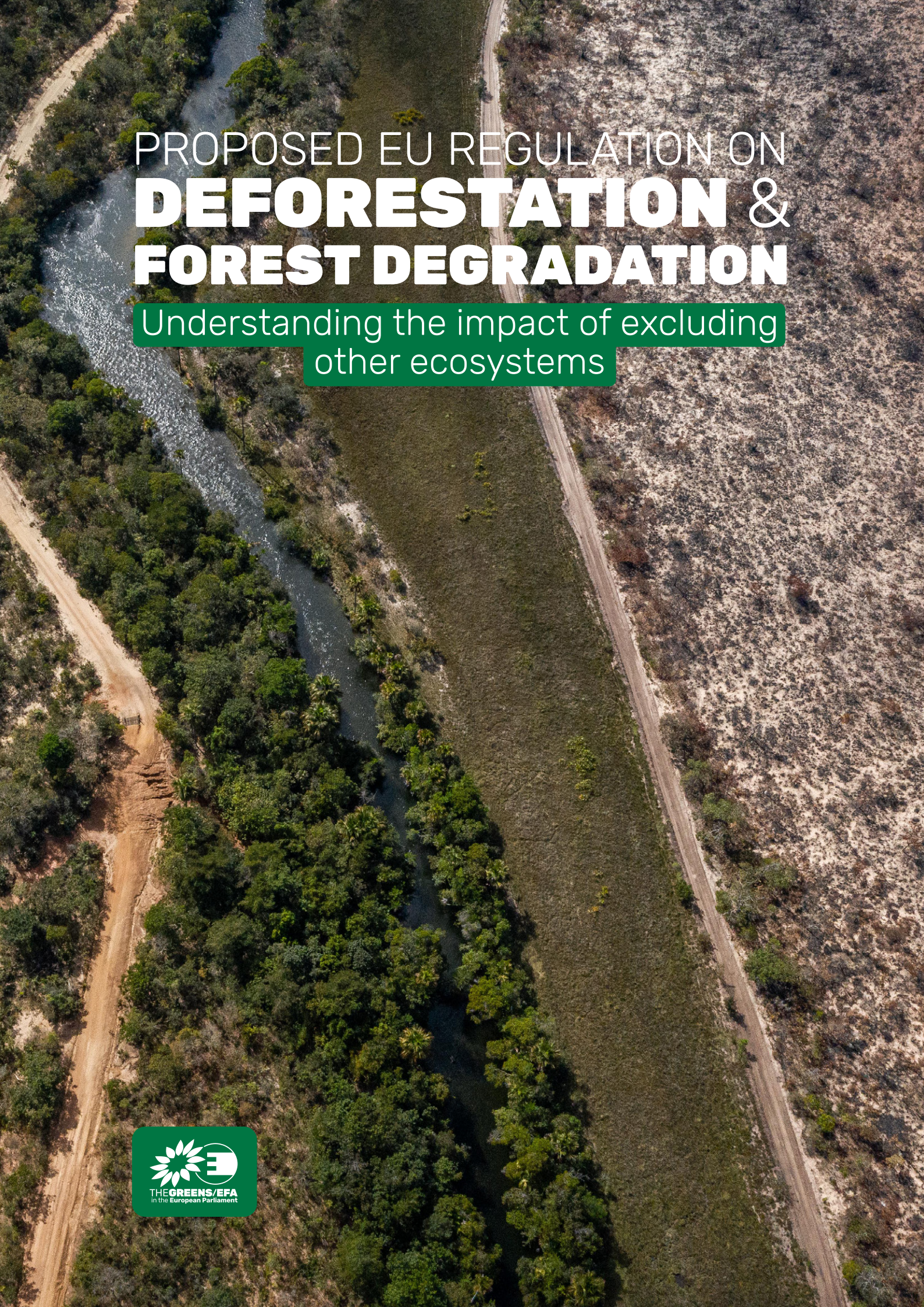

PROPOSED EU REGULATION ON **DEFORESTATION** & **FOREST DEGRADATION**

Understanding the impact of excluding other ecosystems

THE GREENS/EFA in the European Parliament

POLICYMAKER SUMMARY BY GREENS/EFA

On 17 November 2021, the European Commission published a proposal for an EU regulation on deforestation-free products. The proposal aims to reduce the EU's impact on global deforestation and forest degradation by restricting the sale of agricultural commodities such as soy, beef and palm oil unless they are "deforestation-free". The EU is presently the world's third largest importer of tropical deforestation and associated emissions, surpassed only by China and India.

How "forest" is defined in the regulation will affect its reach and impact. Currently, the proposal uses the definition of "forest" set out by the UN Food and Agriculture Organization (FAO). The law will therefore not affect commodities produced on land cleared of native vegetation that does not fall under this definition, even where it is highly ecologically significant, such as biodiverse wooded savannahs and grasslands.

If the EU regulation is limited to FAO "forests", it would leave three quarters of the Cerrado and a third of the Gran Chaco unprotected

The Greens/EFA Group in the European Parliament has asked Trase to assess the impact of excluding other ecosystems from the EU regulation with a focus on soy and beef imports from Argentina, Brazil and Paraguay. The analysis covers more than half of the Amazon rainforest, part of the Gran Chaco and Atlantic forest, and almost all of the Cerrado, the most species-rich savannah biome in the world.

The study shows that, if the EU regulation is limited to FAO "forests", it would leave three quarters of the Cerrado (79 million hectares) and a third of the Gran Chaco (32 million hectares) unprotected. Yet most of the conversion associated with the EU's soy and beef imports from South America is in these areas.

The Cerrado is at particular risk because its lands are suitable for farming and the majority of it is not protected under local laws. The majority of the EU soy and beef imports are sourced from the Cerrado biome. Most of the EU's soy-related deforestation risk, and more than a third of its beef-related deforestation risk is there.

The European Parliament's rapporteur, Christophe Hansen, has proposed that the legislation's deforestation definition should cover the human-induced conversion of "naturally generating forests" as well as "other wooded land" as defined by the FAO.

An extension to FAO "other wooded land" would decrease unprotected Cerrado and Gran Chaco areas to 18 and 24 percent, respectively

We have therefore also asked Trase to calculate the impact of extending the scope of the EU regulation to "other wooded land" as defined by the FAO. According to their assessment, this would go a long way to improve the protection of the Cerrado, by decreasing the unprotected Cerrado area from 74 to 18 percent. It would reduce the Gran Chaco area unprotected by the legislation from 33 to 24 percent. However, large areas of natural grassland would remain vulnerable to EU-driven ecosystem conversion.

In addition, any definition based on thresholds (tree height, canopy coverage) raises challenges to classifying complex mosaic ecosystems, such as frontier regions and biome boundaries. It sets arbitrary boundaries on what is within or outside the scope of the legislation.

We therefore recommend that the proposed EU regulation be amended to cover agricultural commodities produced on land converted from any natural ecosystems, not only "forests" and "other wooded land". The EU must not shift the pressure from these ecosystems to grasslands and other natural vegetation areas that would be excluded from the scope of the regulation.

CONTENTS

About Trase

Trase is a data-driven transparency initiative that revolutionises our understanding of the international trade and financing of agricultural commodities which drive tropical deforestation. Its unique supply chain mapping approach brings together disparate, publicly available data to connect consumer markets to deforestation and other impacts in producer countries. Trase's free online tools and actionable intelligence enable governments, companies, financial institutions and civil society organisations to take practical steps to address deforestation. Trase is a not-for-profit partnership founded in 2015 by the Stockholm Environment Institute and Global Canopy.

trase

EXECUTIVE SUMMARY

The Greens/EFA in the European Parliament commissioned Trase to assess the implications of the proposed EU regulation on deforestation-free products.[1] The proposed regulation seeks to minimise the impact of EU imports of certain commodities, such as palm oil, soy, coffee and cocoa, on the conversion and degradation of forests, as defined by the UN Food and Agriculture Organization (FAO).

This paper presents a case study on EU imports of soy and beef from South America. It addresses four objectives to consider the extent that the conversion of natural vegetation driven by EU imports of these commodities may be left outside the scope of the law:

OBJECTIVE 1: What proportion of the natural vegetation in key biomes is covered by the proposed regulation? We use the latest data from Mapbiomas (Collection 6) to assess this as far as possible.

OBJECTIVE 2:

a. What proportions of EU soy and beef imports are sourced from these biomes?
b. Where are the high-risk areas where EU imports are particularly linked to conversion of natural vegetation?

   We use Trase data to answer these questions.

OBJECTIVE 3: Regions where the EU sources soy and beef have seen the recent (2015-2020) conversion of natural vegetation to agriculture, especially in the Cerrado. What percentage of such conversion in the Cerrado was of vegetation that would be covered by the proposed regulation?

OBJECTIVE 4: What is the impact of extending the definition of forests within the proposed FAO framework to include "Other Wooded Land"?

We also provide information on the exposure of trading companies exporting soy and beef to the EU from South America to deforestation risk, and a brief assessment of the prevalence of forest degradation as a precursor to deforestation in regions where the EU sources soy and beef.

This analysis indicates that:

Overall: The definition of "forest" in the proposed regulation excludes large proportions of the Cerrado biome. This biome accounts for the majority of the EU's soy and beef imports as well as the majority of conversion of natural vegetation linked to those imports. It is also particularly susceptible to future agricultural expansion due to a combination of the suitability of the land and absence of legal protections. Extending the definition of forests to include FAO Other Wooded Land would significantly increase the proposed legislation's coverage of the Cerrado.

1 https://ec.europa.eu/environment/publications/proposal-regulation-deforestation-free-products_en

Yet even with such an extension, significant gaps would remain. For instance, the natural grasslands in the Cerrado, Pantanal, Gran Chaco, and the Pampa grasslands of South America, would not be covered. More broadly, FAO forest definitions are based on arbitrary thresholds. Many biomes are made up of complex mosaics of different forms of vegetation, so that the only certain way to avoid the displacement of land conversion to other biomes - with all the resulting biodiversity loss and climate impacts - is for the legislation to aim for zero conversion of any natural ecosystems, including natural grasslands.

Specifically:

As proposed, the regulation would leave 74% of the Cerrado (amounting to 79 million ha) unprotected

- **OBJECTIVE 1**: While the Amazon and Brazilian Atlantic Forest are mostly covered by the current definition of "forest", there are significant gaps in coverage of the Cerrado, the Pantanal and the Pampa. As proposed, the regulation would leave 74% of the Cerrado (amounting to 79 million ha), 76% of the Pantanal (amounting to 9.2 million ha), and 74% of the Pampa (6.6 million ha), as well as a third of the Gran Chaco (amounting to 32 million ha) unprotected, as of 2020.
- **OBJECTIVE 2**: Most EU soy and beef imports come from the Cerrado biome. High-risk hotspots for deforestation associated with soy imports are almost entirely concentrated there.
    - In 2018 a quarter of the EU's soy imports from the Amazon, Atlantic Forest, Gran Chaco and Cerrado were from areas that together account for 70% of the EU's soy-related deforestation risk. These hotspots are concentrated in the Cerrado.
    - In 2017 most (58%) of the EU's beef imports were from the Cerrado, and accounted for 37% of the EU's beef-related deforestation risk. While only 5% of the EU's beef imports from South America were from the Gran Chaco, these imports account for most (55%) of the EU's beef-related deforestation risk.
- **OBJECTIVE 3**: Among regions where the EU sources soy and beef, agricultural expansion - and an accompanying conversion of native vegetation - is concentrated in the Cerrado. Relatively little (under 20%) of such conversion between 2015 and 2020 was of vegetation that would be covered by the proposed regulation. Further conversion is likely as the Cerrado has a significant amount of remaining native vegetation on land that is both suitable for agriculture and that could be legally converted to agriculture.[2]
- **OBJECTIVE 4**: Extending the definition of forests within the FAO Forests definition framework to also include FAO Other Wooded Land would significantly improve the regulation's coverage of native vegetation in the Cerrado biome from 26% to 82%. It would also improve the cover of recent conversion (2015-2020) from 19% to 80%. However, it would still leave major gaps in terms of the conversion of natural grasslands across South America.

2 Brandão Jr., A., Jr.; Rausch, L.; Paz Durán, A.; Costa Jr., C., Jr.; Spawn, S.A.; Gibbs, H.K. Estimating the Potential for Conservation and Farming in the Amazon and Cerrado under Four Policy Scenarios. Sustainability 2020, 12, 1277. https://doi.org/10.3390/su12031277

INTRODUCTION

The EU is the third largest importer of tropical deforestation and associated emissions (Figure 1).[3] Though imported deforestation halved between 2005 and 2018, EU agricultural commodity imports were still associated with a total of 2.7 million hectares of deforestation over this period.[4]

In 2018 international trade was associated with 1.1 million ha of tropical deforestation. Through its imports and consumption, the EU was responsible for some 13% of this, surpassed only by China and India.[5]

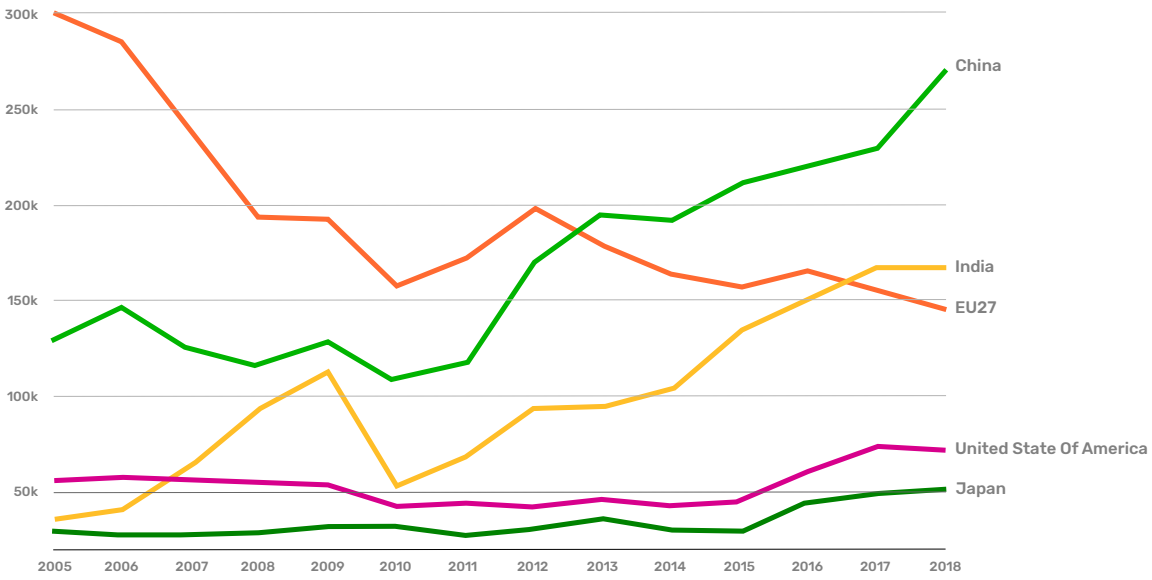

FIGURE 1: **Tropical deforestation (ha) embedded into products imported into the EU27, China, India, Japan and the USA between 2005 and 2018. Based on Pendrill et al (2022).**

However, EU imports of agricultural commodities are not only associated with deforestation, i.e. the conversion of forested areas to agricultural land. Land conversion also affects other ecosystems.

The EU's exposure to land conversion associated with soy and beef imports is highly concentrated in particular ecologically distinct biomes of South America. For imports of these commodities from 2015-2018, the majority of the conversion of natural ecosystems was in Brazil and Paraguay (and in the case of soy, Argentina)[6]. Within those countries, EU imports were most heavily linked to the

3 The EU is the third largest importer of tropical deforestation and associated emissions (Figure 1).1

4 This assessment is for EU 27 (excluding the UK)

5 This is different to the 16% in the WWF EU report due to three reasons 1) The UK is excluded here, if you include the UK then the share of imported deforestation increases from 13% to 15% 2) The EU share drops in 2018 from 2017 as per the trend and 3) The updated Pendrill dataset includes small changes in deforestation risk associated with EU imports across all years.

6 Pendrill, F. et al. 2022. Deforestation risk embodied in production and consumption of agricultural and forestry commodities 2005-2018. 10.5281/zenodo.4250531.

Amazon, Atlantic Forest, Cerrado and Gran Chaco, which accounted for approximately 70% of the EU27 imported volume of soy in 2018 and 90% of beef in 2017. The Cerrado and Gran Chaco are particularly complex mosaics of different ecosystems, encompassing tropical forests, dry forests, savannahs, grasslands, and wetlands.

The recent conversion of forests and other native vegetation for the expansion of soy and pasture is particularly concentrated in these four biomes.[7,8] However, other biomes including the Pampa, Pantanal and Caatinga have also seen significant historical conversion of native vegetation by pasture and soy and/or are emerging frontiers. When considered in terms of how much natural vegetation remains, these represent some of the most threatened natural areas left on the continent.

In terms of how much vegetation remains, the Pampa, Pantanal and Caatinga represent some of the most threatened natural areas left in South America

LIMITATIONS OF EXISTING DATASETS

We used datasets from Trase and MapBiomas to perform an in-depth analysis of the expected impact of the EU-proposed legislation on deforestation-free products.[9]

Existing datasets use definitions of deforestation that do not align strictly with the definitions used in the proposed regulation. This also applies to the datasets used by Trase and Pendrill (2020) that our analysis is based on. The phrases "deforestation risk" used by Trase and "deforestation" used by Pendrill refer to the conversion (risk) of FAO Forest as well as elements of wooded savannah. These are neither covered by FAO Forest nor fully aligned with FAO Other Wooded Land.

8 Song, X.P., Hansen, M.C., Potapov, P., Adusei, B., Pickering, J., Adami, M., Lima, A., Zalles, V., Stehman, S.V., Di Bella, C.M. and Conde, M.C., 2021. Massive soybean expansion in South America since 2000 and implications for conservation. Nature sustainability, 4(9), pp.784-792

9 https://ec.europa.eu/environment/publications/proposal-regulation-deforestation-free-products_en

FIGURE 2: **Biomes covered in this analysis.**

1 **AMAZON**: The Amazon basin includes the most biodiverse tract of tropical rainforest in the world. 60% of the Amazon biome is in Brazil.

2 **CERRADO**: The most species-rich savannah biome in the world, comprising forests, woodlands and open savannah, nearly all in Brazil. Only around 20% of the Cerrado's 2 million km² remain relatively intact.

3 **ATLANTIC FOREST**: A forest biome originally covering 1.3 million km², extending along the entire Atlantic coast of Brazil and inland as far as eastern Paraguay and Misiones province, Argentina. More than 85% of its original extent has been deforested, putting many endemic species under threat of extinction.

4 **GRAN CHACO**: A diverse biome that includes dry forests, savannahs, grasslands and wtlands. It covers 6.5 million km², extending into eastern Bolivia, western Paraguay, northern Argentina and southwetern Brazil. Large areas of the Gran Chaco have been cleared for croplands and grazing lands in the last 30 years. It includes both the Dry Chaco (Chaco Seco) and Humid Chaco (Chaco Humedo).

Amazon biome. Photo: Rogerio Assis

Amazon biome. Photo: Marcio Isensee e Sá / ((o))eco

Atlantic Forest biome.

Cerrado biome. Photo: Victor Moriyama for Rainforest Foundation

Gran Chaco biome. Photo: Andre M. Chang / Alamy Stock Photo

NATURAL VEGETATION COVERED BY THE CURRENT PROPOSAL

OBJECTIVE 1: Assessing the coverage of natural vegetation in key biomes by the definition of forests in the proposed regulation

INSIGHT: ***The current definition of forest means that 74% of the Cerrado (79 million hectares), 74% of the Pampa (6.6 million hectares), 76% of the Pantanal and 89% of the Caatinga are excluded from the proposed regulation.***

The proposed regulation on deforestation-free products defines deforestation as the conversion of forest to agricultural use, whether human induced or not and forest as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach those thresholds in situ, excluding agricultural plantations and land that is predominantly under agricultural or urban land use (Article 2).

This definition is aligned with the FAO definition of forest.[10] It excludes wooded savannahs, agroforestry and grasslands.

Assessing the extent to which the conversion of native vegetation in different biomes is included or excluded is challenging, as few data products align with this definition and a threshold-based definition (e.g. canopy cover, height, area) does not apply straightforwardly to the complex mosaics of different vegetation types that characterise the Cerrado, the Gran Chaco and the Pantanal. However, using MapBiomas data and mapping their land classes onto FAO definitions enables us to assess the coverage of the proposed regulation for biomes in Brazil (MapBiomas 2020 land use map) and the Gran Chaco (MapBiomas 2019 land use map for Argentina and Paraguay). Currently only forests are covered by the proposed regulation (Figure 3).

In biomes relevant to soy and beef production, the Amazon and Brazilian Atlantic Forest are mostly covered by the current definition of forests. Most of the Cerrado (74%, amounting to 79 million hectares) would not be protected. While the majority of the Gran Chaco (67%) is covered, nearly a third is not. Other biomes are also poorly covered - if at all - by the proposed definition, in particular the Pampa, where soy and beef have driven significant conversion of native grasslands over the past decades, and the Pantanal, where cattle pasture has replaced native vegetation.

10 https://www.fao.org/3/I8661EN/i8661en.pdf

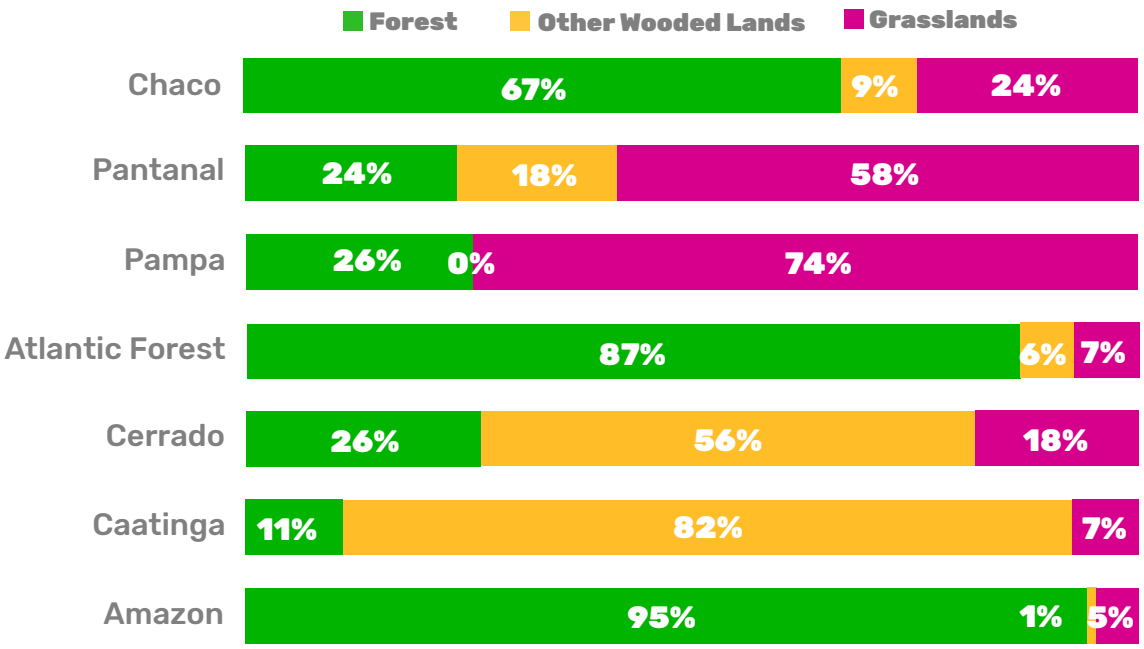

FIGURE 3: **Proportions of natural vegetation types for biomes in South America, according to MapBiomas Chaco and MapBiomas Brazil, based on the FAO definitions of forest and non-forest (wooded and grasslands) vegetation types. FAO natural forests are MapBiomas natural forests and mangroves, other wooded lands are MapBiomas Savannahs, Restingas and Closed/Sparse wooded formations in the Gran Chaco, and grasslands are MapBiomas grasslands for Brazil and wetlands ("Pastizales") for the Gran Chaco.**

HOTSPOTS OF **EU-DRIVEN ECOSYSTEM** CONVERSION

OBJECTIVE 2: Mapping where the EU is sourcing soy and beef in South America, its associated deforestation exposure hotspots, and the exposure of commodity traders

INSIGHT: ***The majority of the EU soy and beef imports are sourced from the Cerrado biome; most of the EU's soy-related deforestation risk, and a significant percentage (37%) of its beef-related deforestation risk, is concentrated there.***

Trase provides data on EU import volumes of soy and beef as well as deforestation risk associated with these imports. Deforestation risk estimates the level of exposure to commodities being produced in newly deforested areas (the 5 previous years in the case of soy and beef) that a trader or importing country has when sourcing from a specific location, depending on their purchased volumes.

Trase data shows that most EU soy and beef imports from Brazil and Paraguay come from the Cerrado biome. Deforestation risks associated with EU soy imports are largely concentrated in the Cerrado (Table 1) while significant deforestation risks linked to beef are also found there (Table 2).[11] Moreover, although only a small fraction of the EU's beef imports come from the Paraguayan Chaco, this is associated with significant exposure to deforestation there.

TABLE 1**: The volumes and associated deforestation risk associated with direct soy imports to the EU in 2018 by focal biomes from Argentina, Brazil and Paraguay (Trase)**

Biome	Volume (t)	Proportion of volume (%)	Soy deforestation risk (ha)	Proportion of deforestation risk (%)
Cerrado	4,640,792	24.3	25,941	65.4
Atlantic Forest	4,066,616	21.3	6,205	15.6
Amazon	2,045,674	10.7	4,617	11.6
Dry Chaco	524,801	2.8	2,308	5.8
Humid Chaco	124,331	0.7	602	1.5
Other	7,673,148	40.2	0[12]	0.0

11 These numbers represent the total of five years of deforestation associated with the export year instead of the annual numbers available on trase.earth.

12 Trase data on deforestation risk data is limited by data availability to the Amazon, Cerrado, Chaco, Atlantic Forest and Pantanal.

TABLE 2: **THE VOLUMES AND ASSOCIATED DEFORESTATION RISK ASSOCIATED WITH DIRECT BEEF IMPORTS TO THE EU IN 2017 BY FOCAL BIOME FROM BRAZIL AND PARAGUAY (TRASE)**

Biome	Volume (t)	Proportion of volume (%)	Beef deforestation risk (ha)	Proportion of deforestation risk (%)
Dry Chaco	2,376	1.9	17,314	42.1
Cerrado	55,545	43.3	12,583	30.6
Amazon	13,318	10.4	2,585	6.3
Humid Chaco	2,718	2.1	1,199	2.9
Atlantic Forest	22,589	17.6	240	0.6
Other	31,834	24.8	7,194	17.5

INSIGHT: ***A quarter of EU's soy imports are from high-risk areas that account for the majority (70%) of the EU's deforestation risk; these hotspots are concentrated in the Cerrado.***

Our analysis shows that EU imports of soy from South America[13] were associated with 39,673 hectares of deforestation risk in 2018.

Focusing on the Amazon, Atlantic Forest, Gran Chaco and Cerrado, we classify sub-national jurisdictions (e.g. municipalities in Brazil or departments in Paraguay) by risk categories: high-risk for jurisdictions that together account for 70% of the deforestation risk; medium-risk, for jurisdictions that together account for 29% of the deforestation risk; residual-risk for the jurisdictions that together account for 1% of the deforestation risk; and low-risk for jurisdictions with zero deforestation risk.

Just over a quarter (27%) of the total volume of soy from the Amazon, Atlantic Forest, Gran Chaco and Cerrado was imported from high-risk areas that together accounted for 70% of the total deforestation risk (27,771 ha) in these biomes. A further 36% of soy was sourced from medium-risk areas (accounting for 11,505 ha of the deforestation risk). Thus, 63% of the soy imported by the EU in 2018 from these biomes was sourced from jurisdictions where deforestation for soy has occurred.

The high-risk hotspots are in the Matopiba region of the Brazilian Cerrado (Maranhão, Tocantins, Piauí, and Bahia states) and in the state of Mato Grosso in Brazil (encompassing Cerrado and Amazon biomes), as well as in the the Atlantic Forest in the east region of Paraguay (Figure 4a).

13 19.1 million tonnes of soybean equivalents directly imported from Argentina, Brazil and Paraguay

FIG. 4A: **Deforestation risk hotspots for EU soy imports**

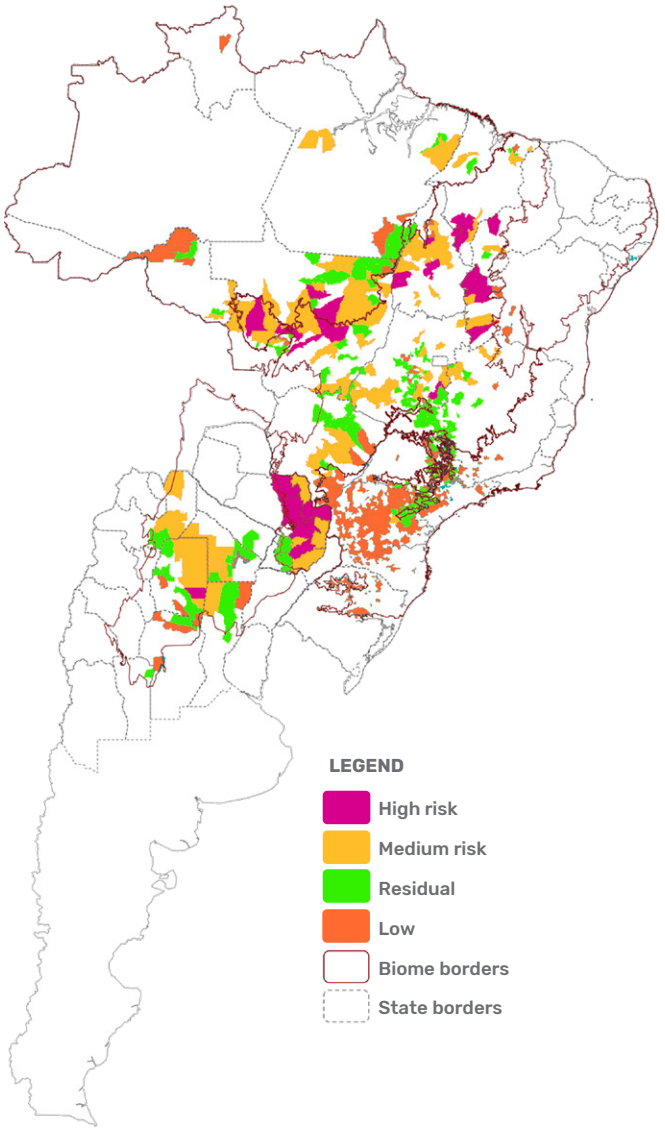

FIG. 4B: **Deforestation risk by biome for EU soy imports**

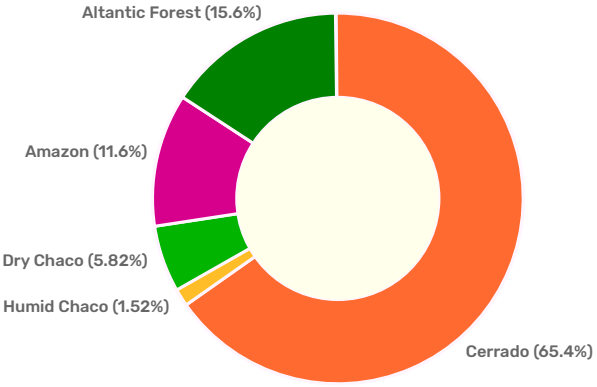

FIG. 4C: **Volumes exported to the EU by risk classes**

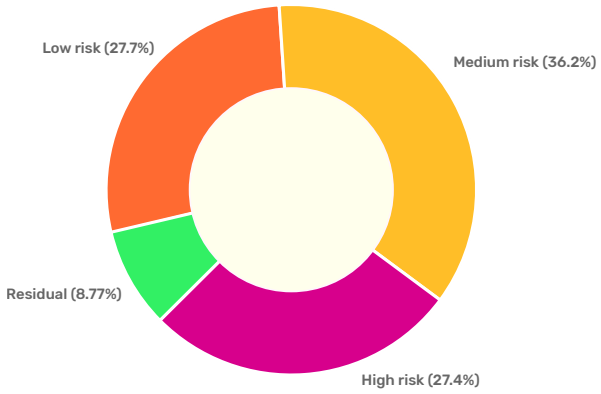

FIGURE 4: **Hotspots of deforestation risk for EU soy imports (2018) based on Trase data. Figure 4a: map highlighting the risk classes of high, medium, residual and low deforestation risk for soy imports from the Amazon, Atlantic Forest, Cerrado and Gran Chaco; Figure 4b: proportion of deforestation risk (2018) from each biome; Figure 4c: proportion of soy volume sourced by the EU (2018) in each risk category from these biomes.**

INSIGHT: ***A fifth of EU's beef imports are from high-risk areas that account for the majority (70%) of the EU's deforestation risk; these hotspots are concentrated in the Gran Chaco.***

Our analysis shows that EU imports of beef from South America were associated with 41,115 hectares of deforestation risk in 2017.[14]

Focusing in on the Amazon, Atlantic Forest, Gran Chaco, and Cerrado that account for 33,921

14 128,300 tonnes of cattle equivalent (meat products are converted to cattle equivalents) imported from Brazil and Paraguay in 2017 - the most recent year where data is available.

hectares of deforestation risk - almost a fifth (18%) of the total volume from these biomes was imported from high-risk areas that accounted for 70% of the total deforestation risk (23,744 ha). A further 53% was sourced from medium-risk areas (accounting for 9,837 ha of the deforestation risk). Thus, 70% of the beef imported by the EU in 2017 from the Amazon, Atlantic Forest, Gran Chaco and Cerrado was from sub-national jurisdictions where deforestation for cattle pasture has occurred.

The high-risk hotspots are in three Paraguayan provinces within the Gran Chaco biome. In Brazil, deforestation risk is centred in the Cerrado biome; though with a more scattered distribution compared to soy deforestation risk (Figure 5a).

FIG. 5A: **Deforestation risk hotspots for EU beef imports**

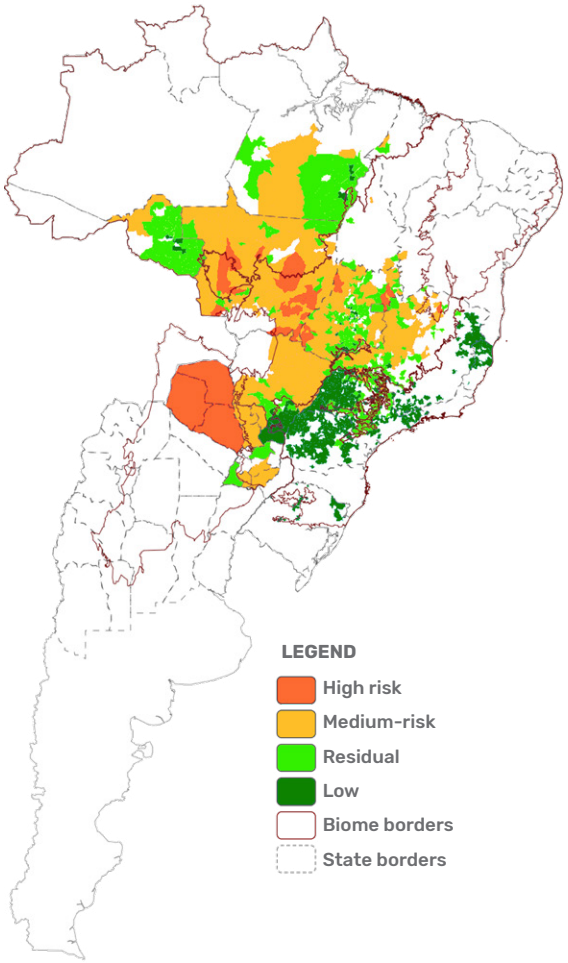

FIG. 5B: **Deforestation risk by biome for beef imports**

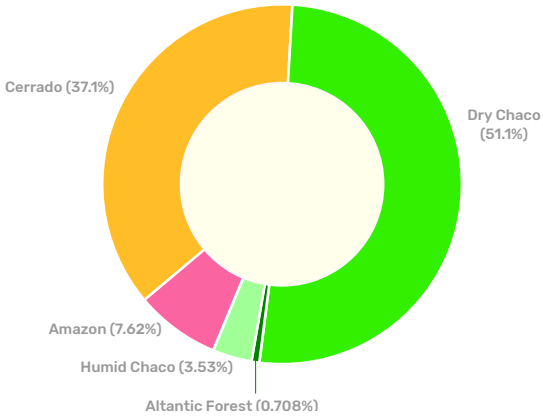

FIG. 5C: **Volumes exported to the EU by risk classes**

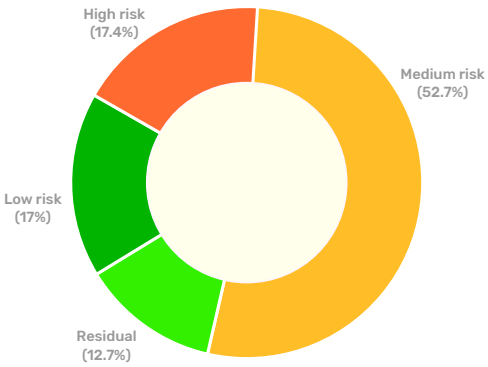

FIGURE 5: **Hotspots of deforestation risk for EU beef imports (2017) based on Trase data. Figure 5a: map highlighting the risk classes of high, medium, residual and low deforestation risk for soy imports from the Amazon, Atlantic Forest, Cerrado and Gran Chaco; Figure 5b: proportion of deforestation risk (2017) from each biome; Figure 5c: proportion of beef volume sourced by the EU (2018) in each risk category from these biomes.**

INSIGHT: ***Deforestation risk associated with EU beef and soy imports is concentrated in a few trading companies***

Many companies are involved in the export of soy and beef from South America to the EU. However, volumes and associated deforestation risk are concentrated in just a handful (Figure 6).

In 2017, 28 trading companies exported beef from Brazil and Paraguay to the EU-27. More than 80% of the volume was handled by three companies: JBS, Marfrig and Minerva. These companies are also linked with the majority of associated deforestation risk (65%), especially in the Cerrado, with Minerva having the largest exposure in the Gran Chaco.

Deforestation risk associated with Brazil and Paraguay's soy exports to the EU are highly concentrated in Bunge (40%) and Cargill (15%) - two companies significantly exposed in the Cerrado

In 2018, 169 trading companies exported soy from Brazil and Paraguay to the EU-27. More than 50% of the volume was handled by 5 companies: Bunge, Cargill, Amaggi, Louis Dreyfus and Vicentin.[15] These companies are also linked with the majority of associated deforestation risk (67%) which is highly concentrated in Bunge (40%) and Cargill (15%), who are both significantly exposed in the Cerrado.

TABLE 3: **Top 5 beef exporters from the Amazon, Cerrado and Gran Chaco in 2017.**

Amazon			Cerrado			Chaco (Dry and Humid)		
Company	**Volume (t)**	**Deforestation risk (ha)**	**Company**	**Volume (t)**	**Deforestation risk (ha)**	**Company**	**Volume (t)**	**Deforestation risk (ha)**
MARFRIG GLOBAL FOODS	5,565	1329	JBS	21,041	4,261	MINERVA	1,427	7,522
JBS	5,366	935	MARFRIG GLOBAL FOODS	16,637	3,858	COOPERATIVA FERNHEIM	1,421	6,570
MINERVA	1,885	197	MINERVA	8,805	2,602	TRIPERA PARAGUAYA (TRIPAR)	668	62
SUDAMBEEF INDUSTRIA COMERCIO IMPORTACAO E EXPORTACAO	400	88	MATABOI ALIMENTOS	6,068	1,485	FRIGORIFICO CONCEPCION	548	424
XINGUARA INDUSTRIA E COMERCIO	35	5	FRIGOESTRELA SA	865	84	FRIGORIFICO GUARANI	511	3,518
Total	13,318	2,585	Total	55,545	12,583	Total	5,095	18,513

15 Vicentin defaulted in 2019 with ongoing lawsuits from creditors and bankruptcy process

TABLE 4: **Top 5 soy exporters from the Amazon, Atlantic Forest and Cerrado in 2018**

Amazon			Atlantic Forest			Cerrado		
Company	**Volume (t)**	**Deforestation risk (ha)**	**Company**	**Volume (t)**	**Deforestation risk (ha)**	**Company**	**Volume (t)**	**Deforestation risk (ha)**
AMAGGI	860,806	1,462	BUNGE	609,424	876	BUNGE	1,412,503	12,938
CARGILL	537,915	879	COAMO	534,217	0	CARGILL	717,731	3,770
BUNGE	358,612	1,647	CARGILL	479,007	1071	AMAGGI	632,829	953
ADM	87,655	212	LOUIS DREYFUS	476,933	1460	ADM	504,738	764
COFCO	72,896	170	BIANCHINI	429,107	0	CARAMURU ADMINISTRACAO E PARTICIPACOES LTDA	501,382	680
Total	2,045,674	4,617	**Total**	4,066,615	6,205	**Total**	4,640,792	25,941

These numbers reflect exports for a specific year and the share of deforestation risk among companies may change for different years, although there is evidence that supply chains are sticky (i.e. have stability and longevity) as companies have invested in assets, logistics and have long-term relationships with producers.

FIG. 6A: **Proportion of deforestation risks for soy exporters to the EU**

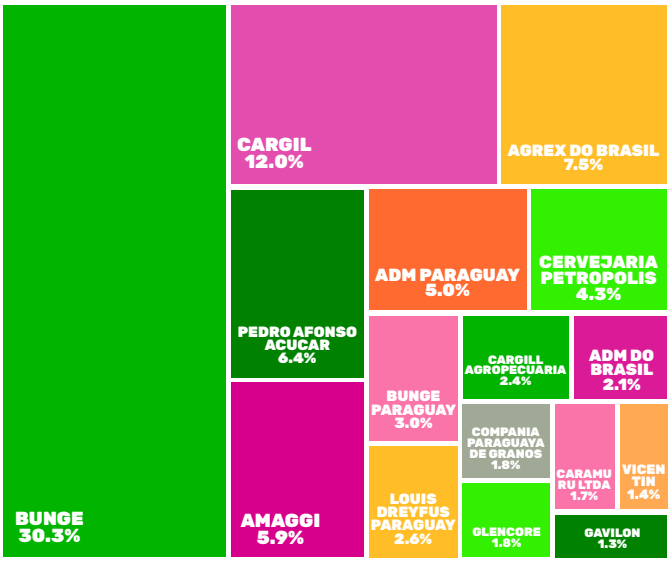

FIG. 6B: **Proportion of deforestation risks for beef exporters to the EU**

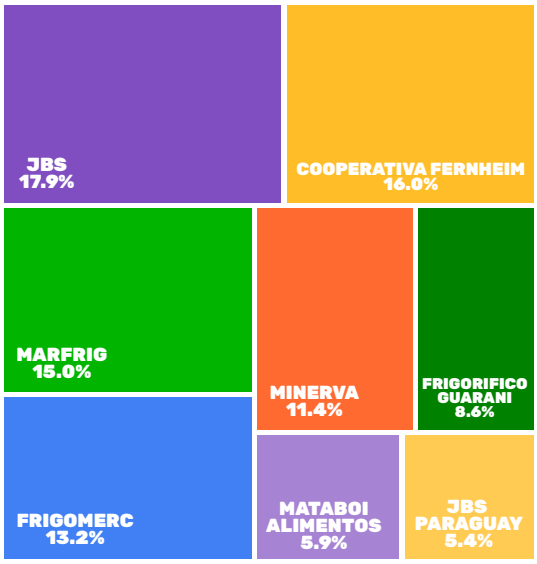

FIGURE 6: **Share of total soy and beef deforestation risk for exporters to the EU that represent 90% of the total deforestation risk associated with soy and beef exports. (a): Soy exporters for Argentina, Brazil, and Paraguay (Amazon, Cerrado, Gran Chaco, and Atlantic Forest biomes) for 2018 exports; (b): Beef exporters for Brazil and Paraguay (Amazon, Cerrado, Gran Chaco, and Atlantic Forest biomes) for 2017 exports.**

RECENT TRENDS IN **ECOSYSTEM** CONVERSION FOR AGRICULTURE IN AREAS WHERE THE EU SOURCES **BEEF** AND **SOY**

OBJECTIVE 3: **Assessing the extent to which the recent conversion of natural vegetation to agricultural land in the EU's beef and soy sourcing areas would be covered by the proposed regulation**

INSIGHT: ***In regions in the Cerrado where the EU sources soy and beef, 80% of recent conversion for agricultural expansion was of vegetation that would not be covered by the proposed regulation.***

Looking at the EU's recent sourcing areas for beef and soy as a whole,[16] 62% of the total recent conversion for agricultural land in this area was in forests which would be covered by the proposed regulation (Figure 7b). This took place mainly as a result of expansion for pasture in the Amazon and Gran Chaco to provide beef (to both the EU and other markets, including the domestic market).

The conversion of grassland and savannah ecosystems is particularly high in the Cerrado

In the Amazon, almost all the conversion would be included within the proposed regulation (Figure 7c), with the exception of a transition area between the Amazon and Cerrado biomes[17] - which is itself ecologically unique. However, 82% of recent conversion for agriculture (2015-2020) in the Cerrado affected vegetation which would not be covered. The conversion of savannah and grassland ecosystems is particularly high in the Cerrado - most (62%) recent conversion (2015-2020) of non-FAO forest vegetation in EU sourcing areas occurred there (Figure 7a). Significant conversion of non-FAO forest vegetation can also be observed within the Paraguayan Atlantic Forest and Argentinian Chaco, in areas of native grassland known as "pastizales naturales".

16 See methodology section

17 The high risk areas of conversion of non-forest vegetation in biomes predominantly covered by forest (Amazon and Atlantic forest) is likely because areas of non-forest vegetation can be found at the boundaries between different biomes.

FIG. 7A: **Proportion of conversion of non-forest type by biome**

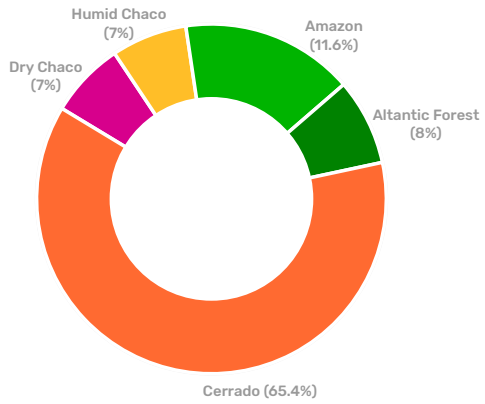

FIG. 7B: **Proportion of conversion by vegetation type**

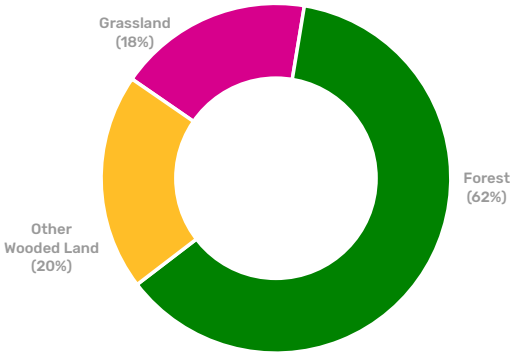

FIG. 7C: **Proportion of conversion of vegetation types within biomes for the EU supply area**

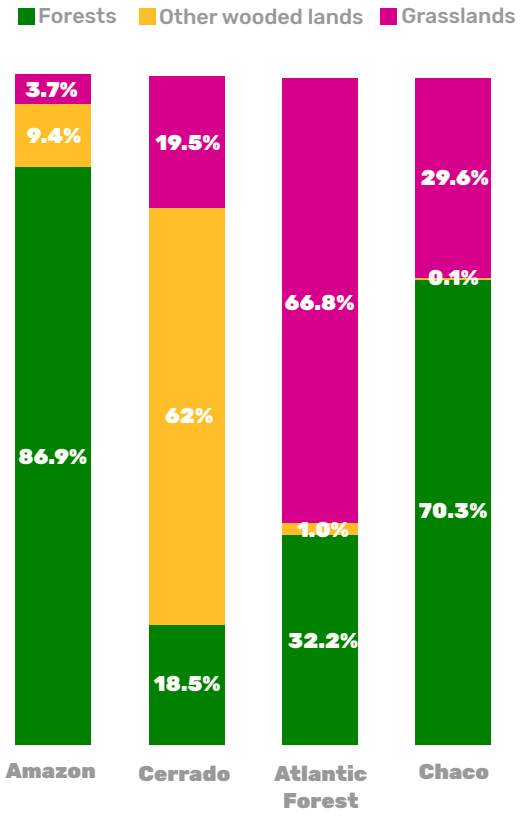

FIGURE 7: **Conversion according to MapBiomas 2015-2020 for Brazil, Argentina and Paraguay (the Amazon, Cerrado, Gran Chaco and Atlantic Forest biomes), considering non-forest vegetation types that include the MapBiomas categories of savannahs [aligned with FAO other wooded lands] and grasslands. Fig 7a.: Proportion of conversion for non-forest vegetation (other wooded lands and grasslands) types in the biomes; Fig 7b.: Proportional conversion of vegetation types for the entire studied area (Amazon, Cerrado, Gran Chaco and Atlantic Forest); Fig 7c.: Proportion of converted area in the EU supply area by categories of vegetation (forests, other wooded lands [savannahs] and grasslands) for the biomes.**

INCLUSION OF FAO "OTHER WOODED LAND"

OBJECTIVE 4: Assess the impact of extending the definition of forests within the proposed FAO framework to include "Other Wooded Land".

INSIGHT: ***Extending the definition of forests to include Other Wooded Land would significantly improve coverage of recent conversion of native vegetation in the Cerrado biome (where the EU has most existing exposure, and further conversion is a significant risk). However, this still leaves significant gaps across biomes due to the omission of grasslands.***

As set out, the proposed regulation uses the FAO definition of forests. The FAO also provides a definition for "Other Wooded Land",[18] which includes land with less canopy coverage, or the same canopy coverage but by shrubs and bushes and trees that do not reach 5 metres. Anything that does not fall within "Forest" or "Other Wooded Land" is classed as "Other Land".

Using the MapBiomas data, we are able to map wooded savannahs to the FAO Other Wooded Land class. This tells us how far changing the proposed regulation to include "Other Wooded Land" would improve coverage of recent conversion driven by EU imports.

In the Cerrado, the majority of the recent conversion of non-forest vegetation for agricultural land was of savannahs (Other Wooded Land - Figure 7c). Extending the definition of forests in the proposed regulation to also include FAO Other Wooded Land would significantly improve the regulation's coverage of native vegetation in the Cerrado biome from 26% (Figure 3) to 82% (and it would improve cover of recent conversion from 18% to 80%). This would therefore significantly extend coverage of the EU's deforestation impact, as the Cerrado represents the majority of the EU's supply of soy and beef, as well as the majority of its current deforestation risk; it is also where future expansion is most likely.

However, this would not cover grasslands, which represent a significant amount of recent conversion in EU sourcing areas (Figure 5) and of the remaining vegetation in these biomes (Figure 3). Applying a definition that relies on arbitrary thresholds to classify forests is challenging in biomes such as the Gran Chaco, Cerrado and Pantanal, which take the form of mosaics of different kinds of natural vegetation.

18 https://www.fao.org/3/I8661EN/i8661en.pdf

FOREST DEGRADATION

The EU proposal covers not only the conversion of forests but also, to some extent, the degradation of forests - this is currently defined as "harvesting operations that are not sustainable and cause a reduction or loss of the biological or economic productivity and complexity of forest ecosystems, resulting in the long-term reduction of the overall supply of benefits from forest, which includes wood, biodiversity and other products or services"; and as only applying to wood in the context of the deforestation-free definition: "that the wood has been harvested from the forest without inducing forest degradation after December 31, 2020".

Monitoring systems for forest degradation are scarce. This is a consequence of numerous challenges in monitoring degradation, among them the necessity of long time series to indicate if the observed change in the structure of the vegetation is due to degradation (e.g. due to logging, fire, fragmentation, weather events) or recovery to secondary regrowth. Remote sensing techniques can help to operationalise the detection of degradation, firstly by establishing a reference of the structure of the non-degraded vegetation, and secondly in the identification of the types of disturbances, which helps in understanding the causes of these degradation events.

A main challenge is to measure the extent to which degradation can be associated with agricultural production, or even the production of specific agricultural commodities. In contrast to deforestation events that normally precede the implementation of a more stable type of land use, for degradation there is no clear direct link to agricultural activities, particularly for commodities like beef, which only occasionally start being produced in degraded areas, and soy, which is most likely produced after complete conversion.

To assess the extent of forest degradation in the EU sourcing regions for soy and beef (as identified by Trase), we use a new dataset from Vancutsem et al. (2021).[19] This dataset is based on a global assessment in tropical moist forests, carried out with high resolution remote sensing analysis. Forest degradation, in this analysis, is limited to the intermediate process before deforestation.

We used this dataset to identify areas that were degraded forests between 2017-2019, and that were subsequently detected as deforested in December 2020. The occurrence of forest degradation followed by deforestation does not necessarily mean subsequent use of converted land to produce soy or beef. Therefore, the dataset is not suitable for assessing deforestation directly caused by commodity production, and the values presented below should not be directly associated with commodity production.

19 C. Vancutsem, F. Achard, J.-F. Pekel, G. Vieilledent, S. Carboni, D. Simonetti, J. Gallego, L.E.O.C. Aragão, R. Nasi. Long-term (1990-2019) monitoring of forest cover changes in the humid tropics. Science Advances 2021

FIG. 8A: **Hotspots of degrated forests before deforestation**

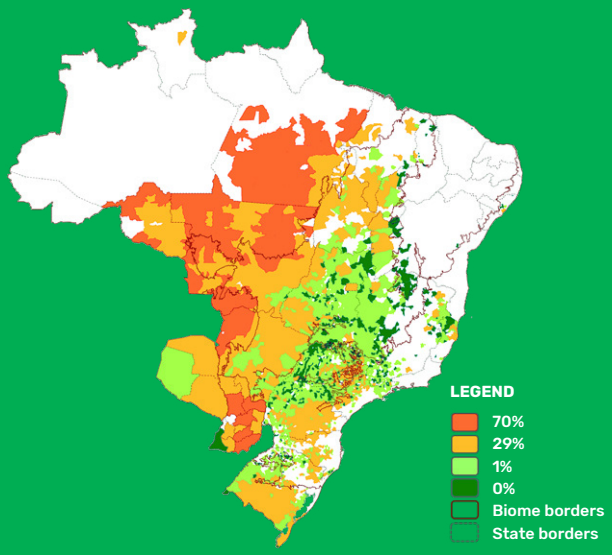

FIG. 8B: **Proportion of deforestation of degraded forests by biome**

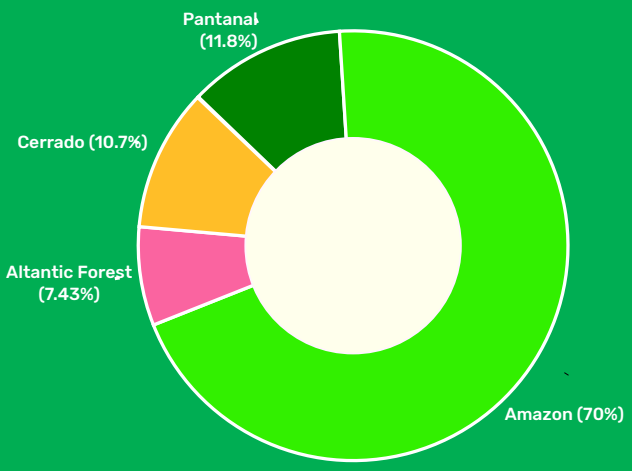

FIGURE 8: **Hotspots of degraded forests that were subsequently deforested according to Vancutsem et al. (2021). Within the EU supply region for soy and beef identified by Trase, we used the Vancutsem dataset to further identify areas that were i) first classified as degraded Tropical Moist Forest in all of 2017, 2018 and 2019 and ii) then deforested in 2020. Fig. 8a: shows the regions in all biomes in Brazil and Paraguay where the subsequent deforestation of degraded forests took place. The map represents the areas accounting for 70%, 29% and 1% of all such degradation; Fig. 8b: shows the distribution of where the subsequent deforestation of degraded forests across the different biomes. Biomes where less than 1% of such deforestation took place are not included.**

Based on our analysis, 70% of the areas of subsequent deforestation on degraded forest in Brazil and Paraguay in EU sourcing areas (Figure 8) is concentrated in the Amazon biome alone; the next most significant biome is the central Pantanal and the Paraguayan Atlantic Forest.

METHODOLOGY

This paper performs a three-step analysis to consider the extent that the conversion of natural vegetation driven by EU imports of soy and beef from South America is left outside the scope of the law due to the existing definition of "forest":

1. First, what proportion of the natural vegetation in key biomes is covered by the proposed regulation and/or the FAO definition of "Other Wooded Land"? We use the latest data from Mapbiomas (Collection 6) to assess this as far as possible.
2. Next, what proportions of EU soy and beef imports are sourced from these biomes? Where are the high-risk areas where EU imports are particularly linked to conversion of natural vegetation? We use Trase data to answer these questions.
3. Finally, we combine these two datasets to estimate what percentage of recent conversion of natural vegetation would be covered by the proposed regulation, and the impact of extending the definition to include other land classes such as the FAO definition of "Other Wooded Land".

DATASETS

This brief uses three complementary datasets as they have different granularity and coverage.

1. **Pendrill**[20] provides a global view of trade and embedded tropical deforestation for imports of commodities into the EU and is available from 2005-2018. Deforestation is defined as the complete removal of tree cover exceeding 5 m height and 25% canopy cover (in year 2000) using Hansen et al 2013.[21] Results from Pendrill rely on the assumption that the net expansion of land for agricultural production is proportional to its role in deforestation within the country.
2. **Trase** provides a more sub-national and spatially-explicit assessment of the countries and biomes with greatest deforestation for commodity production (Brazil, Argentina, Paraguay). Trase data is available for South American soy exports in 2018 and beef exports in 2017 excluding Argentina. The sub-national results from Trase rely on remote sensing information and per pixel analyses of land use for commodity production and deforestation in each of the biomes. Deforestation data sets vary for each commodity and geography and are available here. The results obtained from Pendrill and Trase therefore provide different resolutions following distinct methodologies and, consequently, differences are expected when comparing deforestation.
3. **Mapbiomas** The deforestation data provided by Trase is not segmented by type of vegetation, which means that it is not possible to use Trase to measure the impact of conversion within different native vegetation formations, especially non-forest formations. Therefore, we use annual conversion data provided by MapBiomas Brasil (MapBiomas,

20 Pendrill, F. et al. 2022. Deforestation risk embodied in production and consumption of agricultural and forestry commodities 2005-2018. 10.5281/zenodo.4250531.

21 Hansen, M.C., et al.. 2013. High-resolution global maps of 21st-century forest cover change. science, 342(6160), pp.850-853

2021)[22] and MapBiomas Chaco (MapBiomas, 2020)[23] to assess the conversion of FAO forests and other classes e.g. savannahs and grasslands. For Brazil, we used the 2015-2020 conversion. However, for the Gran Chaco, there is no data available for 2020, so we calculated the conversion for 2014-2019 in order to match the five-year window used in Brazil.

GLOSSARY

a. Deforestation: refers to the conversion of tropical and subtropical forest due to the recent expansion of commodity production - this does not align with the definition of forests and deforestation in the proposed regulation as the definition of deforestation by the data products used (Trase and Pendrill) are not aligned with the FAO definition of forests - deforestation therefore includes the conversion of wooded biomes.
b. Conversion: We use the term conversion to refer to all conversion of native vegetation (forest formations and non-forest types) in a given region due to the expansion of agriculture (pastures and annual croplands) in tropical and subtropical zones;
c. Biome: Biomes are large geographic regions, characterised by similar functional aspects and climatic factors, but some of them can exhibit significant heterogeneity, such as the Cerrado, which contains grasslands, dense forest and open savannahs.
d. Forest formations: Forest, flooded and closed woodlands corresponding to the FAO definition of Forests. In MapBiomas these categories are defined as Natural Forest (Brazil), Mangroves (Brazil), and wooded forest formations (Chaco Paraguay and Argentina);
e. Other wooded lands: Savannahs and open woodlands corresponding to the FAO definitions of other wooded lands. In MapBiomas these categories are defined as savannahs (Brazil), wooded restingas (Brazil), and open/sparse woodland formations (Gran Chaco);
f. Grasslands: Non-forest natural formations corresponding in their vast majority to the FAO definition of natural grasslands, as well as wetlands. In MapBiomas these categories are defined wetlands (Brazil), grasslands (Brazil), salt flats (Brazil), rock outcrops (Brazil), grasslands (Gran Chaco for subcategories of open, sparse, closed and flooded grasslands).

OBJECTIVE 1: Methods for assessing the coverage of the proposed regulation across different biomes

We used data from MapBiomas Chaco and MapBiomas Brazil, mapping MaBiomas formations to the FAO definitions of forest and non-forest (wooded and grasslands) vegetation types.

FAO classes	MapBiomas classes
Forests	natural forests and mangroves
Other Wooded Land	Savannahs, Restingas and Closed/Sparse wooded formations in the Chaco
Grasslands	Grasslands for Brazil and wetlands (“Pastizales”) for the Chaco

A full description of forest and non-forest formations, as well as matching with FAO definitions can be found in the MapBiomas Handbook (MapBiomas, 2022).[24] For FAO native vegetation for-

22 https://mapbiomas.org/en
23 https://Gran Chaco.mapbiomas.org/en
24 https://mapbiomas-br-site.s3.amazonaws.com/Metodologia/ATBD_Collection_6_v1_January_2022.pdf

mations definitions, MapBiomas referred to the FAO document "Manual for integrated field data collection" (2012).[25]

OBJECTIVE 2: Methods for defining risk hotspots

Hotspots of deforestation are places where high levels of recent deforestation coincide with known EU sourcing areas. We map the hotspots of deforestation by selecting the regions, where together, most deforestation has occurred based on the most recent datasets available in Trase for these biomes and countries (2017 for beef and 2018 for soy). Hotspots are shown as the most detailed administrative scale available in Trase, which means municipalities for Brazil and departments for Argentina and Paraguay.

Identifying risk hotspots:

a) Risk threshold classification: to classify risk by thresholds we group jurisdictions according to the amount of deforestation associated with soy or beef exports to the EU relative to the total deforestation in a given region (in this case Argentina, Brazil and Paraguay). We use four risk thresholds: i. High risk, for jurisdictions that together account for 70% of the deforestation; ii. Medium risk, for jurisdictions that together account for 29% of the deforestation; iii. Residual conversion risk for jurisdictions that together account for less than 1% of the total deforestation, and iv. Low risk for areas where deforestation was not observed for the considered period;

b) EU sourcing area: To understand detailed sourcing patterns we look at the last three years of imports to identify typical EU sourcing areas for the most recent period for which we have data. In this brief, the EU sourcing area represents the jurisdictions that account for 90% of the EU's soy or beef imports from the Amazon, Cerrado, Atlantic Forest, and Gran Chaco biomes (Brazil, Argentina and Paraguay) over the last three years of available data.

OBJECTIVE 3: Assessing deforestation and conversion risk that will be included and excluded from the EU proposed regulation

We consider conversion from native vegetation to cultivated pasturelands and annual crops (which may include other crops beside soy, especially corn and cotton). Conversion is mapped for two vegetation formations:

a. Forest formations: 2015-2020 converted area for all forest formations (FAO definition) within EU sourcing area of soy and beef;

b. Non-forest formations: 2015-2020 converted area for all non-forest formations (FAO definition) within EU sourcing area of soy and beef. This includes the categories of other wooded lands and grasslands.

It is important to highlight that we filtered out jurisdictions with less than 2,000 ha of total conversion 2015-2020 (average annual conversion of 400 ha) in order to avoid including regions with very low conversion as detected by MapBiomas "transitions" product.

25 https://www.fao.org/publications/card/en/c/21ebcd8f-1e30-59ce-a594-cda044e50e9f/

We used two metrics to access the native vegetation conversion

a. Detailed hot-spot analysis: represent the area of conversion for non-forest formations due to the expansion of agriculture at jurisdictional scale. In this case, we employed a method similar to the one used to create the risk thresholds (areas accounting for 70%, 29% and 1% of the total conversion);
b. Proportional conversion for biomes: represent the relative amount of conversion from native vegetation to pasture or croplands for the three categories of native vegetation according to FAO definition. We consider the 2015-2020 conversion for the EU sourcing area for forests, other wooded lands and grasslands.

LIMITATIONS OF THE STUDY

Data coverage and resolution

a. The Trase and Pendrill assessments of deforestation risk is not aligned with the FAO definitions of forests and non-forest vegetation types. We therefore use MapBiomas data to fill this gap in assessing the coverage of the EU proposed regulation in each of the main biomes (Objective 1).
b. However, MapBiomas data is not integrated with trade data. This means that in assessing the deforestation risk associated with EU imports we rely on Pendrill (2022) for a global overview and Trase for a more granular assessment based on sub-national supply chain maps. The latest Trase data only covers beef exports from Brazil and Paraguay with the latest common data from 2017 (and deforestation data limited to the Gran Chaco and not the Paraguayan Atlantic Forest) and soy exports from Argentina, Brazil and Paraguay (with soy deforestation data limited to the Gran Chaco in Argentina). Pendrill and Trase use different methodologies and assumptions and therefore their results may differ. .
c. The analysis uses Trase data to assess is focused on biomes, largely using Trase data which is generated for individual countries. The quality and types of available data, which Trase relies on, vary between countries. Consequently, there are also differences in the methods Trase uses to construct the commodity and country-specific supply chain views, and the results are not always strictly comparable. As biomes do not correspond to country boundaries, the analysis in this paper is based on indicative comparisons of risk to illustrate the exposure of those biomes and ecosystems to commodity-driven conversion.
d. MapBiomas estimates the conversions based on yearly transitions from Land Use/Land Cover (LULC) maps produced annually by the classification of satellite image mosaic. The maps may not represent the real area of annual crops or the real area used for beef production. The classification algorithm used by MapBiomas classifies areas according to the observation of visual patterns and associates that with specific land uses. For pasture for example, they classify areas of occurrence of cultivated pasturelands, which does not necessarily mean the area is being used for cattle grazing. Therefore, the absolute conversion presented by MapBiomas may not represent the total conversion related to commodity production. We recommend users to access the full MapBiomas's methods description and be aware of its limitations.

RE-EXPORTS AND DERIVED COMMODITIES

e. In this briefing we are not covering embedded deforestation, which can also be defined as the deforestation caused by the production of a commodity that could be further used for the production of other commodities not directly related to deforestation. For example, livestock feed produced with domestic soy from deforested areas is further re-exported in the form of animal products.
f. Trase data identifies only the first point of entry into the EU market and does not cover re-exports; this consideration is expected to have only a limited effect on the results as the presentation and interpretation of the data was mostly done for the EU27 as an economic bloc.

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