FOREST 500

Global Canopy

Country
Selection methodology 2022

About the Forest 500:
Forest 500, a Global Canopy project, identifies and ranks the most influential companies and financial institutions in the race towards a deforestation-free global economy.

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About Global Canopy:
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Introduction

Forest 500 identifies and ranks the 350 companies and 150 financial institutions with the greatest influence on tropical deforestation through their exposure to forest risk commodities. Forest 500 focuses on the forest risk commodities (FRCs) responsible for the greatest amount of tropical deforestation globally, which are palm oil, soy, beef, leather, timber, and pulp and paper.

To identify which companies and financial institutions should be included in our selection, we first identify key countries which are globally significant in the forest risk commodity economy, including producer countries and key FRC importing countries. Producer countries often not only produce FRCs, but also represent important users and consumers of FRCs alongside the trading countries.

Producer Countries

In 2022, 39 forest countries were identified as important for our selection due to having the largest remaining expanses of tropical forest that are simultaneously losing high volumes of forest at a rapid rate, in part due to the production of FRCs.

Forest jurisdictions were selected through the following steps:

1. Countries with tropical forest cover were identified, and a subset was selected based on the amount of remaining natural forest cover.
2. The subset of countries was ranked based on the overall forest cover, extent and rate of forest loss – used as a proxy for deforestation – between 2010 and 2020, change in average deforestation rate, area of remaining natural forests, amount of intact forest landscape loss, and production quantities of forest-risk commodities. For each country, the ranks for the individual metrics were added together to reach a country specific total rank, which was then used to organise countries in descending order.
3. From there, the top 42 ranked countries were selected for a literature analysis review, to verify that FRC production was a driver of tropical deforestation in each country.
4. A final set of 39 countries was selected as the top ranked countries where FRC production was driving deforestation.

Each of these indicators are discussed in more detail below.

Identification of countries with tropical forest cover

Countries with tropical and subtropical forests were identified using the Food and Agriculture Organisation's (FAO) 2020 Ecological Zones data. Once these countries had been identified, a subset was identified based on the largest remaining natural forest area[1], as identified using FAO's Forest Resources Assessment 2020. An arbitrary minimum cut-off area of 100,000 hectares of natural forest was selected and applied to the datasets to shorten the working list.

[1] Natural forests generally describe vegetation that evolved naturally in an area and they differ from planted forests which are often established for commodity production and/or protection of soil and water. FAO (2020) Global Forest Resources Assessment 2015 How are the world's forests changing? (Second edition), p. 19 Global Forest Resources Assessment 2020

The area of natural forest within countries was identified as a factor, as natural forests "contribute to conserving the diversity of genotypes and to maintaining the natural tree species, composition, structure and ecological dynamics"[2].

Analysis of countries by rank

Each country in the subset was ranked based on the; overall forest cover, extent and rate of forest loss, change in average deforestation rate, amount of remaining natural forest, amount of intact forest landscape loss, and production quantities of each forest risk commodity (palm oil, soy, beef, leather, timber, and pulp and paper). For each country, the ranks for the individual metrics were added together to reach a country specific total rank.

Data from Hansen et al. (2020), sourced from Global Forest Watch, was used to determine the **overall forest cover**, and to calculate the **extent and rate of tropical forest loss**. While the FAO FRA data does provide forest cover statistics, this dataset relies on country disclosure and is only updated one every five years. Thus, the Hansen data was used for its consistent independent interpretation of forest cover globally, and it also provides the most recent data available on an annual basis and allows for cross-jurisdictional comparison[3],[4].

The Hansen dataset was used to calculate the total amount of forest area loss between 2010 and 2020, identifying which countries lost the greatest extent of forest over this time period. Using 2010 cover data as a baseline, the percent of forest loss per year, and the average deforestation rate between 2010 and 2020 were calculated using the extent of forest loss and the extent of remaining forest cover for each year[5]. The 2010-2020 interval was used in order to mitigate year-on-year data variations as elements such as cloud cover can distort data for an individual year.[6] An average deforestation rate for 2010 to 2012, 2012 to 2014, 2014 to 2016, 2016 to 2018, and 2018 to 2020 were also calculated and compared to establish the **change in average deforestation rate**.

The extent, rate, and change in the rate of forest loss – used as a proxy for deforestation – were assessed to highlight countries that either recently lost the greatest area of forest, have recent high rates of deforestation, and/or witnessed increasing rates of deforestation in the last few years. Examination of these trends provides a globally consistent proxy to understand contemporary hotspots of deforestation.

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[2] UN FAO (2018) *Global Forest Resources Assessment 2015: How are the world's forests changing? Second edition*, Food & Agriculture Organisation.

[3] For further discussion of the FAO dataset, see Keenan, R. J., *et al.* (2015), 'Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment 2015', *Forest Ecology and Management*, 352, 9-20. Available from: http://www.sciencedirect.com/science/article/pii/S0378112715003400

[4] For a brief discussion on the accuracy of the Hansen data, see here: Weise, M. and Petersen, R. (2015). How accurate is accurate enough? Examining the GLAD global tree cover change data (Part 2). [Online] Available from: http://blog.globalforestwatch.org/data/how-accurate-is-accurate-enough-examining-the-glad-global-tree-cover-change-data-part-2.html

[5] Remaining forest cover was approximated by subtracting loss extents from the 2010 cover baseline. This calculation is used as an indicator of natural forest loss and not an exact measurement as it does not account for forest re-growth and tree cover loss may include loss inside plantations given the inability of Hansen et al. data to distinguish natural forest from planted areas.

[6] Weisse, M. and Petersen, R. (2015). How accurate is accurate enough? Examining the GLAD global tree cover change data. Global Forest Watch. [Online] Available from: http://blog.globalforestwatch.org/data/how-accurate-is-accurate-enough-examining-the-glad-global-tree-cover-change-data-part-2.html

The amount of natural forest area and intact forest landscape loss were used to ensure that irreplaceable native ecosystems and any impacts upon them were taken into consideration. The amount of natural forest area and intact forest landscape loss are important to include as factors since the Hansen data does not differentiate between natural and planted forests. The **amount of natural forest area** for each listed country was found using FAO's FRA 2020 dataset (see previous section for details). As this dataset is updated only once every five years, Potapov et al.[7] was used to obtain the most recent data for **intact forest landscapes loss**. Intact forest landscape (IFL) is defined as a seamless mosaic of forests and associated natural treeless ecosystems that exhibit no remotely detected signs of human activity or habitat fragmentation and are large enough to maintain all native biological diversity, including viable populations of wide-ranging species[8]. Although the remaining IFLs around the world comprise only 20% of tropical forest area, they account for 40% of the total aboveground tropical forest carbon[9].

FRC production data was used to establish which tropical countries produce FRCs and to understand where production is potentially driving large scale forest loss. FAO's Statistics Division (FAOSTAT) [10] was used to obtain the most recent data (2020) for the number of cattle, soybean harvested area, and oil palm fruit harvested area, while industrial roundwood production 2020 data was taken from International Tropical Timber Organization (ITTO)[11].

Cattle numbers, oil palm fruit harvested area, and soybean harvested area were used as opposed to meat, palm oil, or soybean production amounts because they were deemed a more appropriate measure for investigating forest area loss. Unfortunately, data for timber harvested area was not available, therefore production quantities had to be used. FRC data for some countries and their commodity production was also unavailable. This lack of available data could have affected a country's total rank, as a country for which FRC data was unavailable would have ranked the same as a country which didn't produce a specific FRC.

Analysis of FRC production as a driver of deforestation

Production data and forest loss rates alone do not confirm that FRC production is responsible for deforestation. To establish whether FRC production was responsible for an increase in forest loss a literature review into the drivers of deforestation in the top 42 ranked countries was undertaken. REDD+ strategy documents, government and non-governmental forest reports as well as peer reviewed-literature detailing drivers of deforestation were used to identify the importance of FRC production as a driver of deforestation in each of the 42 countries. A final set of 39 countries was then selected based on the rank and evidence of FRC driven deforestation risk and impact.

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[7] Potapov, P., M. C. Hansen, L. Laestadius, S. Turubanova, A. Yaroshenko, C. Thies, W. Smith, I. Zhuravleva, A. Komarova, S. Minnemeyer, and E. Esipova. 2017. "The last frontiers of wilderness: Tracking loss of intact forest landscapes from 2000 to 2013." Science Advances 3: e1600821. http://advances.sciencemag.org/content/3/1/e1600821.full

[8] P. Potapov, A. Yaroshenko, S. Turubanova, M. Dubinin, L. Laestadius, C. Thies, D. Aksenov, A. Egorov, Y. Yesipova, I. Glushkov, M. Karpachevskiy, A. Kostikova, A. Manisha, E. Tsybikova, I. Zhuravleva, Mapping the world's intact forest landscapes by remote sensing. Ecol. Soc. 13, 51 (2008). https://www.ecologyandsociety.org/vol13/iss2/art51/main.html

[9] Ibid.

[10] FAO (2020). FAOSTAT. Data. [Online] Available from: https://www.fao.org/faostat/en/#data/QCL

[11] ITTO (2014). Annual Review Statistics Database. [Online] Available from: http://www.itto.int/annual_review_output/

Selected producer countries

The following 39 producer countries were selected in 2022. Globally, these countries represent 91% of tropical forest cover (2020), and 96% of tropical deforestation between 2010 and 2020.

Country	Important FRC drivers of deforestation	Forest Cover 2010 >30% (1000 ha)	Deforested Area (Forest Loss) 2010-2020 >30% (1000 ha)
Angola	Timber, Cattle, Soy, Palm	53,847,201.00	2,242,555.00
Argentina	Cattle, Soy, Timber	38,380,241.00	3,168,599.00
Bolivia	Timber, Cattle, Soy	62,714,153.00	4,176,062.00
Brazil	Timber, Cattle, Soy, Palm	498,198,382.00	33,227,585.00
Cambodia	Timber, Cattle, Soy, Palm	7,641,740.00	1,810,951.00
Cameroon	Timber, Cattle, Soy, Palm	30,543,474.00	1,231,656.00
Colombia	Timber, Cattle, Soy, Palm	81,738,198.00	2,757,224.00
Côte d'Ivoire	Timber, Cattle, Palm	13,953,284.00	2,382,074.00
Democratic Republic of the Congo	Timber, Cattle, Soy, Palm	198,452,936.00	11,811,128.00
Ecuador	Timber, Cattle, Soy, Palm	19,227,280.00	499,395.00
Ethiopia	Timber, Cattle, Soy	12,361,078.00	268,574.00
Gabon	Timber, Palm	24,699,923.00	313,151.00
Ghana	Timber, Cattle, Soy, Palm	7,034,627.00	962,135.00
Guatemala	Timber, Cattle, Soy, Palm	7,034,117.00	873,470.00
Guinea	Timber, Cattle, Palm	8,023,664.00	1,511,482.00
Honduras	Timber, Cattle, Palm	7,554,766.00	835,554.00
India	Timber, Cattle, Soy, Palm	34,435,273.00	1,327,044.00
Indonesia	Timber, Cattle, Soy, Palm	157,793,272.00	16,943,349.00
Laos	Timber, Cattle, Soy	17,941,851.00	2,934,142.00
Liberia	Cattle, Soy, Palm	9,283,496.00	1,601,208.00
Madagascar	Timber, Cattle, Soy, Palm	16,436,355.00	3,171,819.00
Malaysia	Timber, Cattle, Palm	28,632,041.00	5,105,939.00
Mexico	Timber, Cattle, Soy, Palm	50,346,718.00	2,582,788.00
Mozambique	Timber, Cattle, Soy	26,973,824.00	2,279,406.00
Myanmar	Timber, Cattle, Soy	40,919,357.00	3,006,283.00
Nicaragua	Cattle, Soy, Palm	7,622,239.00	1,059,309.00
Nigeria	Timber, Cattle, Soy, Palm	10,934,411.00	823,795.00
Panama	Timber, Cattle, Soy, Palm	5,545,904.00	231,646.00
Papua New Guinea	Timber, Cattle, Palm	42,921,261.00	1,125,224.00
Paraguay	Timber, Cattle, Soy, Palm	20,452,833.00	3,849,814.00
Peru	Timber, Cattle, Soy, Palm	78,780,800.00	2,380,189.00
Philippines	Timber, Cattle	18,391,765.00	864,404.00
Suriname	Palm, Timber	13,997,728.00	156,518.00
Tanzania	Timber, Cattle, Soy, Palm	24,703,916.00	1,770,847.00
Thailand	Timber, Cattle, Soy, Palm	19,272,251.00	1,438,051.00
Venezuela	Timber, Cattle, Palm	57,273,646.00	1,275,155.00
Vietnam	Timber, Cattle, Soy	16,371,754.00	2,343,893.00
Zambia	Timber, Cattle, Soy	22,436,285.00	1,387,154.00
Uganda	Timber, Cattle, Soy	6,926,895.00	692,530.00

Trading countries

In 2022, 15 trading countries or jurisdictions were identified as important to our selection because they import the greatest value of FRC commodities from regions where production is driving deforestation, and are therefore at great risk of importing commodities associated with forest loss.

To identify these countries, the following metrics were considered:

1. Importance as a trading partner with the 39 producer countries for each FRC supply chain
2. Total value of all FRCs imports from the 39 producer countries

These indicators are discussed in detail below:

Analysis of FRC importer countries

Trade data tracking FRC chain of custody was obtained from UN Comtrade, categorised according to commodity-specific Harmonised System (HS) codes selected for each commodity[12,13].Trade data for each of the FRCs identified as driving deforestation in the 39 forest jurisdictions was analysed. The value of imports (USD) was used as a metric by which to understand the importance of a trading partner for each commodity supply chain. To account for any significant variation in trade patterns between years, whilst ensuring the most recent information was considered, total figures for 2019 to 2021 were used. As a few countries do not report imports for this date range, export data was also examined to corroborate trade patterns and supplement any unreported data points for imports.

Jurisdictions importing FRCs from the 39 producer countries were ranked according to trade value of FRC imports within each supply chain. Countries that are the largest trading partners within individual commodities were selected. Subsequently, once the largest importers for each supply chain were identified, countries were selected according to their global importance across multiple FRC supply chains given that major importing countries source a variety of FRC products.

It is worth noting that since UN Comtrade provides official trade data, illegal trade flows are not counted within figures. As illegal trade flows are, by nature of their illegality, difficult to monitor or estimate it is worth recognising their absence but not possible to accurately incorporate these flows into the selection process. It is also important to note that the selection of trading countries is based on imports and these countries may not be the final consumer due to the re-export of goods. Thus the trade data, and selection, is skewed towards countries with major trading ports.

Due to the ease and frequency in which products are moved between European countries, the European Economic Area (EEA), which unites the European Union (EU) member states and three European Free Trade Association (EFTA) countries (Norway, Iceland and Liechtenstein), has been considered as a single trading jurisdiction. For the purpose of this research, this also includes Switzerland, which is part of the EFTA but not officially the EEA, although it has signed bilateral agreements with the EU. Assessment of the EEA was undertaken through consultation of inter-jurisdictional policies established, for example, by the European Commission. As four jurisdictions within the EFTA are within the top eleven importers of FRCs globally, these countries

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[12] UN Comtrade (2016). UN Comtrade Database. [Online] Available from: http://comtrade.un.org/db/ Data accessed: March 2022.
[13] The following HS codes were used for export/import analysis: Palm Oil: 120710, 1511, 151329, 151321, 230660; Soya: 1201, 120810, 1507, 210310, 230400; Cattle: 0102, 0201, 0202, 020610, 020621, 020622, 020629, 021020, 160250, 4101, 4104, 4107; Timber: 44; Pulp & Paper: 48, 4701, 4702, 4703, 4704, 4705. Code definitions are available from: World Customs Organization (2020). Nomenclature and Classification of Goods. [Online] Available from: http://www.wcoomd.org/en/topics/nomenclature.aspx

were also included separately. These are Germany (2nd largest FRC importer globally), The Netherlands (14th), Italy (15th), and Spain (7th).

Selected trading countries

The 15 trading jurisdictions selected below represent the largest importers by value of FRC commodities from the 39 producer countries.

Country	Top 10 FRC Importer
China	Beef, Leather, Palm Oil, Soy, Pulp & Paper, Timber
Germany	Beef, Leather, Palm Oil, Soy, Pulp & Paper, Timber
Mexico	Beef, Leather, Palm Oil, Soy, Pulp & Paper, Timber
USA	Beef, Leather, Palm Oil, Pulp & Paper, Timber
Canada	Beef, Soy, Pulp & Paper, Timber
Turkey	Beef, Palm Oil, Soy, Pulp & Paper
Spain	Leather, Palm Oil, Soy, Pulp & Paper
Japan	Beef, Palm Oil, Pulp & Paper, Timber
Viet Nam	Beef, Leather, Soy, Timber
United Kingdom	Palm Oil, Soy, Pulp & Paper, Timber
Rep. of Korea	Beef, Leather, Palm Oil, Timber
Malaysia	Beef, Palm Oil, Pulp & Paper
Colombia	Palm Oil, Soy, Pulp & Paper
Netherlands	Palm Oil, Soy, Timber
Italy	Leather, Palm Oil

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