerrado where about 70 % of Brazil's farm output is produced (Pearce, 2011) because there is no Soy Moratorium, no such good satellite monitoring and so on (Nepstad *et al.*, 2014). According to NASA (2015) the Soy Moratorium in the Amazon actually shifted deforestation to the Cerrado in recent years.

Another aspect that makes the Cerrado vulnerable to deforestation is that only 8.24 % (168,000 km^2) of the Cerrado are officially protected and only ⅓ of these are in strict Protection Areas (PAs). Françoso *et al.* (2015) investigated deforestation rates in the different protection zones and found that deforestation rates in sustainable use PAs did not vary a lot from those outside PAs. Only the deforestation rates within the strict PAs were considerably lower.

Outlook: The future of the Amazon and the Cerrado is totally unclear

Will Brazil achieve its deforestation reduction goals and keep deforestation, also in the Cerrado, low? Nepstad *et al.* (2014) are not sure whether law enforcement and economic incentives are sufficient and point out that there is still 120,000 km² of forest area outside of protected areas in the Brazilian Amazon that is profitable for conversion to soy.

The Brazilian Government itself draws diverse pictures of the future of the Amazon. As a basis for the Brazilian INDCs (Intended Nationally Determined Contributions) that were developed in the run-up to COP21 in Paris in 2015, INPE (the Brazilian National Institute for Space Research) developed three scenarios. They range from an optimistic scenario with restoration and conservation measures exceeding those foreseen in the Forest Code to a pessimistic scenario in which the environmental advancements of the past are setback. In the optimistic scenario where clear-cut deforestation and forest degradation processes are stopped and secondary vegetation is increased, the Amazon becomes a carbon sink after 2020. In the pessimistic scenario, deforestation rates rise again in combination with other problems like chaotic urbanization.

Recent data on soya and cattle production and trade

Between 2010 and 2014, the soya area harvested in Brazil grew by 30 %, hence it was as large as the size of Italy (more than 30 million ha) in 2014 and had a share of 40 % of all Brazilian cropland. Along with the United States and Argentina, Brazil accounts for around 9 / 10 of global soybean exports (WWF, 2014). Since 2010, exports rose by nearly 50 %. Cattle meat exports from Brazil rose by 24 % between 2010 and 2013 (FAOSTAT and UN Comtrade).

Recent data on soya and cattle imports of the EU

For imports, there are different pictures for soya and cattle. Whereas soya imports into the EU declined by about 10 % between 2010 and 2014, cattle meat imports rose by nearly 60 %. For both commodities, Brazil remains the main trading partner of the EU.

Concerning soya, out of the other important exporters in South America, Paraguay and Uruguay considerably increased their soya area and worldwide exports. The EU also drastically increased their imports from these two countries between 2005 and 2010 (+482 % from Uruguay and +173 % from Paraguay, data from UN Comtrade). Going together with the decrease in European soy imports in the last few years, these high levels are decreasing. The figures lead to the conclusion that for soya, the EU is not the main driver of cropland expansion anymore, China is now the largest soy importer by far.

For cattle meat, Uruguay and Argentina are the other major trading partners of the EU besides Brazil but their cattle meat export is more or less constant to decreasing in the last years. With regard to the increasing cattle meat imports from Brazil, the EU is again increasing its impact on deforestation.

Multifaceted picture

This analysis of the recent developments shows a picture with many facets. Deforestation was considerably reduced, but for the Cerrado there is no information on the latest developments. The Forest Code which shall protect the forest seems to contribute to deforestation in the Cerrado and protected areas do not guarantee zero deforestation. Soya and cattle are still expanding on forested lands or former pastures and the Brazilian economy is highly and increasingly dependent on the export of these commodities. It is clear that the EU is still contributing to deforestation in Brazil, and therefore needs to look at options to reduce its impact.

(Political) conclusions

Conclusions from this study address three different levels. At first, deforestation within Brazil needs to be decreased by appropriate measures like effective law enforcement, more ambitious goals for deforestation reduction, an increase in strict protection areas and the installation of a good real time deforestation detection system also for other biomes than the Amazon. Furthermore, the usage of abandoned and degraded cattle pastures for further agricultural expansion should be supported. Leakage and iLUC can be avoided by national approaches on deforestation reduction rather than single goals for the different biomes, by a closer collaboration of the cattle, soya and biofuel sectors as well as by more participatory processes. Additionally, more reliable instruments for transparency should ensure compliance with voluntary agreements like RTRS better.

Secondly, the EU should reduce its impact in Brazil. This can be reached by stimulating the production of certified, deforestation-free products with its demand and imports. There is already good practice for other import goods like biofuel where sustainability standards are regulated in the EU renewable energy directive. The partnership agreement FLEGT for timber trade is another example which could be transferred to soya, beef meat and other commodities. As a consequence, certain sustainability criteria would have to be met by imported products and the EU would help exporting countries in reaching them.

The EU should also set itself broader sustainability goals that include the reduction in virtual land use and hence deforestation emissions abroad. By a goal like this also pesticide use, land conflicts with the local population, land degradation and other problems in the exporting countries could be addressed. Going together with a reduction in virtual land import is the increase in self supply of the EU with protein-rich animal feed. The promotion of these crops, which are also good for the nutrient enhancement of the soil, is already ongoing within the “European Protein Strategy”. However, more decisive action in terms of research, breeding of suitable and adapted species, consultancy and trainings is needed.

Another aspect the EU’s strategy should include is the reduction of meat production and consumption. The meat production of the EU is not just driven by domestic demand but exports, especially to Africa, play a huge role and destroy local markets. Therefore, all incentives that foster meat export should be abolished. Furthermore, an awareness campaign in the EU for a healthy diet with less meat can reduce meat consumption.

Thirdly, all nations should include the halt of deforestation more into their climate change mitigation efforts and strengthen instruments to halt deforestation like REDDplus. Moreover, by integrating the full environmental costs from deforestation into the price of all products, e.g. by carbon taxes, a decrease of deforestation worldwide could be triggered. Furthermore, it seems to be quite important to focus more on consumption-based greenhouse gas accounting and to join forces and financial means to reduce the demand-driven emissions. Therefore, the virtual land use and the related emissions need to be quantified, like shown in this study or by the European Commission (2013). Like that, the consuming and the producing countries can address them effectively together.

Calculation Methods and Steps

In the following three figures all calculation steps used for this study are visualized.

At first, direct land use change was calculated by using given areas and emissions of deforestation and / or emissions factors for the Amazon and the Cerrado. Using percentages from the literature, these deforestation emissions were then allocated to soya and pasture conversion of the two biomes. By multiplying these results with the proportion of these commodities exported to the EU the direct deforestation emissions of the EU were calculated (see Figure 3).

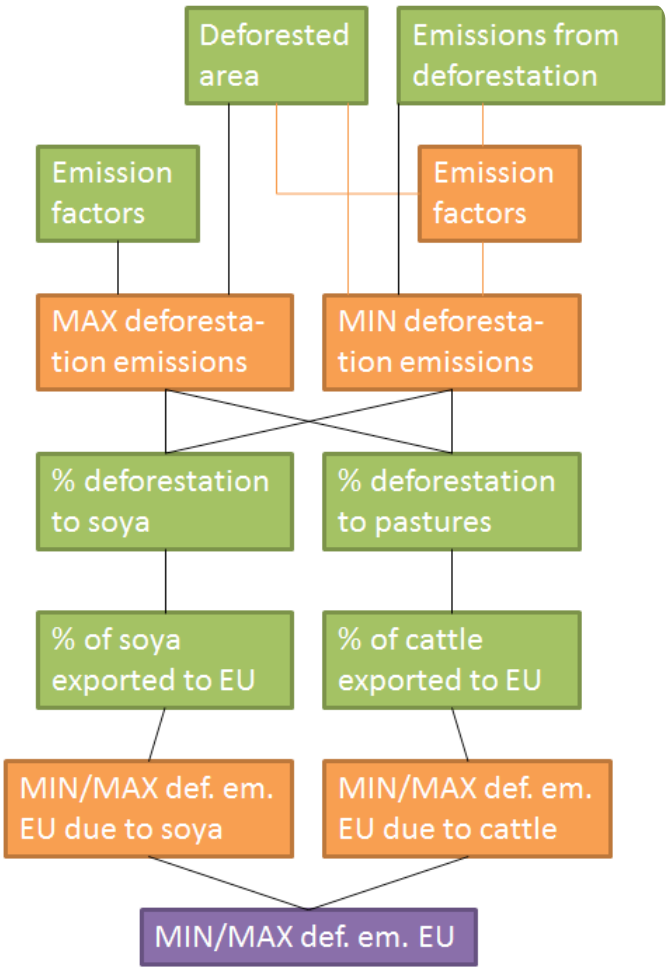

Figure 3: Emissions from direct land use change – calculation steps.

Colour code:
Green = data from the literature;
Orange = calculated;
Purple = result.

Notes:
(1) The same method was used for Amazon rainforest and Cerrado.
(2) For deforestation emissions there was no complete time series given in the literature. Therefore, the emissions for the missing years have been calculated using calculated emission factors from previous or following years and the deforestation area (orange lines).

To calculate iLUC emissions, data from the literature on the area of soya plantations, on the occupation rate of soya on pasture and on the average conversion patterns were needed to calculate on the one hand the emissions of the area firstly occupied by pastures and then by soya and on the other hand the share in time between soya and pastures (see Figure 4).

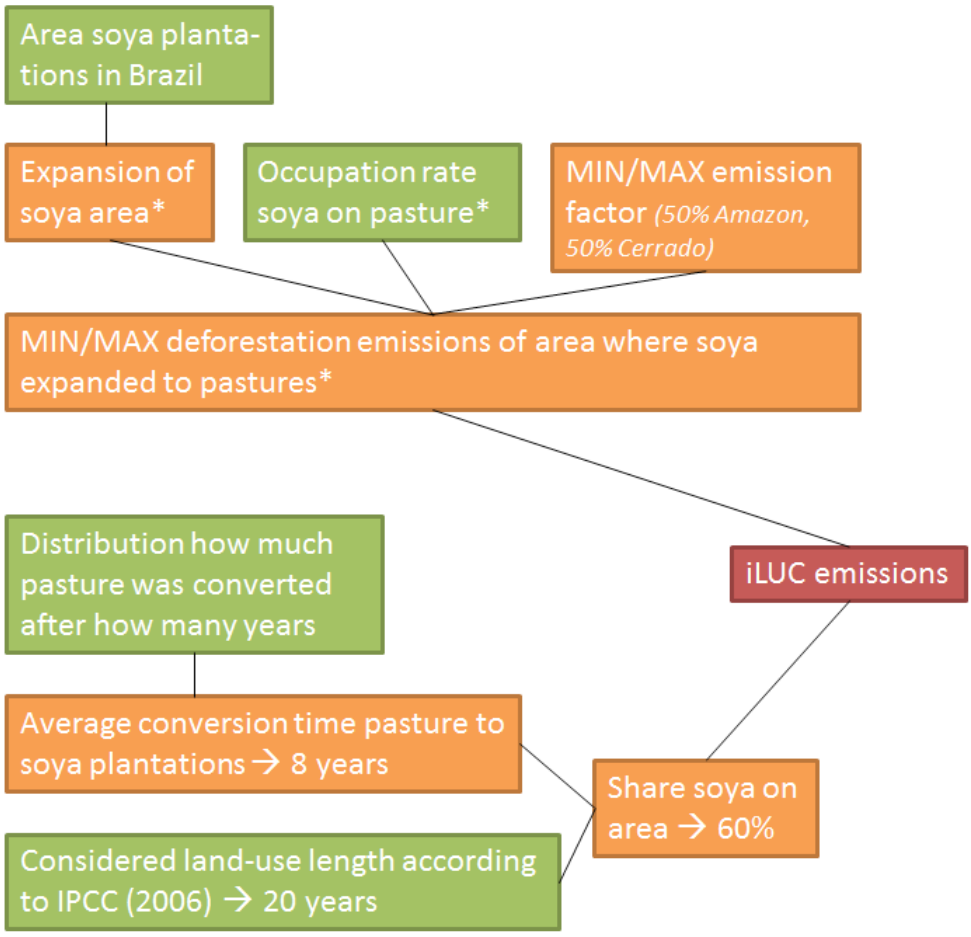

Figure 4: Emissions from indirect land use change – calculation step 1.

Colour code:
Green = data from the literature;
Orange = calculated;
Red = result iLUC.
*** Differentiation for the periods 2011 – 2005 and 2006 – 2010.**

In a second step these iLUC emissions were redistributed between cattle and soya. The resulting emissions were again multiplied with the proportions of these commodities exported to the EU to get the EU's deforestation emissions including iLUC from its imports of cattle and soya from Brazil (see Figure 5).

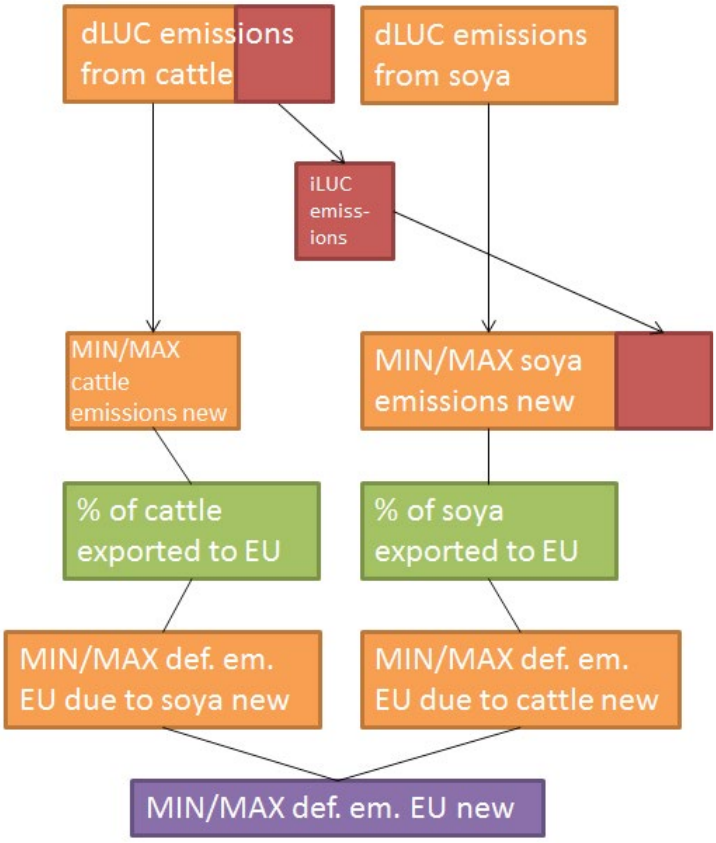

Figure 5: Emissions from indirect land use change – calculation step 2.

Colour code:
Green = data from the literature;
Orange = calculated;
Red = result iLUC;
Purple = result.

Imprint

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