Small-scale farmers critical to curbing deforestation linked to forest-risk commodities

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Abstract

Deforestation remains a critical challenge despite increasing global attention. Voluntary and market-based initiatives have proven insufficient to reverse this trend. In response, the European Union introduced the Deforestation Regulation (EUDR), requiring information for several forest-risk commodities (e.g., palm oil, soy, rubber, cocoa, and coffee) to enforce deforestation-free standards across these supply chains. With agriculture driving an estimated 86% of global deforestation, a major obstacle to reversing this trend is the limited understanding of farmers operating in forested landscapes. Most existing agri-food system models evaluate deforestation risk at the national scale, overlooking differences between landholding types, limiting targeted policy insights. Here, we evaluate how different farm sizes contribute to the production of EUDR-listed crops within forested landscapes, using spatial datasets on crop distribution, forest cover, and farm size. We find that small-scale farms (<2 ha) are responsible for a large share of forest-linked production: 91% for rubber, 81% for palm oil, 53% for coffee, and 60% for cocoa. These crops are produced mainly in countries where traceability and compliance pose major challenges. In contrast, soybean production in forested areas is dominated by large-scale farms. We identify regions where smallholders may face high risks of exclusion from EU supply chains due to EUDR compliance across Indonesia, Vietnam, Thailand, and Côte d'Ivoire. These findings highlight the need for targeted support to smallholders in these countries, including investment in data collection, certification systems, and land tenure security. Our findings also reveal a misalignment between the EUDR's country benchmarking classification and actual deforestation exposure, indicating that the current country classification approach of the EUDR needs revision.

Introduction

Deforestation has received growing attention from both the private and public sector owing to the critical state of forests and the role they play in sustaining biodiversity, storing carbon, and regulating the climate and freshwater cycles(1–3). Deforestation continues to be driven by low regulatory enforcement(4), extractivist policies (such as government subsidies that encourage resource extraction) (5), and growing global food demand(6, 7). Forest loss also threatens the food security(8) of the 1.6 billion people globally who live within 5 km of forests(9).

A key challenge in addressing deforestation lies in understanding the diverse activities of farmers operating within forest landscapes. Differences in farm sizes, assets, and management practices shape land-use decisions and can lead to different pathways of forest loss and forest degradation within the same landscape(10–14). In highly heterogeneous socioecological systems such as the Brazilian Amazon, different actor groups including smallholders, medium-sized farmers, large landholders, and remote actors (e.g., export and processing multi-nationals) contribute differently to both deforestation and forest degradation over time(15). This diversity complicates attribution and actor-sensitive policy design because broad categories used in regulation and monitoring can group distinct farmer types and land-use processes that require different interventions(10, 15, 16). Addressing deforestation therefore requires identifying and engaging different farmer types and using tailored, context-specific policy interventions. Recent global assessments of the deforestation footprint of agriculture have substantially improved estimates of the scale and key drivers of forest loss associated with crop and livestock production(17). However, their reliance on aggregated production categories hinders attribution of deforestation to specific farm types. This limits the ability to design targeted and effective interventions, as such disaggregated insights are critical for informing the development and implementation of deforestation policies that are both effective and equitable(18, 19).

Voluntary and private initiatives, such as Zero Deforestation Commitments, certification schemes like Rainforest Alliance Certification, and corporate frameworks such as SBTi FLAG, have so far proven insufficient in reversing deforestation trends(20), as they often suffer from inconsistent implementation and limited scope(21). Deforestation rates have remained relatively stable or only partially mitigated(20). In this context, the EU Deforestation Regulation (EUDR) has emerged as a key regulation to curb deforestation linked to global supply chains. The EUDR applies to the sale and import of seven key commodities associated with deforestation: cocoa, coffee, palm oil, natural rubber, soybean (hereafter as “EUDR-linked crops”), cattle (beef), and timber, as well as a range of derived products such as chocolate and paper. Products may only enter the EU market if they are deforestation-free, comply with relevant legislation in the country of production, and are accompanied by a due diligence statement (Regulation (EU) 2023/1115, Art. 3)(22).

The EU plays a significant role as both a major driver of deforestation and a key regulatory actor. Between 2019 and 2021, direct EU imports of agricultural products resulted in an average of 190,500 ha of deforestation annually, equivalent to 15% of global trade-related deforestation, mostly in the Global South and concentrated in cocoa, palm oil, coffee, soy, and cattle products(23). Overall, EU demand drives 19% of tropical deforestation linked to imports of EUDR-listed agricultural commodities(24). Given its role, the impact of the EUDR relies on the expectation that the EU’s market power and trade restrictions will be sufficient to drive compliance among traders, operators, and producers(25), since most EUDR-regulated commodities are produced outside the EU.

Traceability is a necessary condition for identifying and managing environmental risks in EU supply chains. However, tracing and certifying commodities is challenging due to the complex structure of global supply chains and differences between producers(26). These challenges have raised concerns about potential unintended consequences, particularly for small-scale farmers. The EUDR does not directly oblige farmers to engage in due-diligence, its impact is indirect, channeled through operators sourcing from farms who must obtain the required data. While smallholders who do not directly sell products on the EU market are not subject to legal obligations under the regulation, they are vertically integrated into supply chains operated by multi-national companies who may request geolocation data of the farms and production details. This could lead to reduced market access, and exclusion from EU supply chains if smallholders fail to provide these details (27–31). For smallholders operating with weak tenure systems, limited access to mapping tools, and minimal digital infrastructure, geolocation-based compliance may be technically and economically unfeasible(29). Moreover, the reliance on remotesensing-based forest definitions may misclassify complex agroforestry systems, especially in tropical regions, further compounding the problem(32).

Existing models and analyses of deforestation embedded in trade(33–39) provide valuable insights into deforestation linked to agricultural and forestry commodity flows by country, year, and commodity. These approaches are designed to quantify trade-linked deforestation at aggregated levels and are not intended to support the operational implementation of the EUDR. These estimates do not account for differences between producer types, such as small-, medium-, and large-scale farms. As such, current work cannot be used to estimate the differentiated roles of actors involved in land-use change. While the challenges facing smallholders have been qualitatively discussed in recent studies(27–30), these have yet to be quantified. As a result, we still lack a clear understanding of how many smallholders contribute to deforestation and may face exclusion from EU markets under this new regulation.

We examine how deforestation associated with EUDR-listed crops vary across different farm sizes and highlight regions where smallholders may be at risk of exclusion under the regulation. We combine three main datasets: the crop production layers of the Spatial Production Allocation Model (MAPSPAM) SPAM 2020 v2.0 4.1 Global data(40); the Global Map of Forest Cover 2020, Version 2(41), developed by the Joint Research Centre (JRC) of the European Commission for EUDR specific assessments; and the global farm size distribution raster dataset(42). By integrating spatial data on forest cover (defined using a 50% threshold of forest cover per area, please see methods for further details), crop production, and farm size distribution, our analysis supports evidence-based policy adaptation and contributes to broader efforts to incorporate actor-level data into food-system and land-use analysis. We (i) calculate the share of the production of the EUDR-listed crops (soybean, palm oil, rubber, coffee, and cocoa) originating from farms of different sizes, (ii) assess the share of the production of EUDR-listed crops in forested landscapes across different farm sizes, and (iii) identify regions where smallholders may face potential exclusion from the EU market under the EUDR.

Results

Production estimates show that around 44,400, 83,800, 1,400, 2,700, and 3,800 kilotons of soybean, palm oil, coffee, cocoa, and rubber, respectively, may originate from forested landscapes. The production of EUDR-listed crops shows distinct patterns across farm size categories, with small-scale farms (<2 ha) contributing significantly to both total production and production in forested landscapes (hereafter 'forest-linked production'), as Figure 1 illustrates.

Production estimates show that small-scale farms account for the highest share of total output for rubber (84%), palm oil (74%), coffee (42%), and cocoa (67%) (see Figure 1). In contrast, small-scale farms contribute only 6% of total soybean production where large-scale farms (200–5000 ha) dominate (at over 70%). A similar pattern is seen with forest-linked production (see Figure 1). Small-scale farms produce 91% of total forest-linked rubber, 81% of forest-linked palm oil, 53% of forest-linked coffee, and 60% of forest-linked cocoa. Again, small-scale farms comprise 9% of the forest-linked soybean production with medium-scale (2-200 ha) farms accounting for 35%, and large-scale farms contributing 56%.

The spatial distribution of EUDR-listed crop production within forested areas across 11 farm size categories shows specific concentrations (see Figure 2a) in three key regions: Central and South America, West Africa, and Southeast Asia (see Figures 2b-d). The distribution of farm sizes varies across these regions with West African and Southeast Asian forest-linked production predominantly associated with small-scale farms, while Central and South American production is comprised of a greater share of medium- and large-scale farms. Data on the total and forest-linked production of the EUDR-listed crops across 11 farm size categories and per country breakdowns can be found in the Supplementary Data.

Soybean production is dominated by large-scale farms (200-5,000 ha), with most production concentrated in Brazil, the United States, and Argentina. China and India also contribute substantially, but have more diversified farm structures including a higher prevalence of smallholders. Thailand, Indonesia, and Vietnam are the largest producers of rubber, followed by Côte d'Ivoire, China, and India, where producers are predominantly small-scale. The Philippines, although not among the largest global rubber producers, exhibits relatively high forest overlap, indicating locally concentrated rubber cultivation in forest areas, mainly from small-scale farms. The top two producers of palm oil, Indonesia and Malaysia, also see some of the highest forest-linked production. In both countries, palm oil production relies on small-scale farms, and the majority of the forest-linked production comes from small-scale farms. Nigeria and Papua New Guinea are prominent in forest-linked palm oil production compared to their total output. Both total and forest-linked coffee production is led by Brazil, Vietnam, Indonesia, and Colombia. In Vietnam and Indonesia, coffee production is mainly small-scale driven, and both rank high in forest-linked production whereas in Brazil most of the production share comes from large-scale farms. Brazil's forest-linked share is relatively low, even though it leads in total volume. In the case of cocoa, Côte d'Ivoire, Ghana, and Indonesia are the top producers globally, with production concentrated in small-scale farms. While Indonesia is the third in total cocoa production, it ranks as the first for forest-linked production. Similarly, Peru ranks much higher in the forest-linked production in comparison to the total production, but mainly produces cocoa mostly in mid- to large-scale farms. Conversely, Ghana, producing almost solely in small-scale farms, ranks as the second in the total cocoa production while ranking much lower when it comes to forest-linked production.

Our findings reveal five main groups of countries (see Table 1) that invite different considerations for targeted support to address EUDR compliance challenges, based on the differences between countries' rankings in overall production and forest-linked production.

- **Group 1. Low overall production, but high forest-linked production.**

Agroforestry systems may be particularly prone to misclassification as deforestation, making robust ground-truthing and verification systems essential.

- **Group 2. High overall production, but low forest-linked production.**
  Targeted technical assistance, especially to enable farmers to collect geolocation data, could substantially reduce exclusion risk.
- **Group 3. High forest-linked production across multiple crops.**
  Calls for comprehensive, nationwide coordinated support systems for farmers to avoid fragmented, crop-by-crop approaches.
- **Group 4. High forest-linked production concentrated in medium- and large-scale farms.**
- **Group 5. High forest-linked production concentrated in small-scale farms.**

Groups 4 and 5 can inform prioritization of supportive EU funds by distinguishing whether forest-linked production is concentrated among larger operators or smallholders. For example, forest-linked coffee production is similar in volume in Colombia and Indonesia, yet it is largely produced by large-scale farms in Colombia and by small-scale farms in Indonesia. A comparable contrast exists for cocoa in Ecuador versus Nigeria, where similar volumes mask very different smallholder exposure.

Discussion

This study addresses a critical knowledge gap in tackling deforestation by providing spatially explicit insights into the contributions of small-, medium-, and large-scale farms to the production of EUDR-listed commodities and assessing where the smallholders may be most vulnerable to exclusion due to their potential forest-linked production. We find that the production of EUDR-listed commodities is predominantly associated with small-scale farms, particularly in low- to middle-income countries, and that a substantial share of forest-linked production of these crops can be attributed to areas where smallholders are located.

The EUDR benchmarking system classifies countries as low-, standard-, or high-risk. The assessment criteria were not based solely on deforestation but also included a broader set of environmental, legal, and governance indicators. As outlined in Article 29 of the EUDR, the Commission evaluates countries using indicators such as legal and enforcement capacity, protections for human rights and Indigenous Peoples, data transparency, and the presence of international sanctions. Current high-risk designations mainly cover countries under EU or UN sanctions, namely Belarus, Myanmar, North Korea, and Russia(43), none of which we find to be major producers of EUDR-listed crops. By contrast, countries with high production in forest areas, such as Thailand, Vietnam, and Ghana, are classified as low-risk, while other ostensibly high-risk countries highlighted by this analysis (e.g., Indonesia, Malaysia, Brazil, Colombia, and Côte d'Ivoire) are classified as standard-risk(43). Regardless of category, operators must provide geolocation data for all commodity production plots(44), and low-risk status only simplifies due diligence without waiving traceability requirements (Regulation (EU) 2023/1115, Art. 13)(22), meaning current benchmarking is a poor proxy for deforestation exposure and may need revision to better reflect actual deforestation risk.

The geographical distribution of total and forest-linked production of EUDR commodities highlights the potential exclusion of small-scale farmers in Africa and Asia from EU supply chains. The findings also invite regionally tailored technical support mechanisms such as assistance with geolocation data and additional support is required to document and verify agroforestry systems. For example, in Group 1 countries such as Nigeria, which ranks higher in forest-linked production than in overall output, make robust ground-truthing and verification essential to prevent misclassification. Group 2 countries with high production but relatively low forest exposure, such as Ghana, Côte d'Ivoire, and Thailand, where most of the production comes from small-scale farms, represent the best opportunity for targeted technical interventions. In these cases, the primary barrier to EUDR compliance is likely to be traceability rather than deforestation. A main assumption is that smallholders will struggle with geolocation and traceability requirements of the EUDR (27–30) and so these countries represent apposite cases for targeted EUDR-compliance support. This is also consistent with the evidence that cocoa landscapes in Ghana and Côte d'Ivoire were largely established through historical forest conversion(45), so remaining forest cover is relatively limited and much ongoing production can occur on already converted land under the EUDR's 2020 cut-off framework. In that context, the main challenge is not preventing new deforestation, but proving plot-level compliance, and limited transparency in parts of the Ivorian cocoa supply chain shows why traceability is often the key bottleneck(46). One practical response is to work through farmer cooperatives, which can support small-scale farms' EUDR compliance by raising awareness, sharing traceability systems, and lowering the cost and complexity of geolocation reporting and due diligence(47). For example, cooperative membership has been shown to improve traceability and maintain EU market access(48). However, other models operate in different countries. For example, Ghana illustrates a system where traceability is driven primarily by COCOBOD (the Ghana Cocoa Board, the country's cocoa sector regulator and marketing authority) and trading companies rather than cooperatives(49). Côte d'Ivoire similarly illustrates a shift toward more centralized, national-level approaches to traceability alongside company systems(50). Organizations such as the EU Sustainable Cocoa Initiative, Roundtable on Sustainable Palm Oil, and Solidaridad provide training, digital tools, and collective systems to enhance sustainability, traceability, and market access for smallholders(51). Digital tracing tools and mobile applications(52) can further help farmers record polygon- or point-based geolocation data via GPS-enabled smartphones.

Group 3 and 5 countries that combine high smallholder production volumes with high forest exposure, such as Indonesia and Vietnam, face more severe risks. Even if smallholders in these regions can have the technical support for the traceability requirements, they may remain vulnerable to exclusion if their plots fall within areas classified as forest and cannot be clearly shown to have avoided post-2020 deforestation, including where agroforestry systems are misclassified. In case they produce in areas deforested after 2020, complementary strategies such as reducing agricultural expansion in these regions, or supporting reforestation-based transitions may be needed to prevent economic marginalization of these smallholders.

When environmental regulations are designed and enforced by consumer countries in industrialised countries, they may impose burdens on producer countries in low-income countries without sufficient consideration of local contexts or capacities. These findings highlight this critical tension that is otherwise overlooked by most agri-food system models, which ignore the size of producers on the ground. Support for producers operating in small-scale farms is not only critical for their wellbeing but also essential for safeguarding the resilience and stability of these commodity markets, rural development, maintaining agrobiodiversity, and promoting cultural heritage(53). Smallholders are therefore likely to be negatively affected by the EUDR due to the technical and infrastructural challenges associated with traceability, particularly the provision of geolocation data, and because most of the production in areas classified as forest under EUDR definitions comes from small-scale farms, as shown by our findings. In both cases, whether due to traceability limitations or spatial exposure, smallholders face a structurally high risk of exclusion under the current implementation framework of the EUDR. Recent amendments in late 2025 introduce a lighter regime for “micro and small primary operators” in low-risk countries, allowing a one-time simplified declaration and postal addresses instead of precise geolocation. This benefits small producers who directly place their own products on the EU market. However, simplified obligations for small operators do not automatically benefit smallholders as most small-scale farmers in exporting countries are instead linked to EU markets via large traders and processors, so full due diligence and traceability obligations may still be enforced on them indirectly.

Mapping the farmers implicated in forest risks is limited by coarse farm size and forest datasets, reliance on extrapolated data to address missing values, absence of farm-level trade flow information, and the potential misclassification of complex land systems such as agroforestry. Future work can develop region- and crop-specific analyses that leverage high-resolution spatial datasets to improve the accuracy of EUDR-relevant assessments. Such analyses would enable more precise deforestation risk assessments, particularly if the current limitation of coarse global farm size maps is addressed through the availability of more detailed data. Additionally, we do not attempt to link specific farm sizes to current EU trade flows, as farm-level trade data are not publicly available, and sourcing profiles can vary substantially over time; instead, we provide a global overview of crop production by farm size and forest overlap as a screening tool to identify potential sourcing risks under the EUDR rather than a precise snapshot of current trade impacts, for which the resolution and attributes of MAPSPAM are sufficient. Linking farm size categories to current EU trade flows could be a valuable future research direction, provided that farm-level trade data becomes publicly accessible. Future modeling efforts should also consider how supply chains adjust when deforestation-linked products are diverted from EU markets to less-regulated regions like the U.S. and China.

Our findings have implications for policy design and implementation. First, in order to be effective, the EUDR’s traceability architecture would need to be adapted to account for the realities of smallholder production. Second, cooperative models, digital tools tailored to low-connectivity environments, and transitional support mechanisms would greatly benefit traceability. Third, the EUDR’s benchmarking approach would need to be revised to more accurately capture deforestation risks linked to commodity production. Our analysis can help inform the EUDR’s 2028 review, which is a formal evaluation by the European Commission of how the regulation is working in practice and its impacts (including on farmers and smallholders), and contribute to a more equitable implementation that secures both environmental integrity and the livelihoods of the world's smallest and most vulnerable producers.

Materials and Methods

We apply a spatial analysis approach to examine how EUDR-linked crop production and forested landscapes overlap and vary across farm size categories and countries. Three main data sets were used: the production layers of the Spatial Production Allocation Model (MAPSPAM) SPAM 2020 v2.0 4.1 Global data(40); the Global Map of Forest Cover 2020, Version 2, developed by the Joint Research Centre (JRC) of the European Commission for EUDR specific assessments(41); and the global farm size distribution raster dataset(42).

We use the Spatial Production Allocation Model (MAPSPAM) SPAM 2020 v2.0 4.1 Global dataset at 10 km resolution, with arabica and robusta coffee production layers combined into a single coffee layer for agricultural land-use maps for the EUDR-listed crops. While alternative crop-specific land-use products, such as CROPGRIDS(54), also include EUDR-listed crops, they delineate only the physical extent of crop areas and do not provide production volume data or higher spatial resolution than MAPSPAM, making MAPSPAM the most suitable crop-specific dataset currently for directly assessing production of the EUDR-listed crops. As the only suitable global farm-size dataset(42) is available at 10 km resolution, all spatial layers in the analysis were harmonized to a common 10 km grid, necessitating aggregation of other data at finer resolution (e.g., forest coverage data).

The data we used in our analysis are limited to EUDR-listed crops, reflecting both agricultural focus and data availability. While the EUDR also applies to timber and cattle, we excluded these from our analysis due to data limitations. We omitted timber due to (i) the lack of global production data, (ii) lack of differentiation between wood plantations from natural forests within the JRC forest map could lead to overestimation, and (iii) existing deforestation-free compliance mechanisms such as the EU's Timber Regulation, designed to combat illegal logging. Cattle were excluded because the most updated available FAO data represent density rather than headcount, limiting their suitability for spatial analysis. Estimating cattle headcount by integrating the FAO cattle density map(55) with the grazing area map(56) was considered but not pursued. This approach would have introduced additional methodological complexity and uncertainty, particularly because accounting for soy feed requirements for cattle destined for non-EU markets would complicate the attribution of farmer-level impacts. Furthermore, assessing forest overlap is inherently more challenging for livestock systems than for crop production, as livestock are mobile and therefore not spatially fixed within clearly delineated production areas.

To estimate EUDR commodity production across farm size classes, we used the global farm size distribution raster dataset(42) that provides a spatially explicit global map of farm sizes, at 10 km resolution, derived through the integration of national-level farm size statistics and subnational field size estimates. The farm size raster classifies each pixel into one of the 11 farm size classes: 0–1 ha, 1–2 ha, 2–5 ha, 5–10 ha, 10–20 ha, 20–50 ha, 50–100 ha, 100–200 ha, 200–500 ha, 500–1,000 ha, and 1,000–

5,000 ha. Although other datasets provide insights into agricultural production by farm size(57, 58), our study uses(42) due to greater number of farm size categories, its public availability, and suitability for spatial assessments.

For some production regions in which do not have corresponding values in the farm size map, we use an extrapolation procedure. We calculate various zonal statistics using the Database of Global Administrative Areas (GADM)(59) boundaries and the original farm size map, with the “majority” statistic used to assign the most common farm size class within each administrative unit. This approach assumes that, in the absence of data for a specific region, the most common values found in the jurisdiction apply. The uncertainty level per farm size category per country has been measured by calculating the percentage of extrapolated area over the total area for each farm size category per country as seen in the heatmaps in the Supplementary Materials. However, high level of extrapolation is not widespread across all crops or most countries, and the highest extrapolation in the small-scale farms occurred mostly in lower production countries.

We use The Global Map of Forest Cover 2020, Version 2(41) to identify areas classified as forest in the 2020 reference year. Plantations of all relevant non-wood commodities, including cattle, cocoa, coffee, oil palm, rubber, and soya, were also excluded from the forest definition(60). Since this map was developed by the Joint Research Centre of the European Commission for application with the EUDR applicability, its structure aligns with the regulation’s operational definition of forest, making it a practical and interpretable reference layer for identifying deforestation after the 2020 cut-off date.

To calculate the co-occurrence between forest cover and agricultural production by farm size category, we aligned the resolution, spatial extent, and coordinate reference systems of the three key datasets: MAPSPAM, the farm size dataset, and the Global Forest Cover map. Pixel values were assigned based on the share of forest cover within each area. Using Google Earth Engine, the 10 m JRC Global Forest Cover 2020 dataset was aggregated to 10 km using a summation reducer, yielding pixels that represent the percentage of area classified as forest. A binary forest map was derived from the forest-cover percentage map by classifying pixels with > 50% forest cover as forest, thereby identifying predominantly forested areas. Sensitivity analyses (see Supplementary Materials) using 30% and 80% thresholds indicated that this assumption does not materially affect the conclusion that small-scale farmers dominate production of EUDR crops in forested areas.

The analyses addressed two main objectives: (i) quantifying crop production by farm-size category and country, and (ii) estimating crop production originating within forested areas. Both objectives were implemented using the Zonal Statistics tool in ArcGIS Pro, with all raster processing performed at a consistent spatial resolution, pixel size, coordinate system, projection, and spatial extent. Full methodological details, including raster calculations, statistical procedures, and GeoTIFF files of all generated map layers, are provided in the Supplementary Materials.

Declarations

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Table

Table 1: The list of country and crop pairings, grouped by ranking patterns in overall production and forest-linked production

Group Descriptions	Country	Crop
Group 1: Low rank in total production but higher rank in forest-linked production	Mexico	Coffee
	Nigeria	Palm oil, Cocoa
	Papua New Guinea	Palm oil, Cocoa
	Honduras	Coffee
	Philippines	Rubber
Group 2: High rank in total production but lower rank in forest-linked production	Ghana	Cocoa
	Thailand	Palm oil
	Cote d'Ivoire	Rubber, Cocoa
Group 3: High rank in forest-linked production across multiple crops	Indonesia	Palm oil, Cocoa, Rubber
	Vietnam	Rubber, Coffee
Group 4: High rank in forest-linked production overlapping with medium- and large- scale farms	Brazil	Soybean, Coffee
	Colombia	Coffee
	Ecuador	Cocoa
	Peru	Cocoa
Group 5: High rank in forest-linked production overlapping with small-scale farms	Indonesia	Palm oil, Cocoa, Rubber, Coffee
	Vietnam	Coffee, Rubber
	Thailand	Rubber
	Malaysia	Palm oil
	Nigeria	Cocoa

Figures

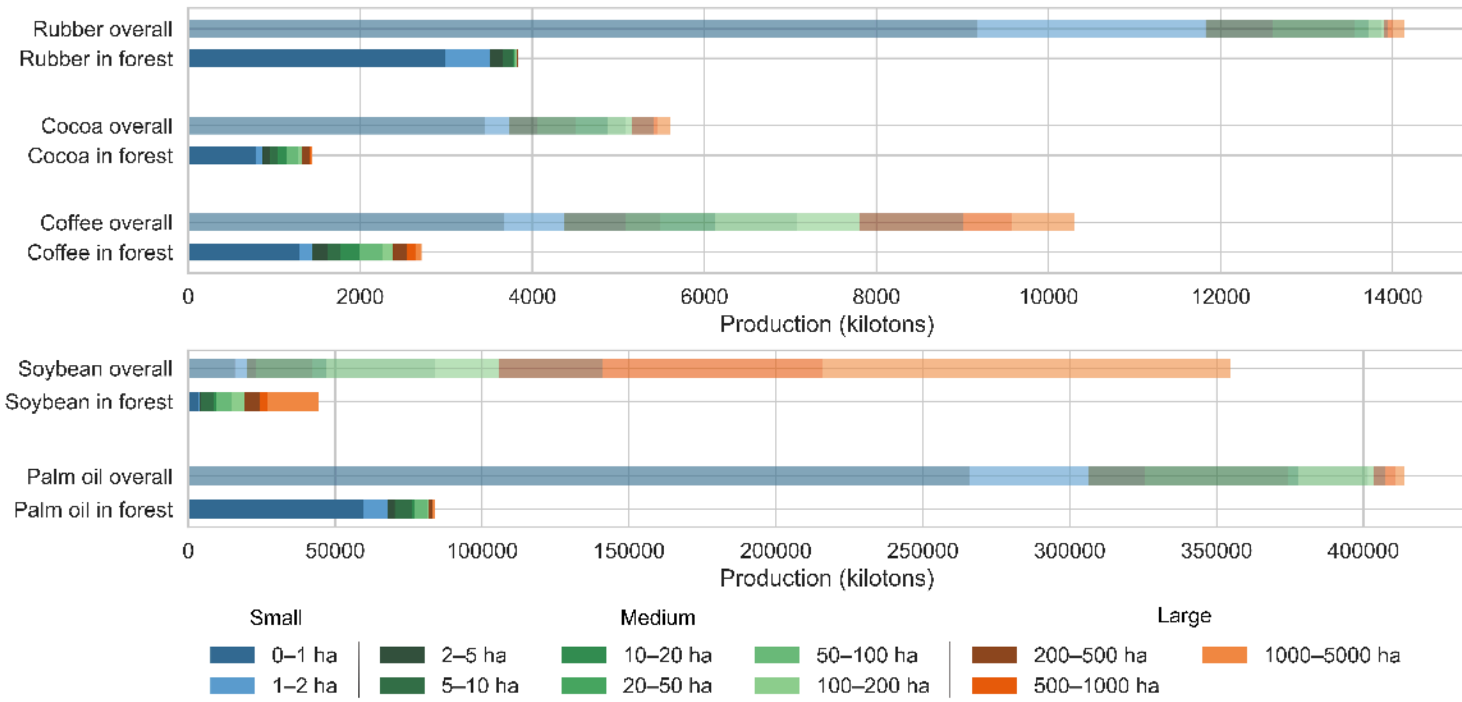

Figure 1

The annual forest-linked production of the EUDR-linked crops (shown opaque) and overall production (shown transparent) across 11 farm size categories. The total tonnes for each crop and farm size category, globally and per country, can be found in Supplementary Data.

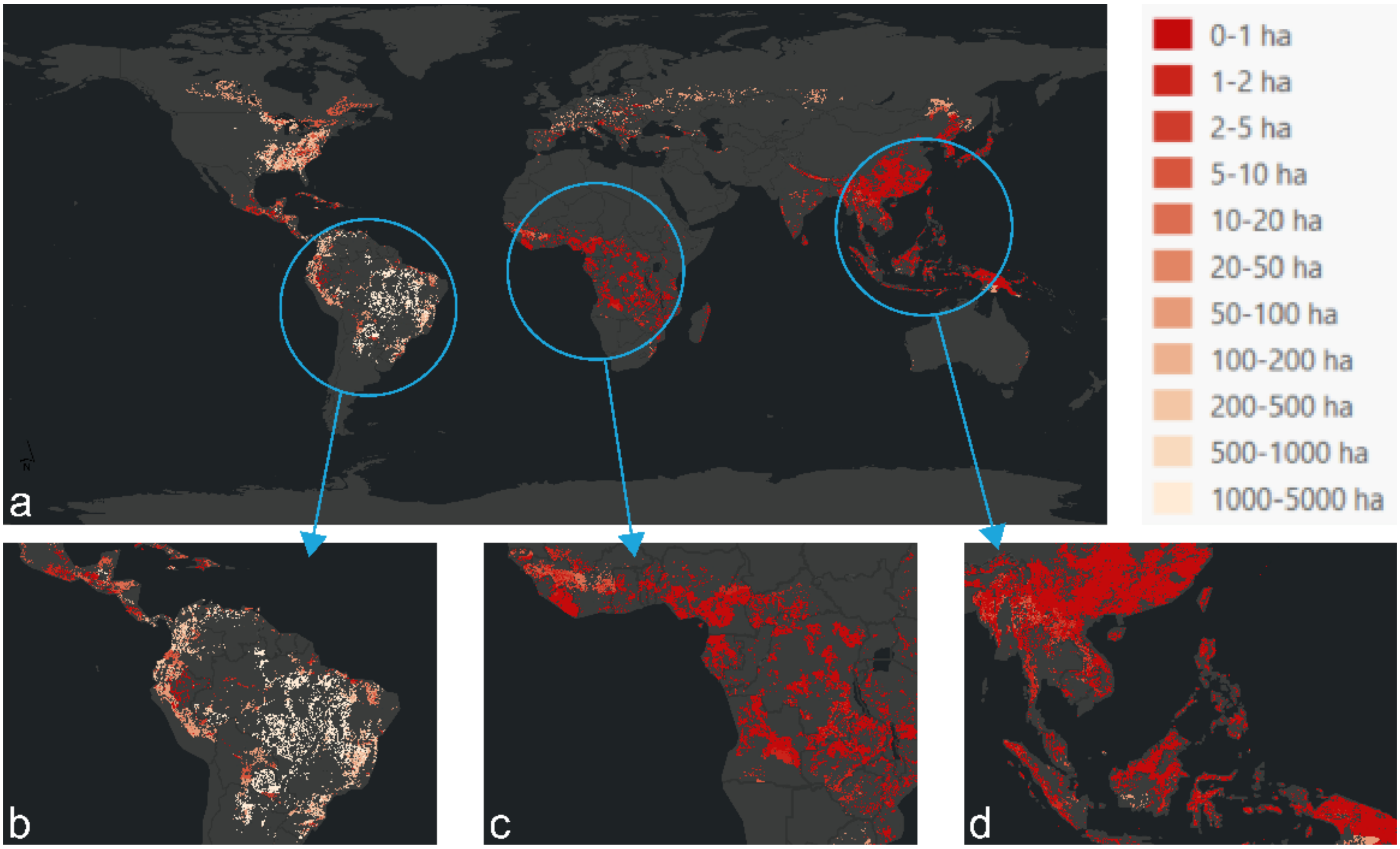

Figure 2

Geographical distribution of forest-linked production of EUDR-listed crops (rubber, palm oil, coffee, cocoa, soybean combined), distinguished by 11 farm size categories (darker to lighter representing smaller to larger farm sizes, respectively). Shows a) Global distribution, b) Central and South America, c) West Africa, and d) Southeast Asia. (please find all further maps per crop in Supplementary Material)

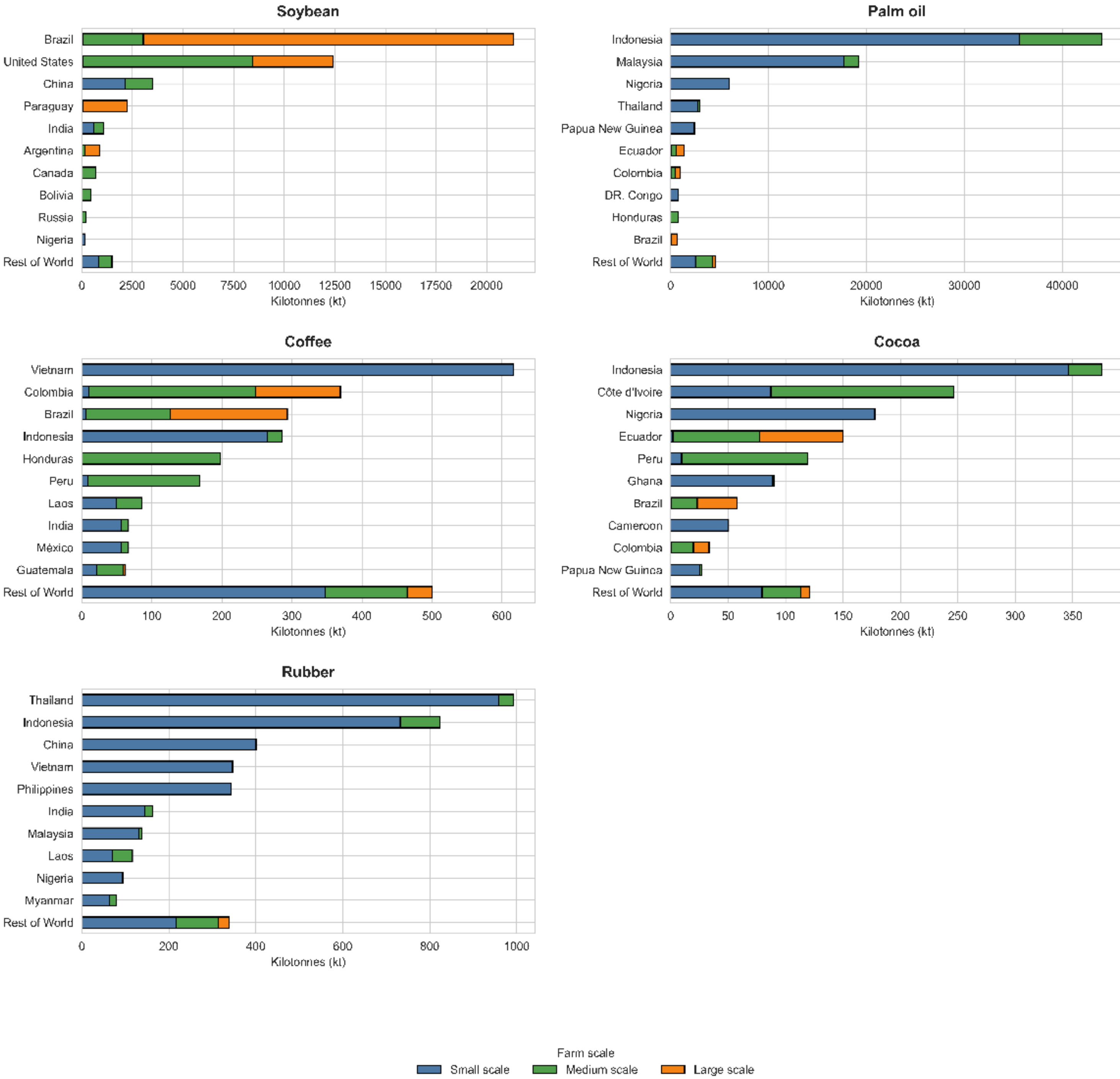

Figure 3

Top 10 countries with EUDR-relevant crop production in forested landscapes by farm size (small-scale (<2 ha), medium-scale (2-200 ha), large-scale (200-5000 ha)) category. The forest-linked production of the EUDR-listed crops across farm size categories with the per country breakdown can be found in Supplementary Material.

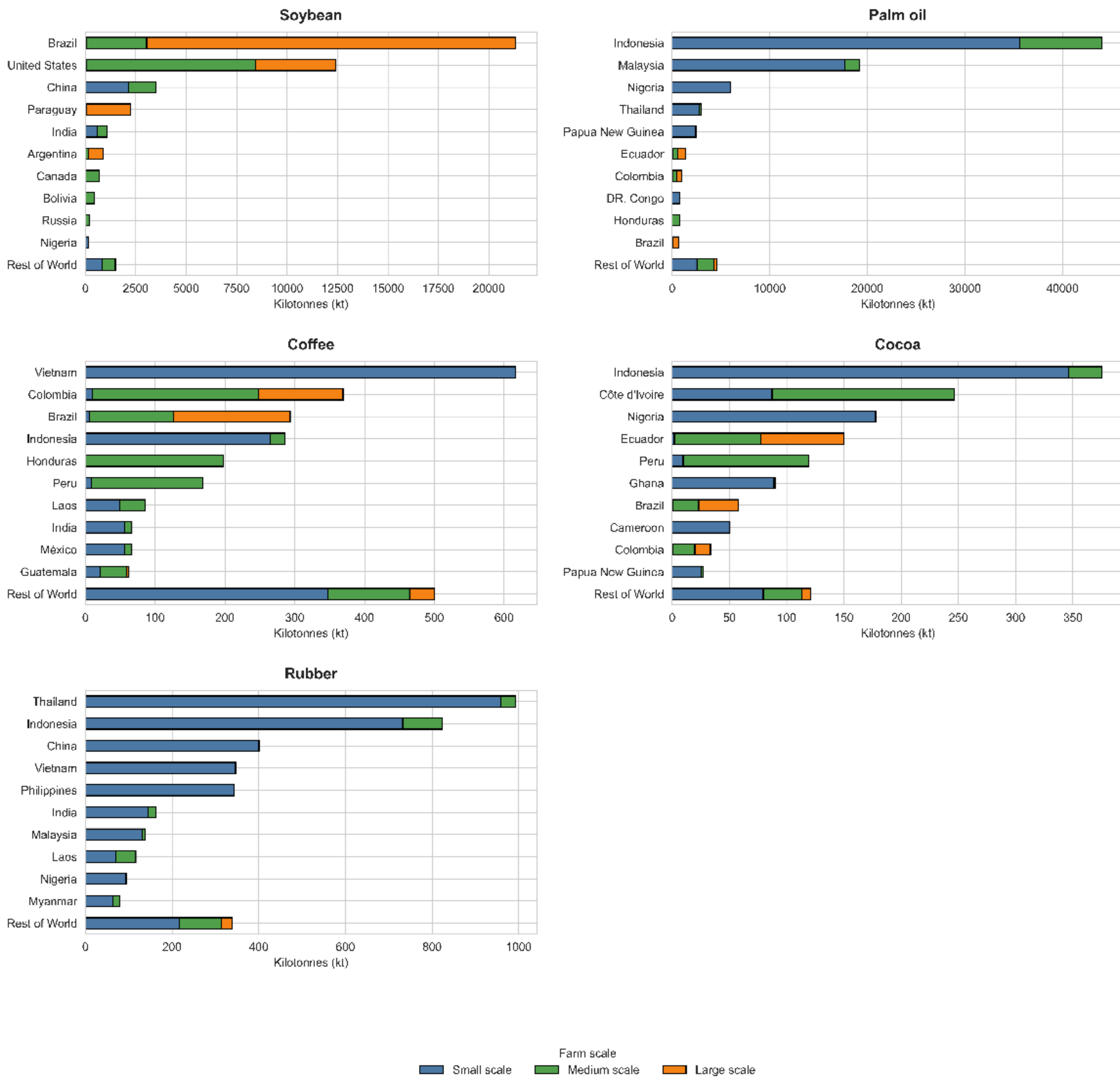

Figure 3

Top 10 countries with EUDR-relevant crop production in forested landscapes by farm size (small-scale (<2 ha), medium-scale (2-200 ha), large-scale (200-5000 ha)) category. The forest-linked production of the EUDR-listed crops across farm size categories with the per country breakdown can be found in Supplementary Material.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- OutputGeoTIFF.zip
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- SupplementaryMaterial.pdf
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