

Deforestation Debt Universe

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Forests are a global carbon sink, net absorbing about twice as much carbon as they emit each year.[1] They also hold the majority of the Earth's terrestrial biodiversity; including 80% of amphibian species, 75% of birds, and 68% of the world's mammal species.[2] Unfortunately, the rate of human-induced forest destruction continues to increase, with reports warning that the Amazon is close to the dieback tipping point, beyond which recovery may not be possible.[3]

Investor exposure to deforestation risk comes from several sources. There are direct physical risks through extreme weather events. There are litigation and reputation risks originating from the treatment of indigenous communities.[4] And despite a recent delay in the EU's Deforestation Regulation,[5] there are regulatory risks facing companies and investors in several jurisdictions.[6]

The Deforestation Debt Universe builds on earlier work[7] to identify a comprehensive universe of significant fixed income issuers which have substantial deforestation exposure. It helps investors to mitigate deforestation risks when managing bond portfolios, and also supports engagement.

The three-step methodology for creating the Deforestation Debt Universe is as follows:

- To identify a **comprehensive universe**, we used Forest IQ,[8] a consolidated dataset that enables the comparison of deforestation exposure across different commodities. For inclusion we have considered companies assessed as exposed by either Forest 500 or ZSL SPOTT, two NGOs focused on identifying the most significant contributors to deforestation.
- The analysis has focused on six relevant commodities: soy, palm, beef, leather, timber, and pulp & paper. The universe captures **substantial deforestation exposure** both through concentrated exposure to a single commodity or broad exposure across commodities.
- The final group of companies have debt in G7-currencies (either directly or via their parent entities). This allows us to focus on entities that are **significant for fixed income investors**.

The Deforestation Debt Universe contains 101 substantially exposed issuers, who collectively have issued nearly USD1.3trn of hard currency debt.

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[1] "Forests Absorb Twice As Much Carbon As They Emit Each Year", WRI, 21 Jan 2021.
[2] "Earth's Biodiversity depends on the World's Forests", UNEP, May 2020.
[3] "Critical transitions in the Amazon forest system", Nature, Feb 2024.
[4] "Explainer: Why deforestation matters for investors", IIGCC, 16 Sep 2024.
[5] "EU parliament votes in favor of EUDR implementation delay", S&P Global, 14 Nov 2024.
[6] "Recent developments in deforestation legislation", Ropes & Gray, accessed 9 Dec 2024.
[7] For earlier work please see "RDCP: Deforestation exposure in liquid credit portfolios", AFII, 22 Dec 2023.
[8] This data is at 2 Oct 2024 and was obtained under license from Global Canopy as part of its proprietary Forest IQ project https://forestiq.com. More up-to-date data may be available from Forest IQ.

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Introduction

In December 2023, AFII developed the Representative Deforestation Credit Portfolio (RDCP).[7] This was comprised of an initial set of issuers deemed relevant for liquid credit portfolios seeking to manage deforestation exposure.

This paper introduces the evolution of the RDCP, in the form of an extended universe of issuers. The Deforestation Debt Universe offers increased transparency into these issuers' exposure to those commodities that are drivers of deforestation.

This new iteration aims to identify sources of deforestation exposure, instead of focusing on how the exposure is managed by entities. It serves as a starting point for those investors that want to identify debt investments with deforestation risk for further analysis and engagement.

How investors understand nature-loss risk is an evolving field. As such, updating the AFII deforestation portfolio reflects a methodology of current best practices, and will continue to be reviewed.

Deforestation and land-use conversion

There is no wholly accepted definition of deforestation and how it relates to land-use change, but a number of global institutions have taken steps to provide a definition. The Forests and Agriculture Organisation of the United Nations (UN FAO) defines deforestation as: *"The conversion of forest into other land use independently of whether human-induced or not."*[9] More recently the World Resources Institute's Global Forest Review defined deforestation as *"… human-caused, permanent removal of natural forest cover."*[10]

The World Wildlife Fund (WWF) uses numerous different terms to describe the clearing or degradation of land. For example, deforestation includes 'forest conversion', which is *"… when natural forests are removed so that the ground they once stood on can be used for other purposes. For example, forests are destroyed so the land can be used for agriculture, to grow plantations for commercial timber, as pasture for cattle or so it can be mined."*[11] However, the Rainforest Alliance also includes *"… turning natural forests into tree plantations."*[12]

Further, guidance from the Roundtable on Responsible Soy (RTRS) uses the term 'conversion' and defines 'conversion' as *"change of a natural ecosystem to another land use or profound change in a natural ecosystem's species composition, structure or function. Deforestation is one form of conversion (conversion of natural forests). Conversion includes severe degradation or the introduction of management practices that result in a substantial and sustained change in the ecosystem's former species composition, structure, or function. Change to natural ecosystems that meets this definition is considered to be conversion regardless of whether or not it is legal."*[13]

This is an evolving definition. In our methodology we use the term 'deforestation' to cover deforestation and forest/land conversion or degradation that is human-induced. We acknowledge

[9] "Global Forest Resources Assessment 2020", UN FAO, 2020.
[10] "Global Forest Review: Key Terms and Definitions", WRI, accessed 5 Dec 2024.
[11] "Deforestation", WWF, accessed 5 Dec 2024.
[12] "Deforestation vs forest degradation - what is the difference and why does it matter?", Rainforest Alliance, 23 Apr 2024.
[13] "RTRS Standard for Responsible Soy Production V4.0", Round Table on Responsible Soy, Dec 2022.

that the data relied upon for this assessment and detailed in the section '*Forest IQ*' focuses on tropical deforestation and includes 'conversion of natural ecosystems'.[28]

Why deforestation is relevant for SDGs and climate

Deforestation and sustainability are interlinked. Several United Nations Sustainable Development Goals (SDGs) involve addressing the drivers, or impacts, of deforestation. These include SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land).

Deforestation is integral to SDG 15. The goal includes multiple references to sustainably managing forests. For example, target 15.2 of this SDG is aimed at halting deforestation by 2020. This is but one demonstration of the importance of deforestation to sustainability.[14]

Forests are a carbon sink, meaning they absorb greenhouse gas emissions that contribute to global warming.[15] From 2001 to 2023, deforestation accounted for approximately 9 Gt CO_2e/year of emissions, making it one of the largest contributors to climate change.[15,16] This makes deforestation a key issue with regards to SDG 13 (Climate Action).

Finally, a key driver of deforestation is land clearing for the production of commodities such as: palm oil, coffee, timber, cattle, cocoa, rubber, soy and their derived products.[17] Sustainable resource management, noted in target 12.2 of SDG 12 (Responsible Consumption and Production), would reduce pressures on deforestation driven by these commodities.[18]

Why deforestation is relevant for fixed income investors

Deforestation is relevant for fixed income investors due to its potential risks.

Credit risk is one of these. Studies show that nature loss can negatively impact sovereign and non-financial corporations' credit ratings. However, it is not currently a criterion used in credit rating assessments.[19,20]

Regulatory risk is another. Forthcoming EU Deforestation Regulation (EUDR) regulation will increase costs for companies that import covered commodities into the EU, as they will need to implement systems to track and monitor their supply chains and provide due diligence statements to confirm the absence of deforestation in their supply chains. Those that fail to comply could incur fines and/or import bans.[21] We note that the EUDR was recently delayed by one year.

Finally, despite over 69% of global investors planning to increase their nature-related investments,[22] opportunities in the fixed income space for investment preventing deforestation are, to our knowledge, limited.

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[14] "Goal 15 | Department of Economic and Social Affairs", United Nations, accessed 4 Dec 2024.
[15] "Greenhouse Gas Fluxes from Forests | Global Forest Review", accessed 4 Dec 2024.
[16] "Land Use, Land-Use Change and Forestry (LULUCF) | UNFCCC", accessed 4 Dec 2024.
[17] "Regulation on Deforestation-free products - European Commission", EU, accessed 4 Dec 2024.
[18] "Goal 12: Responsible consumption and production", The Global Goals, accessed 4 Dec 2024.
[19] "Nature Loss and Sovereign Credit Ratings", Finance for Biodiversity Initiative, Jun 2022.
[20] "Living in a World of Disappearing Nature: Physical Risk and the Implications for Financial Stability", ECB, 2023.
[21] For our earlier work please see "EU deforestation law: fire on the horizon for soy traders", AFII, 13 Sep 2023.
[22] "Over two-thirds of investors working on nature plan to increase their investment", Pollination Group, published 20 Sept 2023.

The Natural Capital Investment Alliance (NCIA), comprised of 18 asset managers, have various natural-capital funds[23] and BNP Paribas launched a similar fund in November 2024,[24] although focused on equity capital.

Fixed income investment in deforestation prevention is accessible via individual labelled debt instruments, which have specific reforestation or sustainable forestry Key Performance Indicators (KPIs) or Use of Proceeds (UOPs). One example is the recent Amazon reforestation bond.[25]

Therefore, understanding deforestation exposure is key for fixed income investors to align their portfolios with their sustainability goals and mitigate risk from deforestation.

Objective

To our knowledge, no corporate indices specifically track the financial performance of companies exposed to deforestation risk in the fixed income market. Tools like Deforestation Free Funds assess deforestation risk in mutual funds and ETFs,[26] while Forests & Finance reviews corporate loans, bond issuances, and investments for over 300 companies and associated banks.[27]

The objective of our Deforestation Debt Universe methodology is to identify**:**

(1) A comprehensive universe of issuers
(2) which have substantial deforestation exposure
(3) that are significant to fixed income issuers

What follows is more detailed information on each step of the universe's construction.

1) Comprehensive universe

One of the biggest challenges involved in compiling the universe is the fragmentation and lack of standardisation in data. How companies are evaluated on their nature impacts varies by data provider and categorisation approach. These discrepancies make integrating datasets a complex task, and understanding the inclusion criteria of each dataset very challenging.

Additionally, datasets from nature and financial data providers may use different names for the same company, or may not have the same rules on how subsidiaries and parent companies are differentiated, which further complicates the data aggregation process.

Finally, given that much of this data comes from self-reported company disclosures, together with the fact that the nature data provider industry itself is still in its infancy, incomplete data is a big issue. Completeness is important to accurately understanding and comparing deforestation exposure between issuers. Moreover, assessing deforestation risk for fixed income investors needs to incorporate the best datasets available.

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[23] "Mobilising USD 10 Billion", Sustainable Markets Initiative, accessed 4 Dec 2024.
[24] "BNP Paribas Asset Management launches a dedicated fund for responsible forest management", BNP Paribas, 22 Nov 2024.
[25] "World Bank Amazon Reforestation Bond: Concession, financial risk, and complexity", AFII, 23 Sep 2024.
[26] "Deforestation Free Funds", As You Sow, accessed 7 Jan 2025.
[27] "Methodology", Forests & Finance, accessed 7 Jan 2025.

Forest IQ

Table 1 contains details of the main data providers in the space of which we are aware, showing the breadth of data available and the challenges using them to create a comprehensive analysis.

Table 1. Key Nature Data Providers, Sources: listed in table, AFII.

Source name	Number of Companies	Number of Commodities covered	Commodities Assessed
Forest500	350 companies, 150 financial institutions	9	Beef, Cocoa, Coffee, Leather, Rubber Palm Oil, Pulp & Paper, Soy, Timber
Forest IQ	2,000+	11	Beef, Cocoa, Coffee, Coal, Gold, Leather, Natural Rubber, Palm Oil, Pulp & Paper, Soy, Timber.
CDP	23,000+	Dependent on Disclosures	Varied depending on which companies disclose
Forest & Finance	300+	6	Beef, Palm Oil, Pulp & Paper, Rubber, Soy, Tropical Timber
Trase.Earth	Undisclosed	13	Beef, Chicken, Cocoa, Coffee, Corn, Cotton, Palm Kernel, Palm Oil, Pork, Shrimp, Soy, Sugarcane, Wood Pulp
Deforestation Free Funds	6,530	n/a	n/a
SPOTT	230	3	Natural Rubber, Palm Oil, Timber and Pulp

Forest IQ is a data platform launched in Dec 2022,[28] supported by an alliance of non-profit institutions including Global Canopy, the Stockholm Environment Institute (SEI), and the Zoological Society of London (ZSL).[29] The platform collates and sometimes expands data from a selection of providers along consistent fields and scales. It is focused on core metrics covering how companies are managing their exposures, their financial materiality, and reporting on deforestation and conversion of natural ecosystems and associated human rights abuses.[30]

The data providers Forest IQ use include CDP, Deforestation Action Tracker, Forest 500, Stockholm Environmental Institute York (SEI York), Trase, ZSL's Sustainability Policy Transparency Toolkit (ZSL SPOTT) and the Roundtable on Sustainable Palm Oil (RSPO).[28]

These sources are well-known, trusted, and encompass a range of financial, climate, and nature information. For more details please see Table 12 in Appendix 3.

Because Forest IQ collates data from a range of sources, including companies' self-disclosed reports, there is not necessarily a set of consistent inclusion criteria, or a fixed boundary for inclusion. This presents some challenges to our methodology.

Fortunately, two datasets used by Forest IQ do have comprehensive inclusion criteria. We have therefore restricted our universe to entities covered by them. More information is provided below.

[28] "Forest IQ Methodology", Forest IQ, 2 Oct 2024.
[29] "Explore", Forest IQ accessed 5 Dec 2024.
[30] "About - Forest IQ", Forest IQ, accessed 5 Dec 2024.

1) Forest 500

Forest 500 is a Global Canopy project, created in 2014, which *"identifies the companies and financial institutions with the greatest exposure to tropical deforestation risk, and annually assesses them."* [31]

It has a clear and public methodology for both the country selection and company selection processes,[32] which appears robust, and therefore leads to a comprehensive assessment of the most exposed potential debt issuers.

2) ZSL SPOTT

Launched in 2014, ZSL SPOTT – developed by the Zoological Society of London – is an online toolkit for assessing companies on their self-reported disclosure of policies, practices, and organisation related to environmental, social, and governance (ESG) issues.[33]

SPOTT assesses producers, processors, and traders who source from, and operate in, tropical forests across three commodities: palm oil, natural rubber, and timber and pulp. The toolkit covers the 230 companies determined to have the largest impact on tropical forests and with the greatest potential and actual user interest.[34]

Even though scoring is based on self-reported data, the criteria for choosing the covered entities is based on a shortlisting process, discussed with a Technical Advisory Group, and names can be included or removed depending on relative performance.[34]

This process gives us comfort around the comprehensiveness of the assessments offered. It is worth noting that for this inaugural Deforestation Debt Universe, only one issuer is covered by ZSL SPOTT and is not covered by Forest 500 (Klabin SA).

Entity mapping

As already mentioned, the process of mapping entity names across data sources is complex. In order to include outstanding debt, we use Bloomberg tickers as the identifier. Forest IQ provides ISIN identifiers for some of the companies it assesses, and we have factored these into our mapping. For now, we have restricted our population to companies which had a score of 3 or higher (indicating either high exposure or assessment pending) in any commodity covered by Forest IQ. This resulted in a list of 588 unique entities(split into 619 Issuer&ISIN mappings). The ISINs given were checked and converted to company tickers, and where mappings were missing a manual search was conducted. Where tickers were found to be the wrong class of share, a correction was made. All overrides were shared with Forest IQ.

Summary

We created a comprehensive Deforestation Debt Universe using a series of trusted data sources.

[31] "About – Forest 500", Forest 500, accessed 4 Dec 2024.
[32] "How do we identify the companies and financial institutions?", Forest 500, accessed 5 Dec 2024.
[33] "About SPOTT", SPOTT ZSL, accessed 4 Dec 2024.
[34] "SPOTT Methodologies", SPOTT.org, accessed 4 Dec 2024.

Forest IQ was relied on as the primary data aggregator, however for the selection process we restricted our focus to two of its underlying sources, Forest 500 and ZSL SPOTT, both of which are assessed to have robust inclusion criteria.

This created a reduced universe for analysis of 290 issuers mapped to the relevant Bloomberg tickers.

2) Substantial deforestation exposure

Our next task was to understand the magnitude of deforestation exposure facing this list of issuers.

An investor seeking to manage their deforestation exposure must ask the question: to what extent does an issuer's activities include commodities that drive or contribute to deforestation? This is a question we sought to answer in the second step of our methodology.

Forest IQ scoring framework

Forest IQ developed its core metrics, focused on company exposure, financial materiality, and reporting on deforestation and conversion of natural ecosystems, to allow for comparisons across different sectors and supply chains, where previously data was hard to combine from different sources.[35]

Forest IQ combines "*the best available data sets on how companies are addressing their exposure to deforestation, conversion of natural ecosystems and associated human rights abuses, aligned with the Accountability Framework's common methodology*".[36]

These core metrics use integrated data from Forest 500, ZSL, CDP, and other data sources (for full details please see Appendix 3).[28,37] Forest IQ uses proprietary methods to align data sources and enable issuer comparisons in a form consistent with the Accountability Framework's common methodology. It also conducts additional analysis to complement the data received:

"Although most of the datasets are aligned with the Accountability Framework initiative, there are variations in how similar issues are assessed among the data providers. [...] All reasonable steps have been taken to align data".[38]

As we are focused on identifying deforestation exposure, we used Forest IQ's Metric 1 Deforestation Exposure score (hereafter referred to as Metric 1) for company identification.[39]

Metric 1 estimates *"… companies' exposure to deforestation and conversion of natural ecosystems by assessing the volume of a commodity produced, sourced or used with risk of deforestation. Where data is available, companies are assessed on the total annual volume of each commodity produced in or sourced from countries with risk of deforestation."*[40]

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[35] "Beta version of Forest IQ launches today", SPOTT.org, 13 Dec 2022.
[36] P1 "Forest IQ Methodology", Forest IQ, 2 Oct 2024.
[37] We use the data release from 2 Oct 24. Comparison with the previous release in May 24 showed that three entities covered by Forest500 had been removed from Forest IQ. On discussions with Forest IQ this was confirmed to be an error, so we have manually added these back in.
[38] P16 "Forest IQ Methodology", Forest IQ, 2 Oct 2024.
[39] Metric 2, which focuses on the financial materiality of deforestation by assessing the proportion of company revenue that depends on exposed commodities, will be used in a further stage of analysis.
[40] P4-6, "Forest IQ Methodology", Forest IQ, 2 Oct 2024.

Each company is assessed under Metric 1 separately by commodities. For example, if a company produces both beef and soy, it will have two assessments — one for beef and one for soy. This approach ensures that the deforestation exposure of a company can be comprehensively identified through multiple assessments of different commodities.

Companies assessed by Forest IQ on Metric 1 can be given the following scores:

- 5: Critical
- 4: Very high
- 3: High
- 3: Exposed (assessment pending)
- 2: Moderate
- 0: Not exposed

The exact thresholds used to score a company vary by commodity and their position in the supply chain. The scoring methodology uses volume data sourced the from SEI York, RSPO, and Trase. For some example thresholds, please see Appendix 2 – Forest IQ methodology details.

In-scope commodities

Forest IQ gives scores for 11 commodities; palm oil, soy, pulp & paper, beef, timber, cocoa, coal, natural rubber, leather, coffee, and gold. In Forest 500's 2022 methodology it assessed only four commodities: palm, timber, cattle, and soy, with all four considered drivers in the two jurisdictions suffering the highest forest loss (see Table 2).[41] Its updated 2024 methodology extends to nine to align with the EU DR.[42] ZSL SPOTT considers palm oil, timber & pulp, and natural rubber.[34]

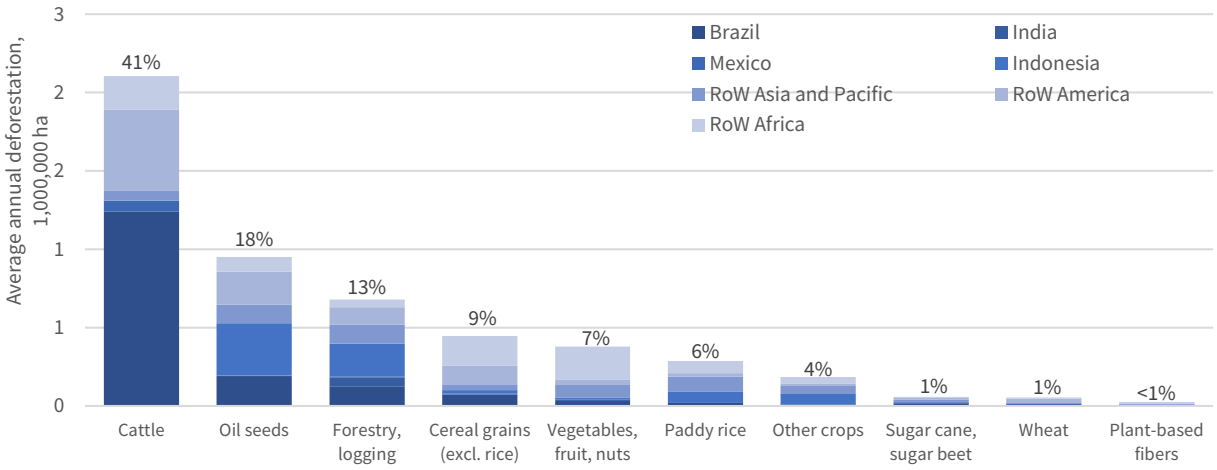
Table 2. Drivers of deforestation. Source: Forest 500 2022 methodology.

Country	Drivers of deforestation	Forest loss 2010-2020 (1mn ha)
Brazil	Timber, Cattle, Soy, Palm	33,227
Indonesia	Timber, Cattle, Soy, Palm	16,943

Analysis has shown that most global deforestation and land conversion occurs in tropical and subtropical countries, with the greatest portion (41%) being driven by beef, see Figure 1.[43]

[41] "Country Selection Methodology", Forest500, 2022.
[42] "Company Assessment methodology", Forest500, 2024.
[43] "Agricultural and forestry trade drives large share of tropical deforestation emissions", Global Environmental Change, May 2019.

Figure 1. Average annual deforestation by driver, 2010-2013. Source: Global Environmental Change (2019).[43]



These sources combine to suggest a focus list of six commodities; beef, leather, palm oil, soy, timber and pulp & paper. We will now give more details on the deforestation exposure of each.

- **Beef and leather:** Despite broad consensus on beef as a driver of deforestation and land conversion, there is mixed evidence as to the role of leather in this risk ecosystem. From a profitability perspective leather is considered a by-product of cattle, accounting for circa 6-8% of the total value of a live animal.[44] This would indicate that leather is less likely to be a driver of deforestation risk in and of itself. However, including leather as a commodity would bring companies higher in the value chain, specifically in the fashion industry,[45] into the issuer listing. As these companies are ultimately exposed to deforestation risk, we take a systemic risk approach and have included leather as an in-scope commodity because it profits from the processes that drive deforestation.

- **Oilseeds - palm oil and soy:** Brazil is the country most affected by soy-driven deforestation risk. South East Asia is the region most impacted by palm oil-driven deforestation risk,[46] although the Forest 500 (see Table 2) finds it is also a threat in several LATAM jurisdictions, including Brazil.

- **Forestry - timber and pulp & paper:** Large-scale logging, small-scale timber extraction, large-scale agriculture, and smallholder farming, are all activities covered by the timber and pulp & paper industry. It also includes the infrastructure related to these activities, such as roads and mills.[47] Considering the available data from Forest IQ, timber was initially selected as an in-scope commodity due to the high proportion of companies attracting a high deforestation risk score. Forest IQ assigns 11% of companies with a score 5 for timber (critical), and 24% a score 4 (very high). The remainder score 3 (high). All companies with a score for pulp & paper score 3 (high), indicating a lower level of

[44] "Hide Economics: Leather's status as a byproduct", Leather and hide council of America, 11 Jan 2021.
[45] "Nowhere to hide how the fashion industry is linked to amazon rainforest destruction", Stand.Earth, 29 Nov 2021.
[46] "Deforestation linked to agriculture", World Resources Institute, 4 Apr 2024.
[47] P31-32, "Deforestation fronts: Drivers and responses in a changing world", WWF, 2021.

deforestation risk exposure than timber itself. However, including pulp & paper captures companies across the deforestation value chain, and so we have included both commodities in our assessment.

Deforestation is an area where the data is evolving. Accordingly, we err on the side of commodity inclusion as this supports the objective of highlighting issuers that undertake activities that drive or contribute to deforestation and land conversion.

Substantial exposure

When considering entities with exposure only to our six in-scope commodities, the universe on this data set is unchanged. We must now filter for substantial exposure.

We want to balance material concentrated exposure linked to a single commodity with less concentrated but broader exposure to multiple commodities, as this may indicate that a company has cumulative deforestation risk exposure which is substantial.

1) Very high exposure linked to one commodity

Our initial selection in this category was of issuers with 'critical' or 'very high' exposure to deforestation risk, i.e. the top two scores. As shown in Table 3, 91 issuers would be captured if we restricted our selection to only those with 'critical' exposure. An additional 80 are added by including 'very high exposure'. We choose issuers in both categories as the intention is to remain broad.

2) High exposure across multiple commodities

To capture the breadth of deforestation risk exposure, we also want to include companies that score 3 for multiple commodities. A 3 score indicates either high deforestation risk, or assessment pending.[48,49]

We add to our filtered universe those issuers that have exposure to at least two commodities at this scoring level. This adds a further 73 entities to the list.

[48] For issuers with assessment pending, they have already all been designated as included by Forest 500 or ZSL SPOTT, so it is only the score which is pending, which is why we want to include these issuers.
[49] It is also worth noting that for pulp & paper all scores are 3 which is high (not assessment pending), showing that exposure is very broad in this commodity.

Summary

Table 3 shows a breakdown of the resulting 244 entities, indicating the number of companies that have maximum scores of 4 or 5 in one commodity, or 3 in any two commodities. The final column shows the total number of entities which were captured by our criteria. It also shows the split of exposure by each commodity.

Table 3. Commodity and Forest IQ scoring profile. Source: Forest IQ.

FIQ scores	Beef	Leather	Palm oil	Soy	Timber	Pulp & paper	All commodities
Companies with a Forest IQ score of 5 in a commodity	2	0	69	19	14	0	91
Companies with a Forest IQ score of 4 in a commodity	5	0	49	28	30	0	80
Companies with Forest IQ scores of 3 in any two commodities	16	29	36	34	21	69	73
# companies with commodity exposure	23	29	154	81	65	69	244
% companies with commodity exposure	9%	12%	63%	33%	27%	28%	

Table 4 then shows the percentage of companies with Forest IQ scores of 3 or above if a company had a Forest IQ score in each commodity, to show the co-occurrence between the commodity exposures.

The commodity scoring above indicates the potential for a score in beef to be associated with focused, high-impact deforestation exposure, for palm oil to be associated with broader high-impact exposure, and for soy, timber, and pulp & paper to be associated with lower but broader exposure. This highlights the usefulness of this universe for investigating the links between commodity exposure.

Table 4. Commodity scoring prevalence if a 3, 4, or 5 was scored in each commodity. Source: Forest IQ.

Commodity in which a score is obtained:	Beef	Leather	Palm oil	Soy	Timber	Pulp & paper
Beef (69)		25%	90%	97%	32%	93%
Leather (50)	34%		36%	36%	42%	98%
Palm oil (165)	38%	11%		86%	18%	92%
Soy (156)	43%	12%	91%		17%	93%
Timber (71)	31%	30%	41%	37%		89%
Pulp & paper (215)	30%	23%	71%	67%	29%	

Overall, we identified 244 companies by applying these commodity and Forest IQ scoring filters.

3) Significant fixed income Issuers

The objective is to identify issuers of relevance to fixed income investors. To do this, we have analysed the total debt outstanding of the universe, and applied thresholds to find the most significant issuers.

The debt analysed is from Bloomberg's DDIS field, which includes bonds and loans, and is available in currency of issuance. The date of data used is 16 Dec 2024.

Hard currency issuance

To focus on international investors, we have limited debt to currencies within the G7: USD, EUR, GBP, CAD, JPY.

Threshold of total debt

We use a fixed threshold of total debt to identify the most significant issuers. There is a degree of judgement needed to decide what counts as a significant fixed income issuer. We therefore conducted a sensitivity analysis to see how the size of the universe might change under different thresholds, as shown in Table 5.

A threshold of USD2,500mn seems to retain more legacy RDCP issuers while keeping the overall Deforestation Debt Universe manageable in size. We will review the threshold periodically to ensure maximum relevance for investors.

Table 5. Sensitivity analysis to different debt threshold sizes. Source: AFII.

Threshold (USDmn)	Number of issuers in Deforestation Debt Universe	Number of RDCP issuers included
1,000	122	28
1,500	115	28
2,000	107	28
2,500	101	28
3,000	90	26
3,500	88	26
4,000	84	26
4,500	79	26
5,000	74	25

Issuer versus parent level debt

Corporate issuance structures can sometimes be complex, so to capture the maximum potential number of issuers, where debt from the issuing entity is below the threshold we have considered if there is debt at its parent entity, which resulted in three additional inclusions. These entities are all state-owned, and are shown in Table 6.

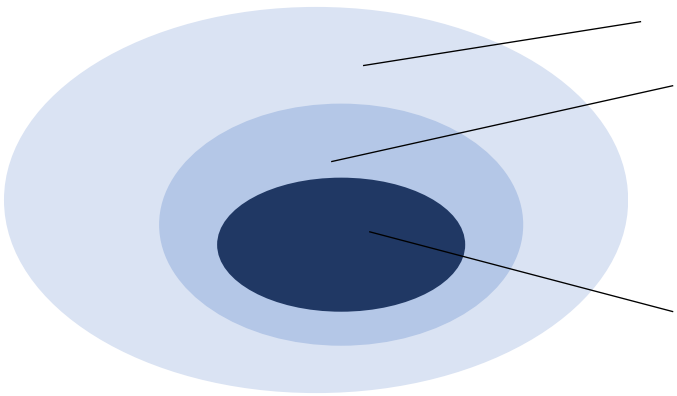
Table 6. Deforestation Debt entities where issuance comes from a parent entity. Source: Bloomberg, AFII.

Issuer Name	Parent Entity
Heilongjiang Agriculture Co Lt	People's Republic of China
China Resources Building Mater	People's Republic of China
FGV Holdings Bhd	Federation of Malaysia

Summary

Applying these three criteria produce the universe depicted in Figure 2, comprising 101 entities. This is our final Deforestation Debt Universe. A full list of issuers is contained in Table 11 in Appendix 1.

Figure 2. Deforestation Debt Universe under three stages of analysis. Source: AFII.



1) **290** - Forest 500 + ZSL SPOTT identified issuers with exposure to Palm, Soy, Beef, Leather, Timber or Pulp/Paper

2) **244** – Very high exposure to a single commodity OR high exposure to two or more commodities

3) **101** - Over USD2,500mn debt in G7 currencies, either at entity or parent level

Analysis of universe

Sector breakdown

Table 7 shows the number of entities in each sector, together with the exposure by commodity.

The most common sector is consumer staple products, the largest three issuers in which are Nestle, PepsiCo, and Proctor & Gamble. The key commodities driving exposure in this sector are palm oil, soy, and pulp & paper.

The second-most common sector is retail & wholesale staples. These are the downstream retailers for many consumer staple products. A significant exposure for this sector is beef.

Conversely, leather exposure is predominantly concentrated in the consumer discretionary products sector, and includes luxury goods manufacturers Kering and LVMH.

Table 7. Analysis of Deforestation Debt Universe entities by sector and commodity exposure. Source: Bloomberg, AFII.

Sector	Total	Count exposed to each commodity					
		Palm oil	Soy	Pulp & Paper	Beef	Timber	Leather
Consumer Discretionary Products	9	1	0	9	0	2	7
Consumer Discretionary Services	5	5	5	5	4	0	0
Consumer Staple Products	42	39	35	40	18	1	4
Health Care	2	2	2	2	0	0	0
Industrial Services	1	0	0	1	0	1	0
Materials	11	5	5	11	1	6	0
Oil & Gas	4	3	2	1	0	1	0
Retail & Wholesale - Staples	23	22	22	20	17	14	6
Retail & Wholesale - Discretionary	4	1	1	4	1	4	3

Regional breakdown

Table 9 shows the number of entities by region, identifying the number of significant debt issuers exposed to deforestation that are from developed markets. Nearly half are from the US and Canada (44 are from the US, and Restaurant Brands International is Canadian), and a further 25 are from Europe. This shows how important international investors can be in funding deforestation, and how much influence they could have through engagement to improve outcomes.

Only eight issuers are located in LATAM, five in Brazil and three in Chile. These issuers are listed in Table 8.

Table 9. Analysis of Deforestation Debt Universe entities by region. Source: Bloomberg, AFII.

Region	Count
APAC	23
Europe	25
LATAM	8
North America	45

Table 8. Deforestation Debt Universe issuers from LATAM region. Source: Bloomberg, AFII.

Entity Name	Country of Risk
BRF SA	BR
Cencosud SA	CL
Marfrig Global Foods SA	BR
Minerva SA/Brazil	BR
Empresas Copec SA	CL
Klabin SA	BR
Empresas CMPC SA	CL
Suzano SA	BR

Changes from RDCP

Of the original 35 issuers in the RDCP, seven are not included in the Deforestation Debt Universe, as detailed in Table 10.

Three issuers are not covered by Forest IQ, and two are covered but have no exposure to our in-scope commodities. (It is worth noting that Glencore's subsidiary Viterra is included where these is relevant commodity exposure). One entity's parent is included, and one does not have enough debt size reach our threshold.

Table 10. RDCP issuers that are not included in Deforestation Debt Universe. Source: AFII.

Issuer	Comment
Aramark	Not covered by FIQ
Auchan Retail International SA	Not covered by FIQ
Burger King Holdings Inc	Parent company included
Compass Group PLC	Not covered by FIQ
Frigorifico Concepcion SA	Not enough debt
Sodexo SA	No in-scope commodity exposure
Glencore PLC	No in-scope commodity exposure

Next steps

Having identified a comprehensive universe of significant fixed income issuers with substantial deforestation exposure, AFII intends to include it in several existing research programs.

The Box

The Box is an AFII tool that investors can use to inform their counterparty selection processes and influence bank behaviour.[50] By monitoring league tables of syndication fees generated from sustainable and unsustainable activities, investors can engage and even stop trading with the poorest performers.

Issuance from entities within the Deforestation Debt Universe can be considered to have higher exposure to deforestation. We therefore intend to include issuers from this universe in our syndication fee leagues tables, to support investors who want to engage with banks on this activity.[51]

Issuance review

At AFII we also study issuance trends, to signpost when they have the potential to change the risk exposure of benchmarked investors.[52] When issuance from deforestation-exposed companies has been higher than the overall market, investors may inadvertently increase their exposure.

On the other hand, when issuance is low, it may be that this presents an opportunity for engagement in advance of anticipated deals coming to market.

[50] For more details please see "The Box: a tool for bank influence", AFII, 20 Dec 2023, and an interactive webpage here.
[51] The latest tables, which included syndication fees from issued in the RDCP, can be found here: "The Box: syndication fee league tables Q3 24", AFII, 17 Sep 2024.
[52] For most recent analysis please see "Deforestation exposure: Q2 & Q3 2024 issuance review", AFII, 8 Oct 2024.

Bond Radar

The AFII Bond Radar is a tool developed to support investor engagement by identifying those issuers most likely to access the capital markets over the next three months.[53]

The issuers covered currently are high impact climate names, but it will be extended to include deforestation-exposed issuers in 2025.

Case study analysis

A core theme of our research work is to analyse pricing of bond curves, to identify potential risks and opportunities. The Deforestation Debt Universe will support identification of relevant issuers for deeper analysis.

For examples, please see our earlier work on Cargill, a US commodities trader,[54] Ahold, a Belgian-Dutch supermarket,[55] and Boparan, a UK-based chicken producer.[56]

Portfolio construction

One other key adjustment from the earlier RDCP work into this Deforestation Debt Universe is the shift from security to issuer analysis. As the size of the universe has extended to over 100 issuers, we have not at this stage identified example securities to track risk and performance.

Going forward, we intend to identify baskets of securities, aligned to key commodity exposures or specific sector-based financial risk, for performance analysis.

Conclusions

Deforestation and land-use change cause often-irreversible reductions in biodiversity, and harm climate mitigation efforts. These risks are therefore coming under increasing scrutiny from regulators and investors.

The Deforestation Debt Universe builds on earlier work to identify a comprehensive universe of significant fixed income issuers which have substantial deforestation exposures.

It uses a consolidated dataset from Forest IQ, which provides consistent risk exposure scoring for 11 commodities. This dataset has been used to identify those companies exposed to the most relevant commodities. We have then reduced this initial universe to include only those companies with significant hard-currency debt outstanding. This results in a final Deforestation Debt Universe of 101 issuers.

This universe will feed many streams of AFII's work, to support investors in reducing exposure to deforestation, and to ensure capital flows at the right price into sustainable businesses.

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[53] For full details please see "Bond Radar", AFII, accessed 7 Jan 2025.
[54] "Cargill's EUDR compliance: risks of a soy-prise", AFII, 14 Jun 2024.
[55] "Relative value is in the eye of the Ahold-er", AFII, 18 Mar 2024.
[56] "Boparan: in the nature of Xover investors", AFII, 29 Oct 2024.

Appendix 1 – Deforestation Debt Constituents

Table 11. Deforestation Debt Universe including commodity exposure and outstanding debt. Source Forest IQ, Bloomberg.

Count	Entity Name	Equity ticker	Credit ticker	Country of Risk	Coverage	Exposed Commodities	Total G7 debt issuer (USD mn)	RDCP
1	adidas AG	ADS GR Equity	ADSGR	DE	Forest500	Pulp & Paper, Leather,	2,603	FALSE
2	Aeon Co Ltd	8267 JP Equity	JUSCO	JP	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	5,816	FALSE
3	Ajinomoto Co Inc	2802 JP Equity	AJINOM	JP	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	2,980	FALSE
4	Amazon.com Inc	AMZN US Equity	AMZN	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	63,604	FALSE
5	Archer-Daniels-Midland Co	ADM US Equity	ADM	US	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper,	10,184	TRUE
6	Astra Agro Lestari Tbk PT	AALI IJ Equity	AALIIJ	ID	Forest500 & ZSL SPOTT	Palm oil,	6,608	FALSE
7	Barry Callebaut AG	BARN SW Equity	BARY	CH	Forest500	Palm oil, Soy, Pulp & Paper,	4,193	FALSE
8	BASF SE	BAS GR Equity	BASGR	DE	Forest500	Palm oil, Soy, Pulp & Paper,	23,039	FALSE
9	BRF SA	BRFS3 BZ Equity	BRFSBZ	BR	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	4,239	FALSE
10	Bunge Global SA	BG US Equity	BG	US	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper,	6,499	FALSE
11	Campbell Soup Co	CPB US Equity	CPB	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	8,825	FALSE
12	Cargill Inc	3091Z US Equity	CARGIL	US	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper,	18,546	TRUE
13	Carrefour SA	CA FP Equity	CAFP	FR	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	13,365	TRUE
14	Casino Guichard Perrachon SA	CO FP Equity	COFP	FR	ZSL SPOTT	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	4,830	FALSE
15	Cencosud SA	CENCOSUD CI Equity	CENSUD	CL	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	2,651	TRUE
16	Charoen Pokphand Foods PCL	CPF TB Equity	CPFTB	TH	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	2,991	FALSE
17	China Resources Building Mater	1313 HK Equity	CHRESO	CN	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	877	FALSE
18	China State Construction Engin	601668 CH Equity	CHCONS	CN	Forest500	Pulp & Paper, Timber,	5,293	FALSE
19	Cie de Saint-Gobain SA	SGO FP Equity	SGOFP	FR	Forest500	Pulp & Paper, Timber,	15,745	FALSE
20	CK Hutchison Holdings Ltd	1 HK Equity	CKHH	GB	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	40,422	FALSE
21	Clorox Co/The	CLX US Equity	CLX	US	Forest500	Palm oil, Soy, Pulp & Paper,	2,500	FALSE
22	COFCO Corp	1070Z CH Equity	COFCO	CN	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	3,787	FALSE
23	Colgate-Palmolive Co	CL US Equity	CL	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	10,114	TRUE
24	Conagra Brands Inc	CAG US Equity	CAG	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	7,572	FALSE

Count	Entity Name	Equity ticker	Credit ticker	Country of Risk	Coverage	Exposed Commodities	Total G7 debt issuer (USD mn)	RDCP
25	Costco Wholesale Corp	COST US Equity	COST	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	5,000	FALSE
26	Coty Inc	COTY US Equity	COTY	US	Forest500	Palm oil, Soy, Pulp & Paper,	3,394	FALSE
27	Daiwa House Industry Co Ltd	1925 JP Equity	DAIWAH	JP	Forest500	Pulp & Paper, Timber,	6,094	FALSE
28	Danone SA	BN FP Equity	BNFP	FR	Forest500	Palm oil, Soy, Pulp & Paper,	15,141	TRUE
29	DSM BV	DSM NA Equity	DSFIR	NL	Forest500	Palm oil, Soy, Pulp & Paper,	8,529	FALSE
30	Dunkin' Brands Group Inc	DNKN US Equity	DNKN	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	8,155	FALSE
31	Empresas CMPC SA	CMPC CI Equity	CMPCCI	CL	Forest500 & ZSL SPOTT	Pulp & Paper, Timber,	3,743	FALSE
32	Empresas Copec SA	COPEC CI Equity	COPEC	CL	Forest500	Pulp & Paper, Timber,	3,966	FALSE
33	Essity AB	ESSITYA SS Equity	ESSITY	SE	Forest500	Palm oil, Pulp & Paper,	8,676	FALSE
34	FGV Holdings Bhd	FGV MK Equity	FVGHLD	MY	Forest500 & ZSL SPOTT	Palm oil, Pulp & Paper,	0	FALSE
35	General Mills Inc	GIS US Equity	GIS	US	Forest500	Palm oil, Soy, Pulp & Paper,	17,276	TRUE
36	Genting Plantations Bhd	GENP MK Equity	GENPMK	MY	Forest500	Palm oil,	6,743	FALSE
37	Grupo Bimbo SAB de CV	BIMBOA MM Equity	BIMBOA	MX	Forest500	Palm oil, Soy, Pulp & Paper,	6,700	FALSE
38	GSK PLC	GSK LN Equity	GSK	US	Forest500	Palm oil, Soy, Pulp & Paper,	19,253	FALSE
39	Heilongjiang Agriculture Co Lt	600598 CH Equity	HLJAGR	CN	Forest500	Soy, Pulp & Paper,	0	FALSE
40	Henkel AG & Co KGaA	HEN GR Equity	HENKEL	DE	Forest500	Palm oil, Soy, Pulp & Paper,	4,235	FALSE
41	Hershey Co/The	HSY US Equity	HSY	US	Forest500	Palm oil, Soy, Pulp & Paper,	3,944	FALSE
42	Home Depot Inc/The	HD US Equity	HD	US	Forest500	Pulp & Paper, Timber, Leather,	51,135	FALSE
43	Hormel Foods Corp	HRL US Equity	HRL	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	2,850	FALSE
44	Indofood Sukses Makmur Tbk PT	INDF IJ Equity	INDFIJ	ID	Forest500 & ZSL SPOTT	Palm oil, Pulp & Paper,	4,525	FALSE
45	International Flavors & Fragra	IFF US Equity	IFF	US	Forest500	Palm oil, Soy, Pulp & Paper,	8,962	FALSE
46	J M Smucker Co/The	SJM US Equity	SJM	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	7,850	FALSE
47	JBS S/A	JBSS3 BZ Equity	JBSSBZ	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Leather,	17,264	TRUE
48	Johnson & Johnson	JNJ US Equity	JNJ	US	Forest500	Palm oil, Soy, Pulp & Paper,	43,738	FALSE
49	Kellanova	K US Equity	K	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	5,691	FALSE
50	Kering SA	KER FP Equity	KERFP	FR	Forest500	Pulp & Paper, Leather,	16,557	TRUE
51	Klabin SA	KLBN4 BZ Equity	KLAB	BR	ZSL SPOTT	Pulp & Paper, Timber,	4,805	TRUE

Count	Entity Name	Equity ticker	Credit ticker	Country of Risk	Coverage	Exposed Commodities	Total G7 debt issuer (USD mn)	RDCP
52	Koninklijke Ahold Delhaize NV	AD NA Equity	ADNA	NL	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	6,019	TRUE
53	Kraft Heinz Co/The	KHC US equity	KHC	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	20,030	TRUE
54	Kroger Co/The	KR US Equity	KR	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	22,528	TRUE
55	Lear Corp	LEA US Equity	LEA	US	Forest500	Pulp & Paper, Leather,	2,750	FALSE
56	L'Oreal SA	OR FP Equity	ORFP	FR	Forest500	Palm oil, Soy, Pulp & Paper,	6,506	FALSE
57	Louis Dreyfus Co BV	0308213D NA Equity	LOUDRE	NL	Forest500 & ZSL SPOTT	Palm oil, Soy,	6,756	TRUE
58	Lowe's Cos Inc	LOW US Equity	LOW	US	Forest500	Pulp & Paper, Timber, Leather,	35,318	FALSE
59	LVMH Moet Hennessy Louis Vuitt	MC FP Equity	MCFP	FR	Forest500	Palm oil, Pulp & Paper, Leather,	26,430	FALSE
60	Marfrig Global Foods SA	MRFG3 BZ Equity	MRFGBZ	BR	Forest500	Soy, Pulp & Paper, Beef, Leather,	4,239	FALSE
61	Mars Inc	4614Z US Equity	MARS	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	14,000	TRUE
62	Marubeni Corp	8002 JP Equity	MARUB	JP	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper, Beef, Timber,	9,158	TRUE
63	McDonald's Corp	MCD US Equity	MCD	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	41,128	TRUE
64	Minerva SA/Brazil	BEEF3 BZ Equity	BEEFBZ	BR	Forest500	Soy, Pulp & Paper, Beef, Leather,	2,650	TRUE
65	Mitsubishi Corp	8058 JP Equity	MITCO	JP	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	11,496	FALSE
66	Mitsui & Co Ltd	8031 JP Equity	MITSCO	JP	Forest500	Palm oil, Soy, Pulp & Paper,	8,191	FALSE
67	Mondelez International Inc	MDLZ US Equity	MDLZ	US	Forest500	Palm oil, Soy, Pulp & Paper,	17,763	FALSE
68	Neste Oyj	NESTE FH Equity	NESVFH	FI	Forest500	Palm oil, Soy,	4,175	FALSE
69	Nestle SA	NESN SW Equity	NESNVX	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	55,442	TRUE
70	NIKE Inc	NKE US Equity	NKE	US	Forest500	Pulp & Paper, Leather,	9,000	TRUE
71	Olam Group Ltd	OLG SP Equity	OLGPSP	SG	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper, Timber,	3,671	FALSE
72	PepsiCo Inc	PEP US Equity	PEP	US	Forest500	Palm oil, Soy, Pulp & Paper,	41,487	FALSE
73	Pertamina Persero PT	PERT IJ Equity	PERTIJ	ID	Forest500	Palm oil,	23,240	FALSE
74	Procter & Gamble Co/The	PG US Equity	PG	US	Forest500	Palm oil, Pulp & Paper,	37,325	FALSE
75	Reckitt Benckiser Group PLC	RKT LN Equity	RKTLN	GB	Forest500	Palm oil, Soy, Pulp & Paper,	9,910	TRUE
76	Restaurant Brands Internationa	QSR CN Equity	QSRCN	CA	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	14,078	FALSE
77	REWE International Finance BV	0750893D GR Equity	REWEEG	NL	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	2,751	FALSE
78	SC Johnson & Son Inc	3273Z US Equity	SCJOHN	US	Forest500	Palm oil, Pulp & Paper,	3,000	FALSE

Count	Entity Name	Equity ticker	Credit ticker	Country of Risk	Coverage	Exposed Commodities	Total G7 debt issuer (USD mn)	RDCP
79	Sekisui House Ltd	1928 JP Equity	SEKIS	JP	Forest500	Pulp & Paper, Timber,	5,540	FALSE
80	Seven & i Holdings Co Ltd	3382 JP Equity	SEVENI	JP	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber,	15,713	FALSE
81	Shell PLC	SHEL LN Equity	SHELLN	US	Forest500	Palm oil, Soy,	48,170	FALSE
82	Sigma Holdco BV	1577926D NA Equity	SIGHCO	NL	Forest500	Palm oil, Soy, Pulp & Paper,	7,479	FALSE
83	Staples Inc	SPLS US Equity	SPLS	US	Forest500	Pulp & Paper, Timber,	7,225	FALSE
84	Starbucks Corp	SBUX US Equity	SBUX	US	Forest500	Palm oil, Soy, Pulp & Paper,	15,700	FALSE
85	Stora Enso Oyj	STERV FH Equity	STERV	FI	Forest500	Pulp & Paper, Timber,	3,247	FALSE
86	Suzano SA	SUZB3 BZ Equity	SUZANO	BR	Forest500 & ZSL SPOTT	Pulp & Paper, Timber,	15,896	FALSE
87	Sysco Corp	SYY US Equity	SYY	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	10,935	TRUE
88	Tapestry Inc	TPR US Equity	TPR	US	Forest500	Pulp & Paper, Leather,	4,888	FALSE
89	Target Corp	TGT US Equity	TGT	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	14,001	TRUE
90	Tesco PLC	TSCO LN Equity	TSCOLN	GB	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	6,681	TRUE
91	Tyson Foods Inc	TSN US Equity	TSN	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Leather,	9,621	TRUE
92	Unilever PLC	ULVR LN Equity	UNANA	GB	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	28,977	TRUE
93	UPM-Kymmene Oyj	UPM FH Equity	UPMFH	FI	Forest500	Pulp & Paper, Timber,	7,551	FALSE
94	VF Corp	VFC US Equity	VFC	US	Forest500	Pulp & Paper, Leather,	4,674	FALSE
95	Viterra Inc	VT CN Equity	GLENLN	AU	Forest500 & ZSL SPOTT	Palm oil, Soy,	28,898	FALSE
96	Walgreens Boots Alliance Inc	WBA US Equity	WBA	US	Forest500	Palm oil, Soy, Pulp & Paper,	9,088	FALSE
97	Walmart Inc	WMT US Equity	WMT	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	39,297	TRUE
98	WH Group Ltd	288 HK Equity	SHUANG	HK	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	2,540	FALSE
99	Wilmar International Ltd	WIL SP Equity	WILSP	CN	Forest500 & ZSL SPOTT	Palm oil, Soy, Pulp & Paper,	2,576	FALSE
100	WM Morrison Supermarkets Ltd	MRW LN Equity	MRWLN	GB	Forest500	Palm oil, Soy, Pulp & Paper, Beef, Timber, Leather,	6,798	FALSE
101	Yum! Brands Inc	YUM US Equity	YUM	US	Forest500	Palm oil, Soy, Pulp & Paper, Beef,	7,458	TRUE

Appendix 2 – Forest IQ methodology details

Below is an extract from the Forest IQ methodology[57] showing some of the assessment category thresholds for Metric 1, used by AFII to understand deforestation risk exposure.

Metric 1 Volume-based assessments of companies' exposure to deforestation

Volumes with risk of deforestation (tonnes)					
Assessment category	**Palm oil producer**	**Palm oil trader**	**Soy trader**	**Beef trader**	**Score**
Critical exposure	>6,000,000	>1,000,000	>5,000,000	> 500,000	5
Very high exposure	1,000,000 - 6,000,000	400,000 - 1,000,000	1,000,000 - 5,000,000	100,000 - 500,000	4
High exposure	100,000 - 1,000,000	10,000 - 400,000	500,000 - 1,000,000	10,000 - 100,000	3
Moderate exposure	<100,000	<10,000	<500,000	<10,000	2
Not exposed	0	0	0	0	0

Metric 1 Volume-based sector assessments of manufacturers and retailer's exposure to deforestation

Palm oil

Sector-based volumes with risk of deforestation (tonnes)			
Assessment category	**Palm oil manufacturer**	**Palm oil retailer**	**Score**
Critical exposure	>1,000,000	>100,000	5
Very high exposure	100,000 - 1,000,000	10,000 - 100,000	4
High exposure	1,000 - 100,000	1,000 - 10,000	3
Moderate exposure	<1,000	<1,000	2
Not exposed	0	0	0

[57] P25 – 29, "Forest IQ Methodology", Forest IQ, 2 Oct 2024.

Appendix 3 – Forest IQ data providers

Table 12: Forest IQ Data Providers. Source: Data Providers listed below.

Data Provider	Notable Reputable Funders	Number of Supporters /Partners/ Members	Notable Supporters and Partners	First Publication/ Founding Date
CDP	**Governments:** Norwegian Agency for Development Cooperation, Netherlands Enterprise Agency. **Foundations**: Children's Investment Fund Foundation, Laudes Foundation, David and Lucile Packard Foundation, Oak Foundation, William and Flora Hewlett Foundation. **Intergovernmental Organisations:** World Business Council for Sustainable Development, World Health Organization (WHO), Worldwide Fund for Nature (WWF).	187	Apple Inc, Danone, Brookfield Renewable Partners L.P., Unilever, Intel Corporation, Tesla, Inc., Patagonia, Inc., Microsoft Corporation, Nestlé S.A., Nike, Inc.	2010
Deforestation Action Tracker	Nature4Climate, Norad.	2	Global Canopy, Forest500.	2022
Forest 500	UK government: UK aid, Climate and Land Use Alliance.	5	National Wildlife Federation, Forest Trends, Fern, ZSL, CDP, GREENPEACE, SEI.	2014
SEI York	**University of York , SEI Funders:** Sida (Swedish International Development Cooperation Agency), Swedish Ministry of the Environment via Formas, European Commission, Swedish Research Council Formas, Swedish Foundation for Strategic Environmental Research (Mistra).	undisclosed	York Environmental Sustainability Institute	1989
Trase	**Governments:** NICFI Norway's International Climate and Forest Initiative, UK Government, FCDO, FGMC, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). **Foundations:** The Gordon and Betty Moore Foundation, Quadrature Climate Foundation, David and Lucile Packard Foundation.	11	**Universities:** University of Santa Barbara, Catholic University of Louvain, University of York, Chalmers University of Technology. **Intergovernmental Organisations:** European Forest Institute. **International non-profit:** SEI, Global Canopy.	2016
SPOTT	**Governments:** NICFI Norway's International Climate and Forest Initiative, UK Government: UK Aid. **Foundations:** David and Lucile Packard Foundation.	21	National Wildlife Federation, Forest Trends , Code REDD , Fern , ZSL.	2014
RSPO	The RSPO is funded by its 6037 members.	6037	Same as funders.	2004

This research is funded by the Gordon and Betty Moore Foundation through The Finance Hub, which was created to advance sustainable finance.

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