



THE IMPACT OF DUTCH IMPORTS ON NATURE LOSS WORLDWIDE

OUR LAND FOOTPRINT FOR SOY, PALM OIL, MAIZE,
COCONUT, COCOA, COFFEE, BEEF & LEATHER AND TIMBER

This report summarises findings of original research undertaken by Alauda Consulting Ltd and WWF Netherlands

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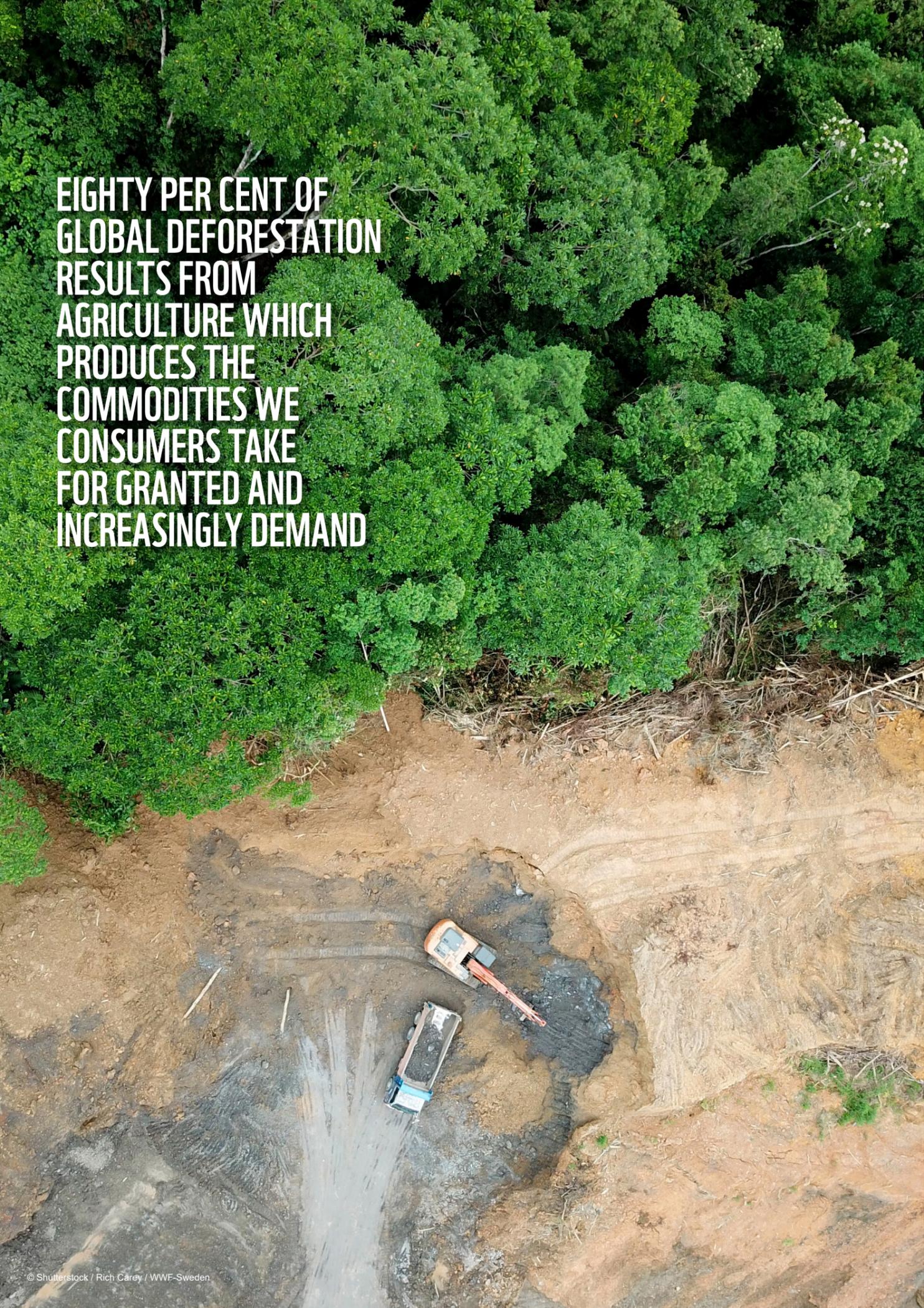
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An aerial photograph showing a dense green forest on the left and a cleared, brownish area on the right. A bulldozer and a truck are visible in the cleared area, indicating deforestation. The text is overlaid on the forest area.

**EIGHTY PER CENT OF
GLOBAL DEFORESTATION
RESULTS FROM
AGRICULTURE WHICH
PRODUCES THE
COMMODITIES WE
CONSUMERS TAKE
FOR GRANTED AND
INCREASINGLY DEMAND**

INTRODUCTION

We are in an era of unprecedented global environmental change, driven almost entirely by human activities. The climate crisis, disruption of biogeochemical cycles, conversion of natural ecosystems, overfishing and pollution are driven by overconsumption, unsustainable extraction rates, and by the methods we use to produce the goods we consume.

One of the major drivers of the biodiversity and climate emergencies is the conversion of natural ecosystems. Eighty per cent of global deforestation results from agriculture which produces the commodities we consumers take for granted and increasingly demand. Furthermore, the conversion of natural ecosystems often results in local and indigenous peoples losing their customary land, and along with it, part of their traditional livelihoods and cultural reference.

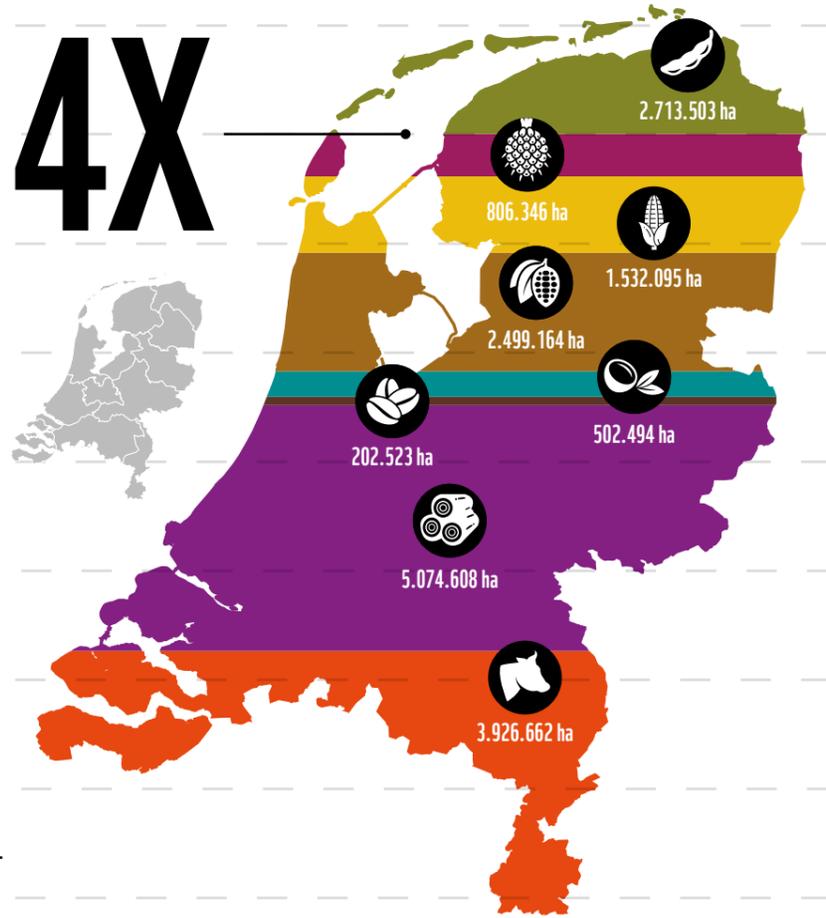
The European Commission is developing legislation making it mandatory for companies to conduct due diligence on deforestation and degradation associated with the commodities they place on the European market. As it stands now, this regulation will have a profound effect on companies operating in the Netherlands – obliging them to be truly vigilant and transparent about the environmental harms embedded within their

global supply chains. It is crucial that the EU legislation is strong and effective, covering the conversion of all natural ecosystems and all relevant commodities and their products. A robust legal framework is an important starting point to motivate businesses to reconsider their impact on deforestation and conversion, yet they should not stop at meeting the bare minimum legal requirements of this regulation and use this opportunity to eliminate deforestation and conversion and human rights abuses from their supply chain and that of their suppliers.

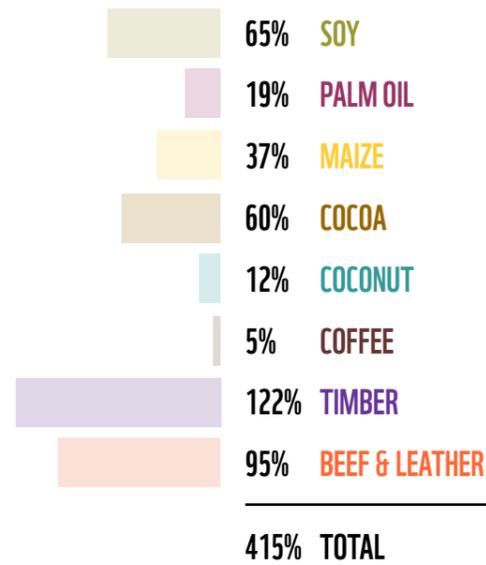
The purpose of this report is to highlight the critical role that the Netherlands plays in importing and trading agricultural and forest commodities that are associated with deforestation and conversion. The report assesses the quantity and provenance of the Netherlands' import and use of eight deforestation and conversion risk commodities: soy, palm oil, maize, coconut, cocoa, coffee, beef & leather, and timber. It estimates the area of land required to supply these imports, the risk of deforestation and conversion, and social issues associated with that land footprint, and the resulting greenhouse gas emissions. It provides recommendations for governments, businesses, the financial sector and citizens.

KEY FINDINGS FOR THE NETHERLANDS

AN AREA FOUR TIMES THE SIZE OF THE NETHERLANDS IS REQUIRED EACH YEAR TO SUPPLY THE NETHERLANDS' IMPORTS OF JUST EIGHT COMMODITIES



Average annual land footprint (% the size of the Netherlands), by commodity



Land footprint and greenhouse gas emissions

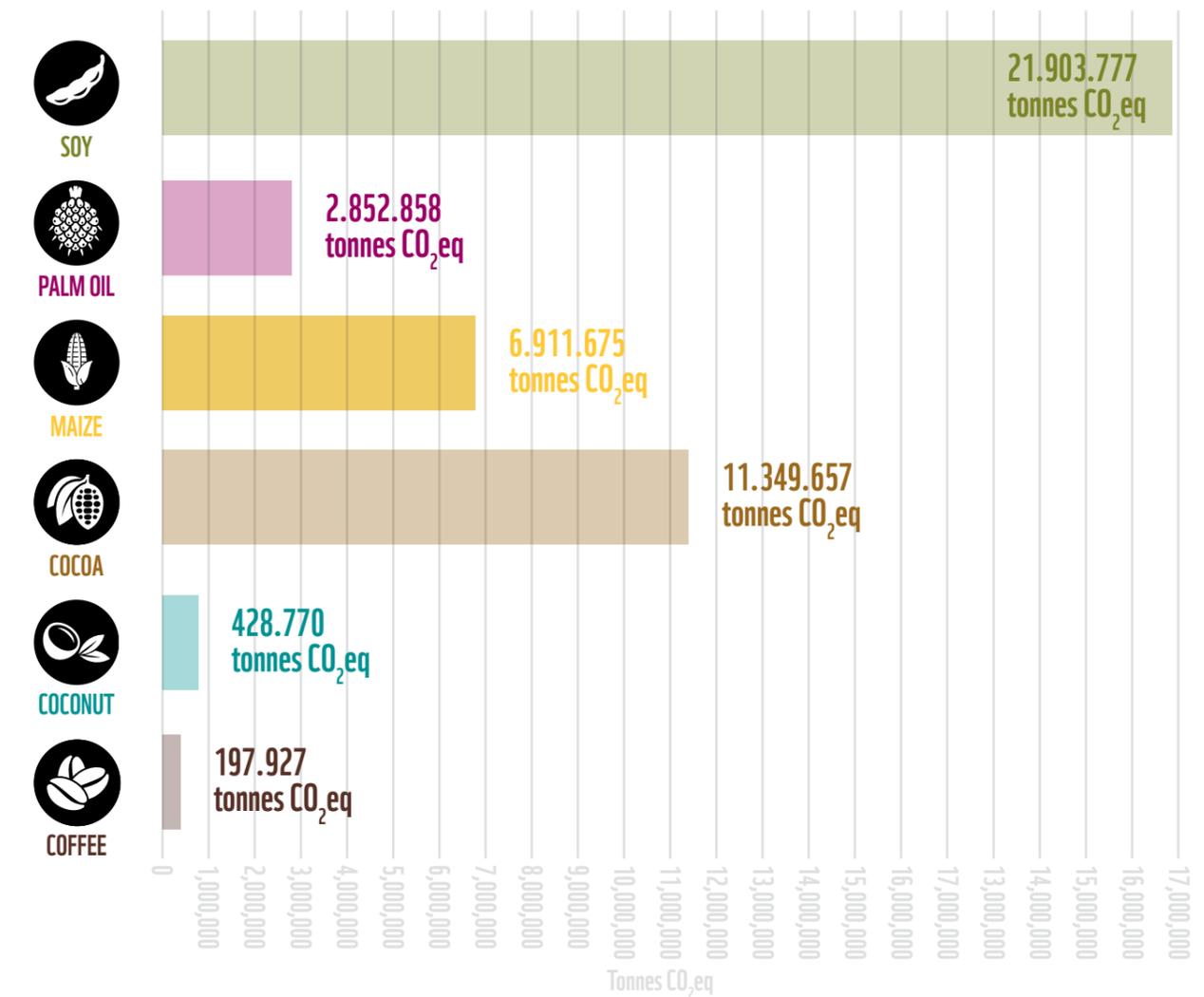
The land required to supply the Netherlands' imports of just eight commodities (soy, palm oil, maize, coconut, cocoa, coffee, beef & leather, and timber) is an estimated 17.3 million hectares a year. This is equivalent to more than four times the Netherlands' land area.

The largest contributions to the Netherlands' external land footprint are imports of timber (5.1 million hectares each year), beef & leather (3.9 million hectares), soy (2.7 million hectares) and cocoa (2.5 million hectares). The greenhouse gas emissions associated with the conversion of natural ecosystems for the six commodities for which emissions could be estimated (soy, palm oil, maize, cocoa, coconut and coffee) amounted to an average of 43.6 million tonnes of CO₂-equivalent each year between 2017 and 2021. This is

equivalent to 24% of the Netherlands' domestic greenhouse gas emissions in 2019. Three commodities, soy (50%), cocoa (26%) and maize (16%) are together responsible for over 90% of these greenhouse gas emissions.

EMISSIONS FROM LAND USE CHANGE ASSOCIATED WITH IMPORTS OF JUST SIX COMMODITIES ARE EQUIVALENT TO ALMOST ONE QUARTER OF THE NETHERLANDS' DOMESTIC GREENHOUSE GAS EMISSIONS

Greenhouse gas emissions from land use change associated with the Netherlands imports, by commodity



High risk footprint

Forty-three percent of the imported land footprint – 7.5 million hectares – is from countries that have a high or very high risk of deforestation, poor rule of law and a poor record of labour rights. A high proportion of the land footprints of imported palm oil (86%), cocoa (80%), coffee (69%) soy (48%) and timber (30%) is produced by countries assessed to have a high or very high risk. Large areas of land in high risk countries are also required to supply the Netherlands with commodities such as maize and coconuts, which have received less attention for their environmental impacts.

Trading deforestation

The Netherlands is a significant global actor in the trade of many of these commodities. For example, it imports 23% of the cocoa produced globally. The Netherlands exports a high proportion of these imported commodities to other countries, often after additional processing (for example of cocoa into chocolate). For example, 85% of soy imports are exported to other countries, and over half of all imported palm oil, cocoa, coffee, coconut, timber and beef and leather are exported. Exports of products from the Netherlands require an estimated 57% of the total land footprint (9.9 million hectares) emphasising the Netherlands' critical role in international trade, and the country's global responsibility for ensuring that commodities are free from deforestation and conversion and social harm.

THE NETHERLANDS EXPORTS REQUIRE 57% OF THE IMPORTED LAND FOOTPRINT TO PRODUCE, EMPHASISING THE COUNTRY'S GLOBAL RESPONSIBILITY FOR ENSURING THAT COMMODITIES ARE FREE FROM DEFORESTATION AND CONVERSION AND SOCIAL HARM



Txai Suruf is an environmental defender protecting the Amazon

© Tessel in 't Veld / WWF-Netherlands

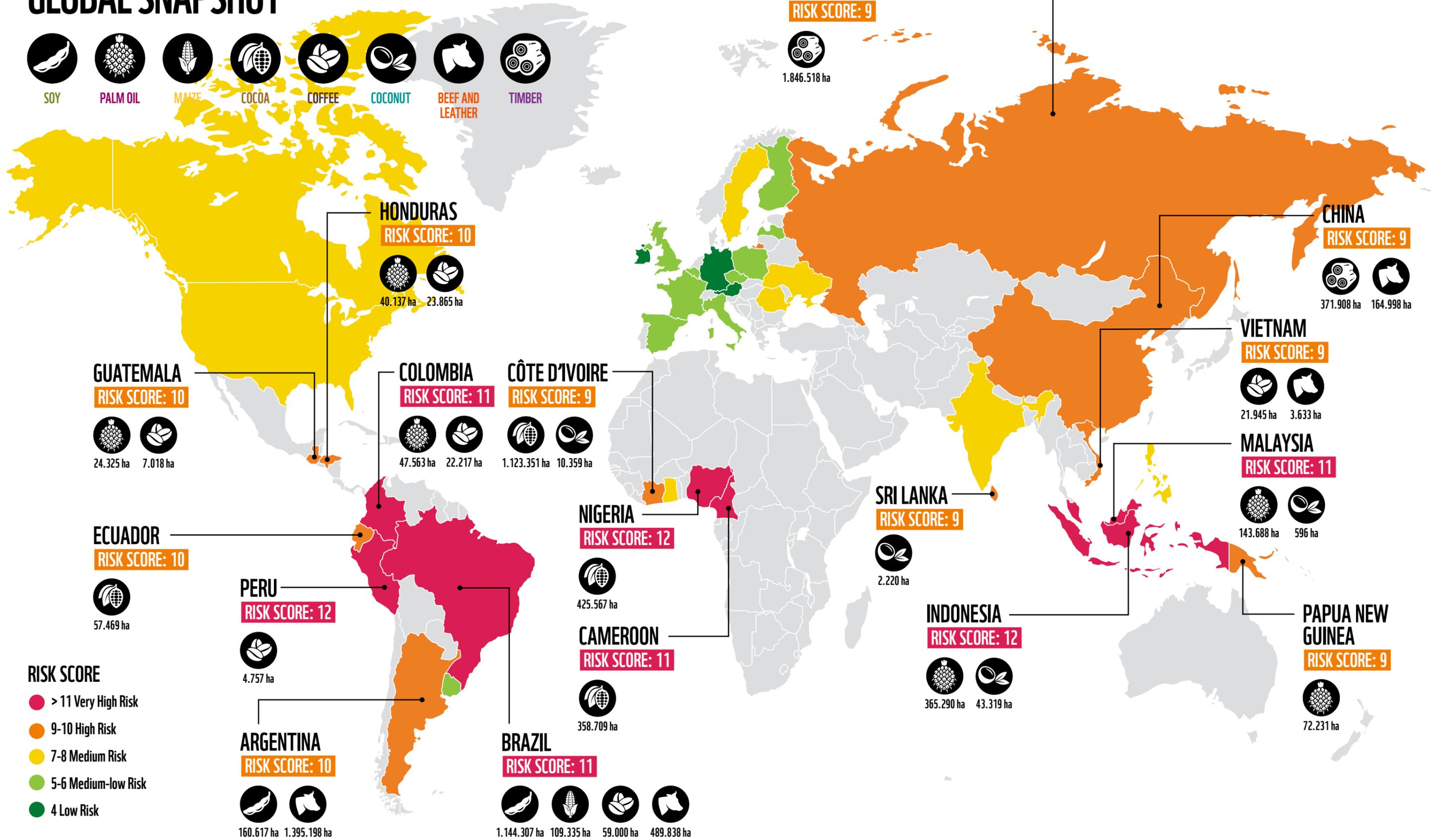
ENVIRONMENTAL DEFENDERS

The production of agricultural and forest commodities can sometimes be associated with social impacts beyond the issues of rule of law and workers' rights that are assessed in this analysis. Amongst the most extreme of these is the killing of environmental defenders.

In 2020, at least 227 environmental defenders who were taking peaceful action against environmental destruction were murdered globally¹. At least a third of these were indigenous people. Logging and agribusiness were amongst the leading motives for these murders and for other human rights abuses perpetrated against environmental defenders. The Netherlands imports significant quantities of commodities associated with deforestation and conversion from many of the countries in which the highest number of environmental defenders were killed: coffee and palm oil from Colombia (65 killings), coconuts from the Philippines (29), soy, maize, coffee, and beef and leather from Brazil (20), and palm oil and coffee from Honduras (17).



GLOBAL SNAPSHOT



- RISK SCORE**
- > 11 Very High Risk
 - 9-10 High Risk
 - 7-8 Medium Risk
 - 5-6 Medium-low Risk
 - 4 Low Risk

RECOMMENDATIONS

The Netherlands is signatory to several international instruments and commitments to prevent deforestation. Under the Aichi biodiversity targets it has agreed to ensure that the *'rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced'*². The Glasgow Leaders' Declaration on Forests and Land Use commits to *'conserve forests and other terrestrial ecosystems'*³. It is difficult to see how the EU's environmental aspirations - such as *'to have a neutral or positive environmental impact'*⁴ - could be achieved if deforestation and conversion of all ecosystems are not eliminated from the Netherlands' supply chains.

Despite the commitments, global deforestation and biodiversity loss continues at an alarming rate and failure to fully account for the Netherlands' deforestation footprint and associated risks overseas threatens the country's environmental credibility and the long-term sustainability of commodity supply.

We call on...



THE GOVERNMENT

→ Support a strong EU regulation on deforestation-free products as an outcome of the ongoing political process by:

- Demanding that the scope of the European Commission proposal is extended beyond deforestation and forest degradation to also include the conversion of natural ecosystems such as grasslands, savannahs and wetlands and that all deforestation and conversion risk commodities, their products and by-products are included within the scope of the regulation. The scope should also include a definition that meaningfully protects forests from degradation.
- Providing a stringent due diligence system with full traceability of all commodities and products to the site of production, to ensure effective transparency of the supply chains, respect of protected areas, protection

of traditional communities' land rights and inclusion as well as active participation of all relevant stakeholders, including smallholder producers.

- Ensuring effective and timely monitoring and implementation of the new legislation through providing sufficient resources to the Dutch authorities involved in the enforcement of the new law, including through carrying out a sufficient number of checks and applying dissuasive penalties and sanctions when the law is broken.

→ Pushing for strong action targets, in partnership with key producer and consumer countries to protect species and habitats as part of the Post-2020 Global Biodiversity Framework under the Convention on Biological Diversity.

→ Taking responsibility as a major trading nation to eliminate deforestation, conversion of natural ecosystems and human rights abuses from commodity production and promote fair and transparent supply chains through bilateral and multilateral initiatives.



COMPANIES

→ Set robust policies, time-bound commitments and implement transparent monitoring, verification and public reporting to eliminate deforestation and conversion and human rights abuses from all supply chains by 2025 at the latest, with a cut-off-date for deforestation and conversion of 2020. This includes materials that are imported to the Netherlands and then traded (after further processing or otherwise) with other countries. Policies, commitments and processes should be fully aligned with the [Accountability Framework](#) and [WWF DCF Principles and Asks](#).

→ Increase transparency of supply chains and require traceability for all commodity volumes sourced from direct and indirect suppliers – ensuring that traceability cascades upstream to the origin through supplier requirements and engagement.





→ Advocate for further action among peers and wider stakeholders (e.g. government and civil society) for policies to achieve deforestation/conversion-free supply chains (e.g. supporting calls for robust environmental and social standards in trade agreements, national and EU legislation).

→ Collaborate with relevant stakeholders – including smallholder producers – in production landscapes and biomes to overcome systemic drivers of deforestation, conversion, and human rights abuses and to achieve long-term protection, restoration, and inclusive local development outcomes across these landscapes.



FINANCIAL INSTITUTIONS

→ Set clear and immediate policies with defined goals and pre-screening and monitoring systems in line with proposed due diligence commitments for the finance sector in the deforestation law and which align with [WWF guidance on deforestation for financial institutions](#). These policies should ensure that no lending or investments are associated with illegal environmental or social practices, or with any deforestation or conversion of natural ecosystems, nor any further destruction of nature. Policies and systems for green- or sustainability-labelled financial products should be aligned with the EU taxonomy for sustainable activities to ensure consistency and transparency.

→ Assess and disclose current risk exposure through an assessment of investees and clients' operations. Engage early with identified clients and investees to align their activities with deforestation and conversion free policy. Report publicly on risks, opportunities, dependencies and impacts and on the progress in addressing these; and request clients to do so. [The Taskforce for Nature-related Financial Disclosures \(TNFD\)](#) will provide a framework for this reporting that can ensure consistency across the industry.

→ Invest at scale in opportunities linked to nature positive activities through instruments such as green bonds or sustainability focused funds and enable the transition to

sustainable commodity production (e.g. finance sustainable agriculture practices, nature-based solutions, and support projects to improve sustainability in at risk landscapes).



CITIZENS

→ Adopt a "[planet-based diet](#)" to reduce the demand for agricultural expansion which drives deforestation and conversion:

- Eat more plant-based and less animal-based foods.
- Buy fresh and local products above ultra-processed foods.
- Choose products from a more sustainable method of agriculture, with a preference for organic products.
- Bring more variation and balance to your plate, everything in moderation.

→ Pressure your national minister and Members of European Parliament to support strengthening of the draft EU deforestation due diligence regulation and other regulations and agreements to halt the destruction of nature and safeguard human rights.

→ Demand greater transparency and action from your supermarket and favourite brands to ensure that the products you enjoy are not associated with deforestation, conversion, or human rights abuses.

SOY

Global soy production has increased eightfold since the 1960s. This growth in production has been dominated by three countries: Argentina, Brazil and the USA, which together account for more than 80% of global production.

Most soy is processed into meal and oil, with direct human consumption minimal outside East Asia. Soy meal is high protein and is widely used as livestock feed, especially for poultry and pigs but also in aquaculture and in intensive beef and dairy production systems.

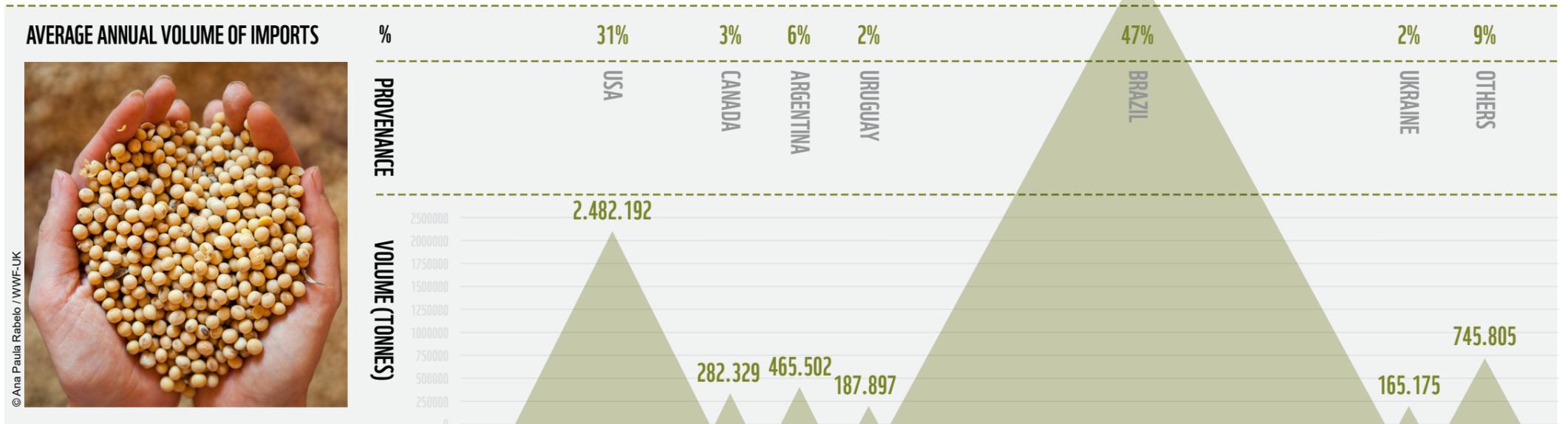
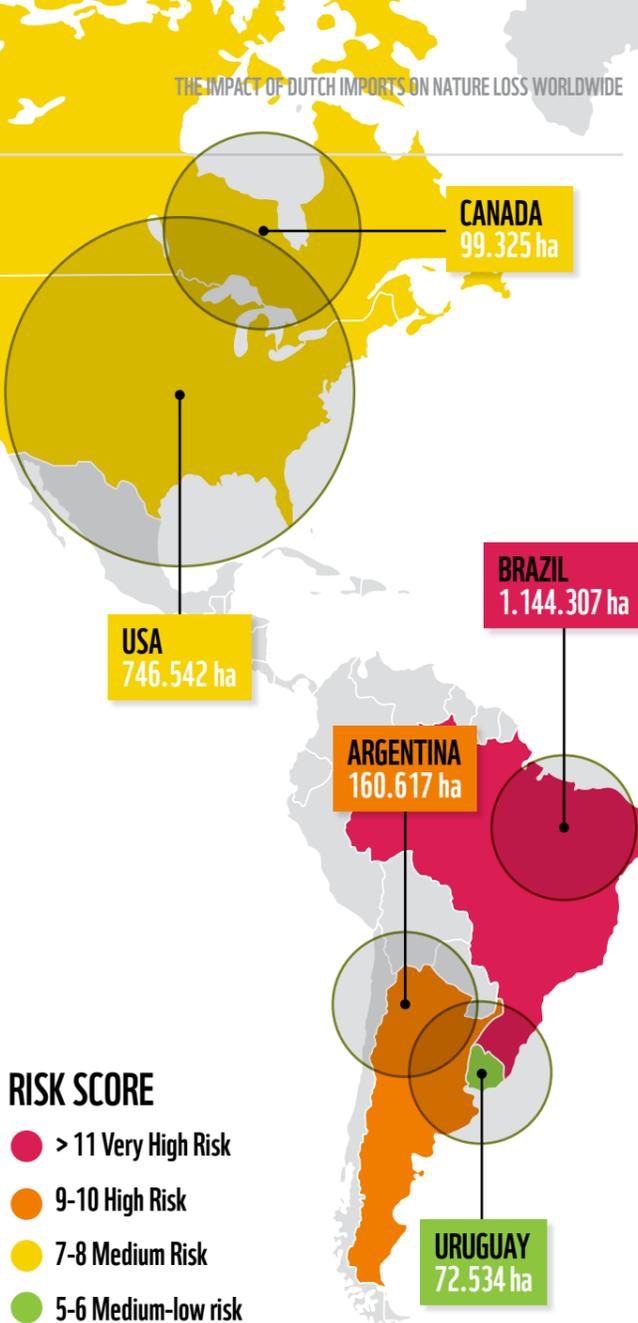
AN ESTIMATED 88% OF THE NETHERLANDS' USE OF SOY IS USED TO FEED LIVESTOCK⁵

The Netherlands' imports, consumption⁶, exports

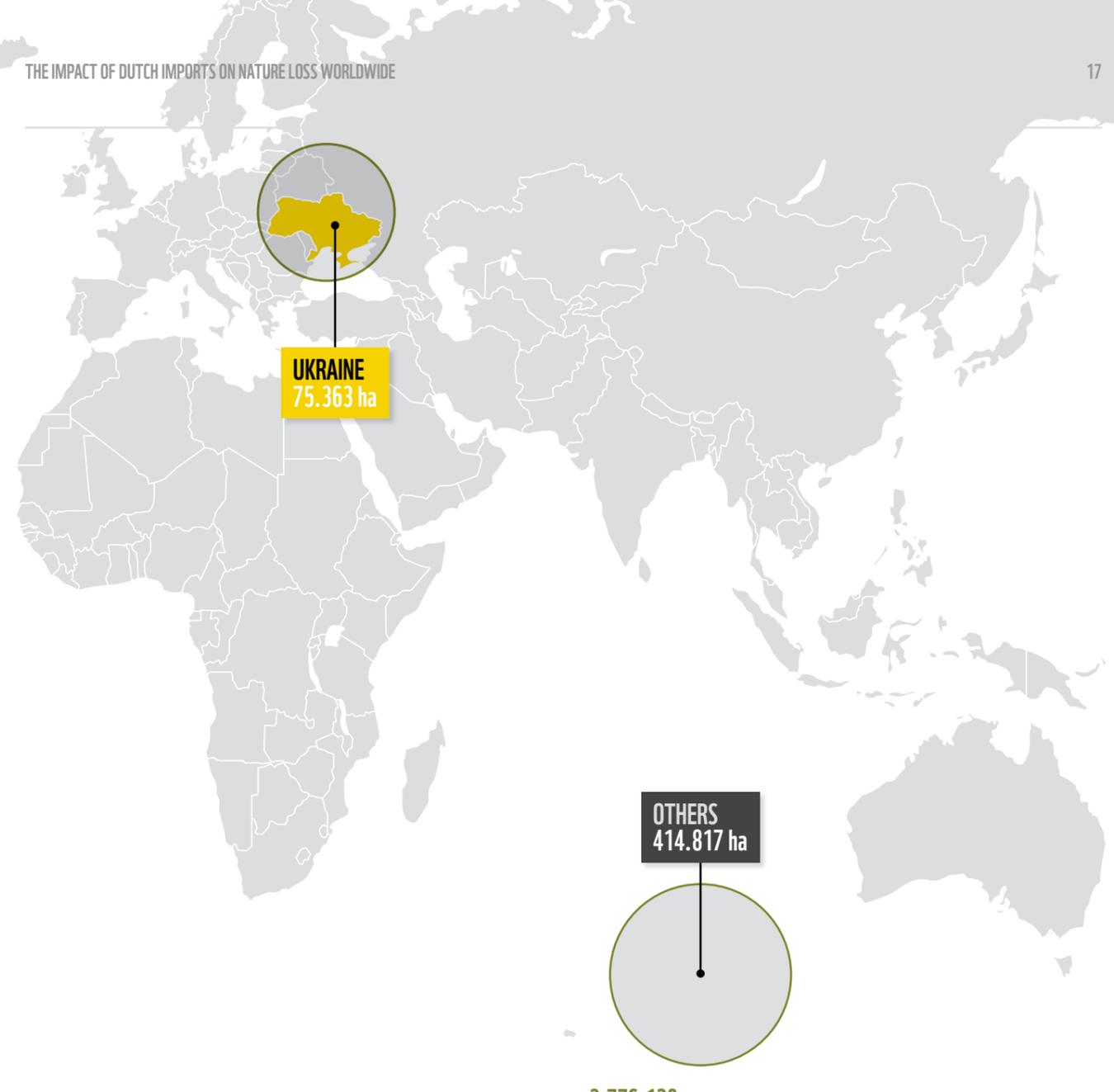
From 2017 to 2021, the Netherlands imported on average 8.1 million tonnes of soy per year, as soybeans, meal and oil and embedded within meat (especially poultry and pigs) and livestock products (e.g., milk and eggs). Eighty-eight to 90% of the combined volumes of soybeans, meal and oil imported by the Netherlands is used to feed livestock⁷. An estimated 85% of the imported soy was re-exported, typically after processing imported beans into soy meal, but also through significant exports of biodiesel and poultry.

The land required to produce this imported quantity of soy was on average 2.7 million hectares each year, an area nearly two-thirds the size of the Netherlands. This land footprint falls predominantly in Brazil (42%), the USA (28%) and Argentina (6%) and is increasing. Forty-eight percent of the land footprint comes from high and very high-risk countries, especially Brazil and Argentina. It should be noted that the expansion of soy production from the Great Plains in the USA is one of the main drivers of ecosystem conversion there, alongside maize and wheat.

The greenhouse gas (GHG) emissions from land-use change resulting from the Netherlands' soy imports are an estimated 21.9 million tonnes CO₂-equivalent per year between 2017 and 2021 – equivalent to 12% of the Netherlands domestic emissions from all sources in 2019. This is by far the largest carbon footprint of any of the commodities analysed here.



© Ana Paula Rabelo / WWF-UK



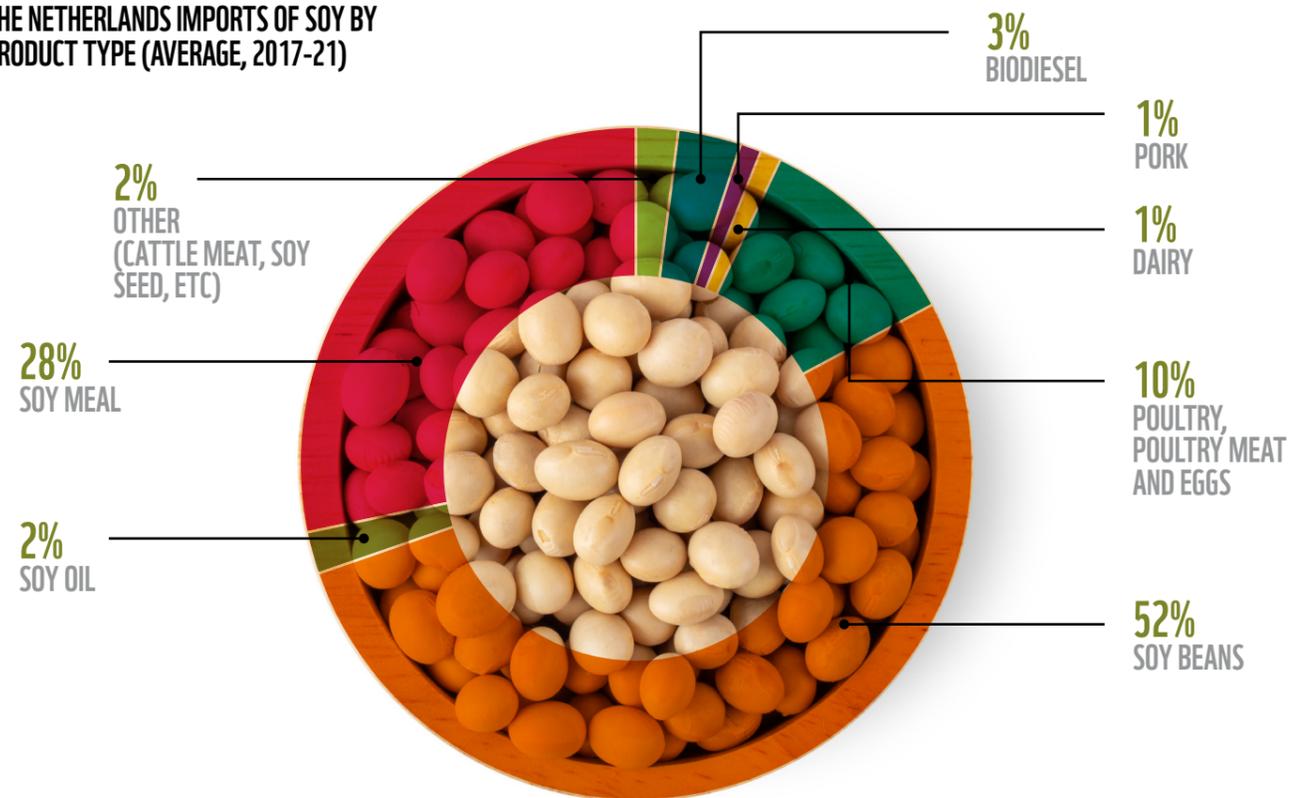
AN AREA NEARLY TWO THIRDS THE SIZE OF THE NETHERLANDS IS REQUIRED TO SUPPLY DUTCH IMPORTS OF SOY

Impacts and risks

Soybeans and derived products are estimated to be responsible for almost one third of the deforestation embodied in crop and livestock products imported into the EU⁸. The expansion of soy production is also associated with widespread conversion of grassland and savannah ecosystems, including the threatened Cerrado in Brazil, the great plains in the USA, and the Gran Chaco and Pampas in Argentina⁹. Soy can also act as an indirect driver of deforestation and conversion, displacing cattle ranching towards the forest frontier and driving up the price of converted land.

The most prominent soy certification schemes are the Roundtable on Responsible Soy (RTRS), ProTerra and the International Sustainability and Carbon Certification (ISCC) which together certify less than 3% of global soy production. Although it can lead to positive environmental and social outcomes at farm level, certification does not prevent new deforestation and conversion in high-risk landscapes, and it is not enough to make the global soy market conversion-free.

THE NETHERLANDS IMPORTS OF SOY BY PRODUCT TYPE (AVERAGE, 2017-21)



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Key sourcing landscape: the Brazilian Cerrado

The Cerrado is a complex ecosystem of savannas, grasslands and forests in Brazil. Its high biodiversity and endemism give it global importance: it contains about 5% of the world's biodiversity and roughly a third of all species found there are endemic, including the giant armadillo (*Prionates maximus*), the northern tiger cat (*Leopardus tigrinus*), and the maned wolf (*Chrysocyon brachyurus*).

The Cerrado ranks amongst the most threatened biomes in South America¹⁰, and more than half of the Cerrado's original area has already been cleared of its native vegetation. Most of the conversion has occurred since the 1970s, driven principally by soy and cattle production. For example, a large expansion of soy plantations took place in Mato Grosso, with a ~60% increase in cropland area between 2006 and 2017¹¹, and the biome now produces over half of Brazil's entire soy crop¹².





The Netherland's imports from the Cerrado

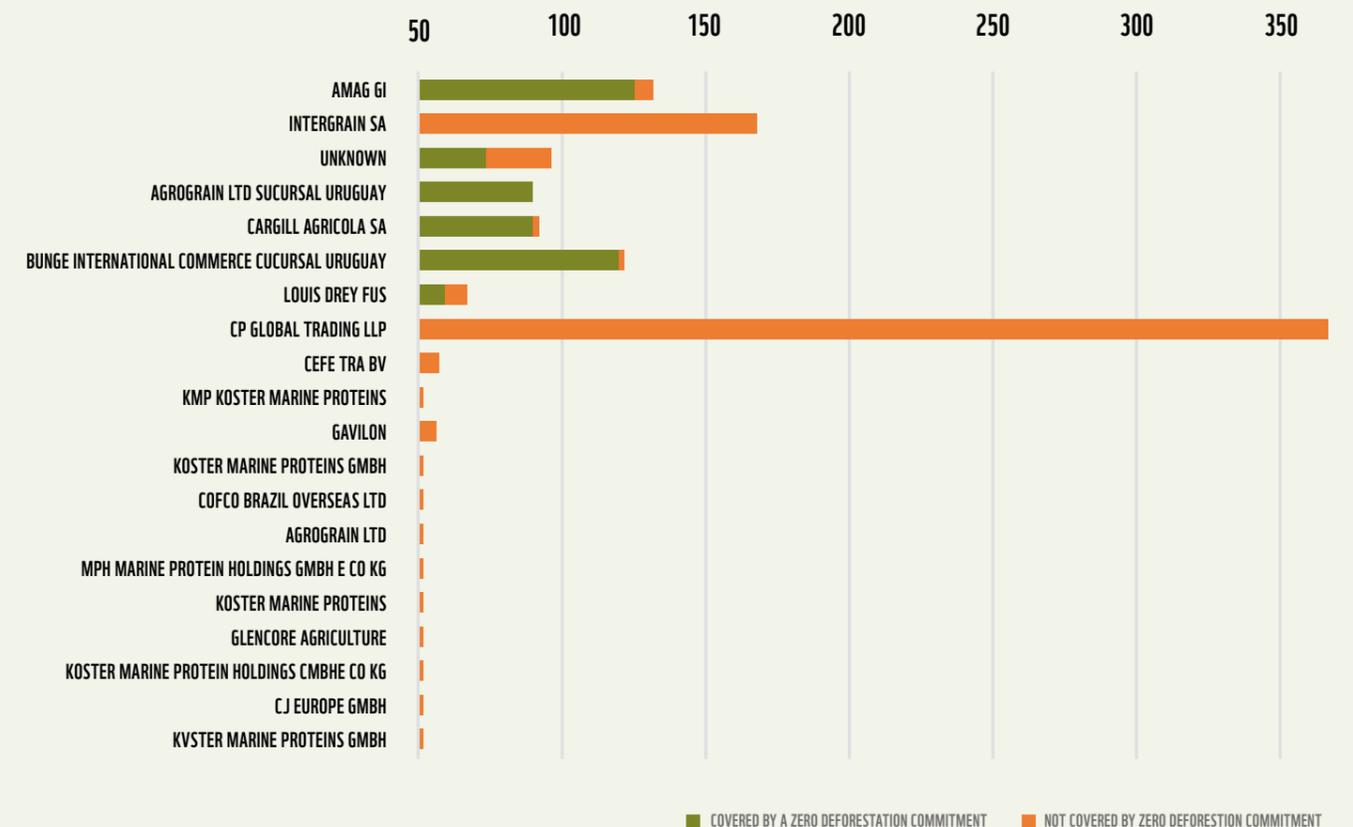
1.75 million tonnes of soy were exported directly¹³ from the Cerrado to the Netherlands in 2018, accounting for 45% of the Netherlands' direct soy imports from Brazil¹⁴. These imports are highly concentrated, with 85% coming from just two states, Mato Grosso and Goias. Both states are also centres of deforestation and conversion, together accounting for 23% of the area of habitat loss attributed to soy in Brazil.

The Netherland's direct imports of soy from the Cerrado were associated with an estimated 41,000 hectares of conversion in total between 2009-18, with resulting cumulative greenhouse gas emissions estimated at 5.95 million tonnes CO₂-equivalent.

Companies trading soy from the Cerrado to the Netherlands

Just eight companies were responsible for at least 82% of all the Netherlands' imports from the Cerrado. They include subsidiaries of some of the largest global grain and oilseed traders, such as Cargill, Bunge, and Louis Dreyfus, as well as large Brazilian producers and traders (e.g., Amaggi). Just half of these imports (52%) were covered by corporate zero deforestation commitments. Despite this, imports of all the major traders were associated with conversion of the Cerrado. Of equal concern is that one third of the imported deforestation and conversion (34%) was from soy that is ostensibly covered by corporate zero deforestation pledges.

DEFORESTATION (HECTARES)



PALM OIL

Palm oil is the most productive oil crop per hectare and is extremely versatile: palm oil, palm kernel oil and their derivatives are estimated to be present in more than 50% of packaged supermarket products, whilst palm kernel meal is mainly used as livestock feed.

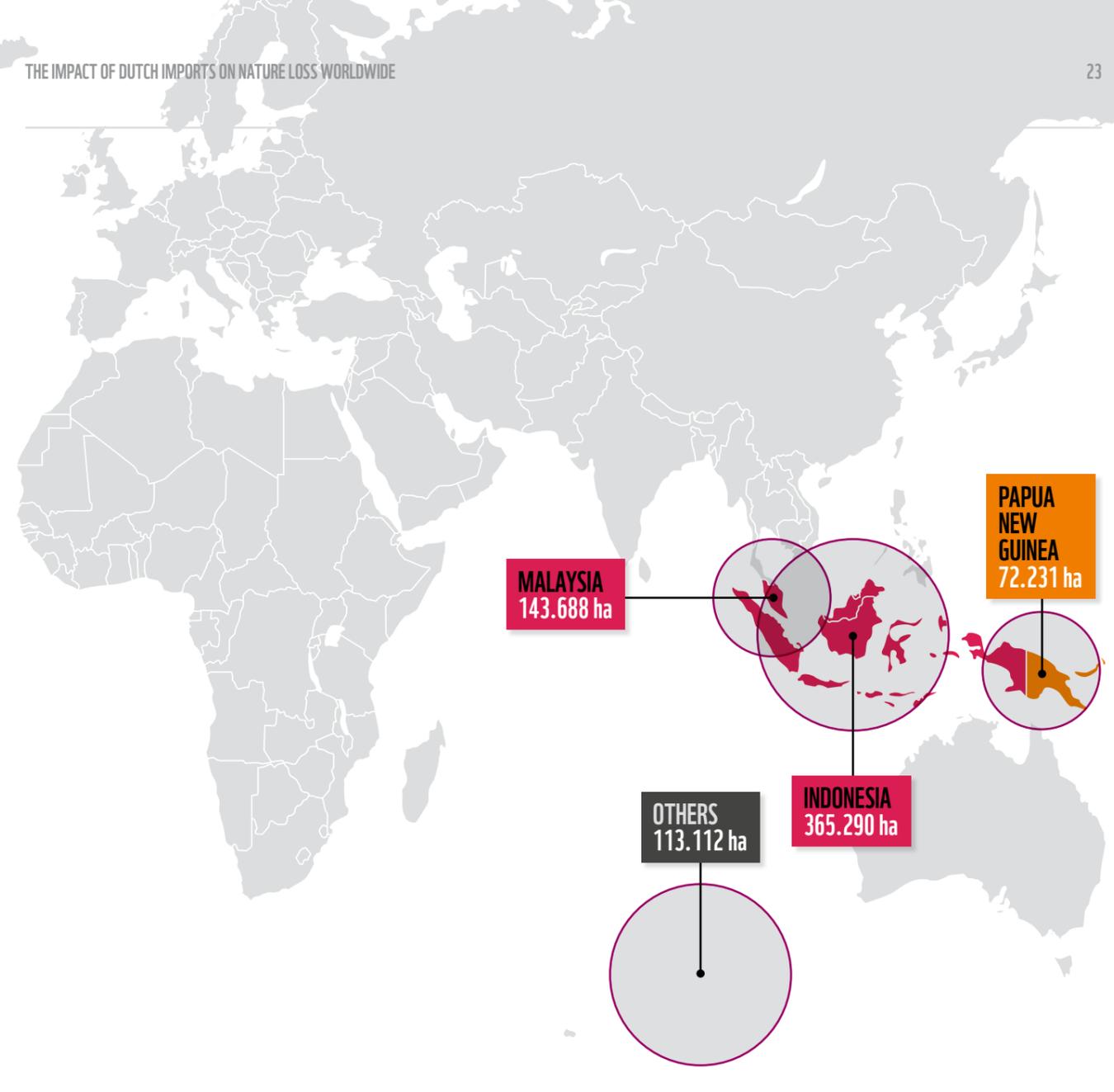
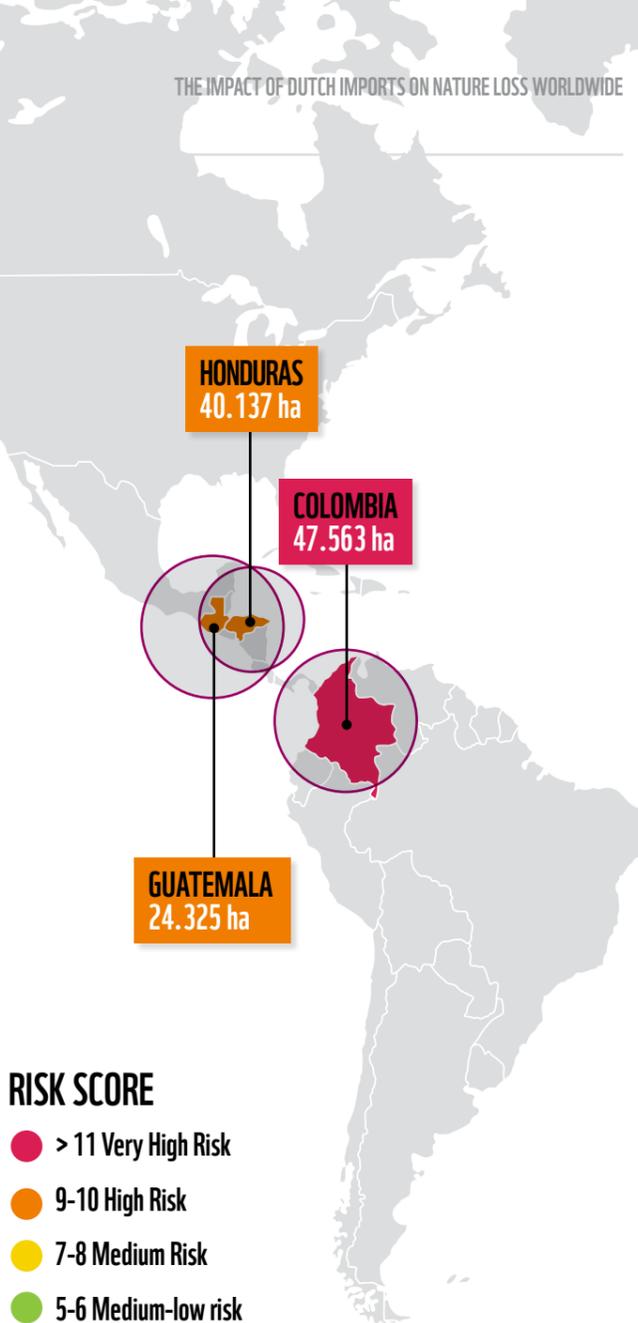
Global palm oil production has increased from 15.2 million tonnes in 1995 to an estimated 62.9 million tonnes in 2017. Large-scale palm oil plantations produce approximately 60% of the world's production with much of the rest grown by an estimated three million smallholders. Palm oil is predominantly produced by Indonesia (60% of global production) and Malaysia (24%). There has also been a marked increase in palm oil production in other parts of the world in recent years, largely in South and Central America, Thailand and western Africa.

The Netherlands' imports, consumption, exports

On average 5.59 million tonnes of palm oil was imported into the Netherlands every year between 2017 and 2021, as palm oil, palm kernel oil, palm kernel meal and embedded within imported foods such as margarine and bakery products. Imports increased by around half a million tonnes during the period. Forty-one per cent of imports were consumed within the Netherlands, the remainder was exported.

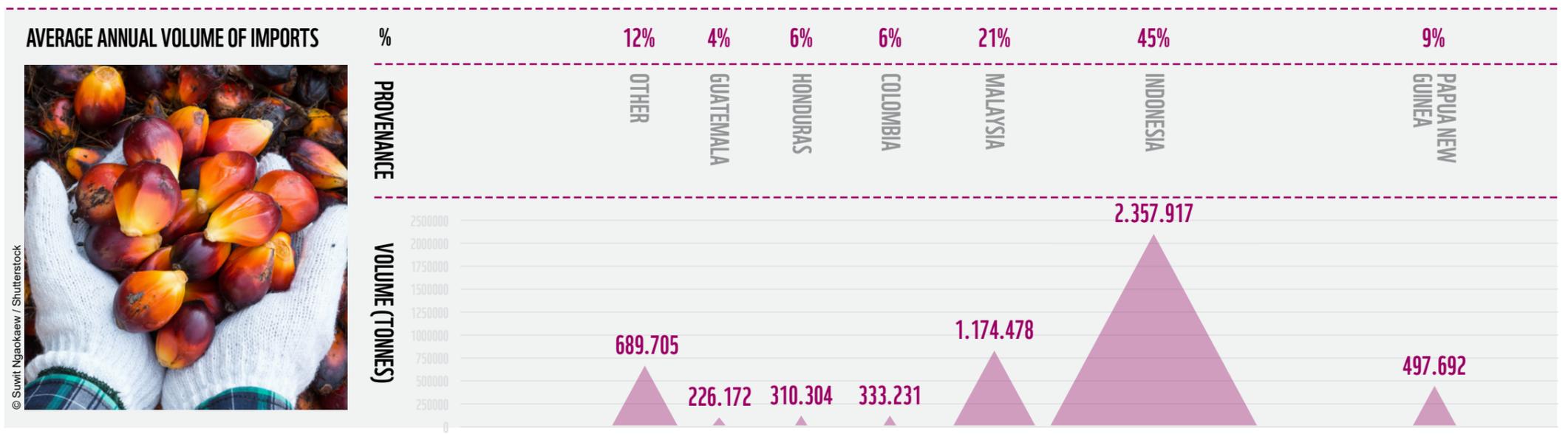
The land required to supply the Netherlands' palm oil imports between 2017 and 2021 was on average 0.81 million hectares per year, almost equivalent to the combined land area of North Brabant and Friesland. Indonesia (42%) and Malaysia (21%) dominate the Netherlands' palm oil footprint, but there is a noticeable supply from the Americas – Colombia (6%), Honduras (6%) and Guatemala (4%) in particular. All of these countries are high or very-high risk locations due to high rates of tree cover loss, a high proportion of natural forest loss, and poor rule of law and record of workers' rights violations. As a result, at least 86% of the palm oil imported by the Netherlands was from high or very-high risk countries.

The estimated GHG emissions from land use change of palm oil imported to the Netherlands were 2.85 million tonnes CO₂-equivalent per year – equal to around 2% of the Netherlands domestic GHG emissions.

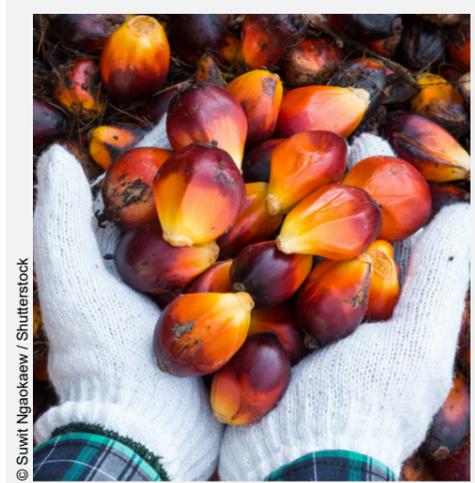


RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk



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AT LEAST 86% OF THE PALM OIL IMPORTED BY THE NETHERLANDS WAS FROM COUNTRIES WITH A HIGH RISK OF DEFORESTATION AND HUMAN RIGHTS ISSUES

Impacts and risks

The expansion of palm oil cultivation has long been linked with deforestation. A study concluded that 45% of oil palm plantations studied in southeast Asia were in areas that had been forest in 1989¹⁵. A significant part of this deforestation is embedded in global trade.

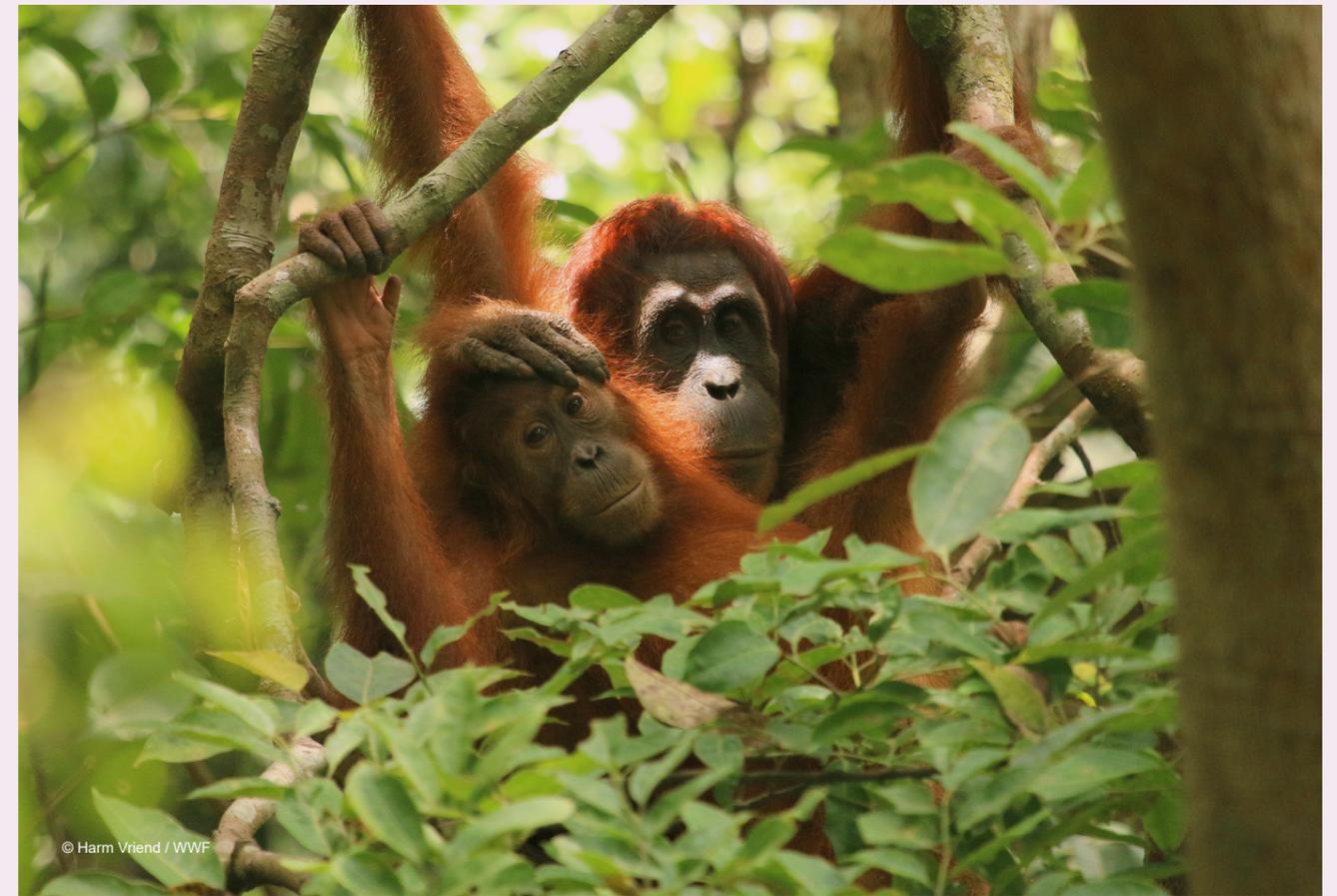
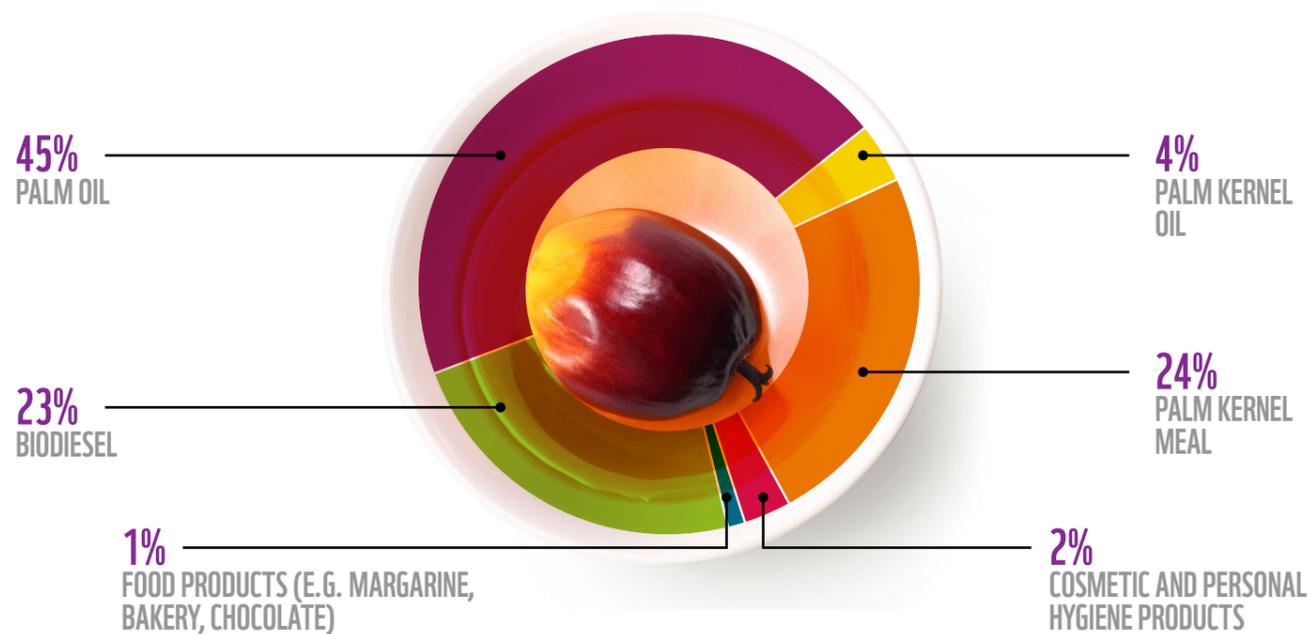
The economic and social impacts of palm oil are complex and contradictory. Oil palm cultivation has improved the incomes for many rural people, including smallholder farmers. It has also supported the development of rural economies and the growth of national economies of producer countries. However, oil palm production has often been associated with land use rights issues (particularly in Indonesia, but also in other

producer countries), forced and child labour (especially Indonesia and Malaysia), and issues relating to the terms and conditions of labour (such as wages, health and safety and gender discrimination)¹⁶.

The main certification scheme for oil palm is the Roundtable on Sustainable Palm Oil (RSPO). RSPO certified palm oil now accounts for 19% of global production. Less than 6% of the combined palm oil, palm kernel oil, palm kernel meal, refined and embedded palm oil that is imported into the Netherlands is claimed to be RSPO certified¹⁷. However, several critiques have reduced confidence that RSPO certificates guarantee palm oil is produced without deforestation and exploitation. This has prompted a drive to develop a more robust standard. A major drawback in the RSPO system is the lack of controls on the uncertified portion of mass balance certified palm oil¹⁸. This is likely to be the major source of deforestation-associated palm oil in many European markets, where certification levels are high, but are in large part mass balance.

Indonesia and Malaysia have both developed national palm oil certification systems. It is important to note that the controls on deforestation within these national standards are generally regarded as less stringent than those in the most rigorous voluntary, international schemes.

THE NETHERLANDS IMPORTS OF PALM OIL BY PRODUCT TYPE (AVERAGE, 2017-21)



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Key sourcing landscape: Riau Province, Indonesia



Indonesia produces approximately 60% of the world's palm oil. One fifth of that comes from Riau Province on the island of Sumatra¹⁹. The natural ecosystems of the island of Sumatra, and Riau province within it, are amongst the most biodiverse places on earth. For example, the Tesso Nilo forest in Riau has possibly the highest diversity of vascular plants of any tropical forest in the world²⁰. Twenty per cent of the 2475 plant and animal species recorded in Sumatra are endangered²¹. Some of the more iconic species include Sumatran tiger, Sunda pangolin, sun bear, Sumatran rhinos, and Asian elephant.

The rate of increase in Riau's oil palm area and palm oil production has been astonishing: in 2008 there were 1.38 million hectares of oil palm, producing 4.8 million tonnes of crude palm oil. By 2020 this had increased to 2.74 million hectares (a quarter of the province's land area) and 9.5 million tonnes²².



RIAU LOST MORE THAN 1.7 MILLION HECTARES OF FOREST BETWEEN 2011 AND 2020, MORE THAN ONE-FIFTH OF ITS FOREST COVER IN 2010

The growth of the palm oil sector has made a significant contribution to Riau's gross regional domestic product, created jobs, and provides many smallholders with an income above the minimum wage²³. However, poverty and unemployment rates have changed little, and the incidence of public health hazards such as fires (sometimes lit deliberately to clear land for new plantations) and the associated air pollution have increased²⁴. The expansion of oil palm plantations onto land that had customary or indigenous rights has generated conflict²⁵.

Riau lost more than 1.7 million hectares of forest between 2011 and 2020, more than one-fifth of its forest cover in 2010²⁶. Of particular concern in Riau is the conversion and degradation of peat swamp forest. Since 1990, 70% of Riau's peat swamp forests have been cleared and most of the remaining forests are degraded²⁷. Oxidation of the organic matter in drained peat swamps results in extreme carbon dioxide emissions, and drained peat is highly flammable: once alight, peat fires can burn for months or even years.

A large proportion of the oil palm estates in Riau have been developed without the correct permits and are in effect illegal²⁸: including up to 2 million hectares of the province's palm oil area²⁹. The Indonesian government has made significant efforts to verify the legality of oil palm plantations, through the introduction and subsequent revision of the Indonesian Sustainable Palm Oil (ISPO) standard. While ISPO certification can provide an indication of whether legality has been met, it does not give any indication of whether this was given to a management unit that had been or is currently deforesting or that has adopted a zero-deforestation commitment in its supply chain.

The Netherland's imports from Riau

The only direct publicly available data tracing palm oil from Riau to the Netherlands is for 2015³⁰. However, given the rapid expansion of oil palm cultivation in Riau, as well as the turnover in companies' supply bases, this is considered too dated to be used for analysis.

In the absence of up-to-date data tracing oil palm from Riau to the Netherlands, the supply bases of five companies with significant operations in the Netherlands were examined to assess their links to palm oil from Riau³¹. Of these companies, only two, Olenex and Bunge Lodders Croklaan (BLC), provide lists of mills that supply their facilities in the Netherlands. Cargill (who have major facilities in the Netherlands), and AAK (who own a palm oil refinery in Rotterdam) only supply lists of their global palm oil supply base. In the absence of greater transparency, it is therefore assumed that oil palm products originating in Riau could be part of their imports to the Netherlands. A fifth company, Viterro B.V., is headquartered in the Netherlands. They do not provide any public information on their palm oil supply base, but source large quantities of palm kernel meal (763,852 tonnes in 2019³²) which they trade as animal feed.

All of the companies assessed have strong links to palm oil from Riau. The Universal Mill List (a database that attempts to list all known palm oil mills with their geographic coordinates and ownership) lists a total of 217 mills in Riau³³. All companies source from some of Riau's mills, and in the case of Cargill and AAK, from most of them.

The Roundtable on Sustainable Palm Oil (RSPO) is a voluntary standards system that is by far the most widely used in the palm oil sector. None of the companies have more than 20% of their Riau supply base certified.

The low levels of certification coupled with the sheer complexity and lack of transparency of palm oil supply chains makes it almost inevitable that some material from environmentally and socially undesirable sources will enter supply chains. For example, only Bunge Lodders Croklaan does not have at least one of the six mills that have been found to receive illegal fresh fruit bunches from within Tesso Nilo National Park within their supply base (see Table, below). Given that only a fraction of the fresh fruit bunch supply from within the National Park has been traced to mills, this almost certainly underestimates the supply chain linkages between Tesso Nilo and the Netherlands. Tesso Nilo National Park was established in Riau in 2004 and at the time included some of the largest contiguous areas of lowland rainforest remaining in Sumatra. An estimated 75% of the area of the national park is now occupied by oil palm plantations³⁴, and at least 50 mills operate in the area³⁵.

MAIZE

Maize is the third largest plant-based human food source (after wheat and rice), is a major animal feed and biofuel feedstock, and is widely processed for edible oil, refined sugars and for numerous chemical purposes. Within the EU, the predominant use of maize is animal feed, with over 57 million tonnes used as feed, which is 70% of all maize used within the bloc³⁷. Rotterdam hosts Europe's largest bioethanol refinery, owned by Alco Energy, and which is dedicated to producing bioethanol from maize.

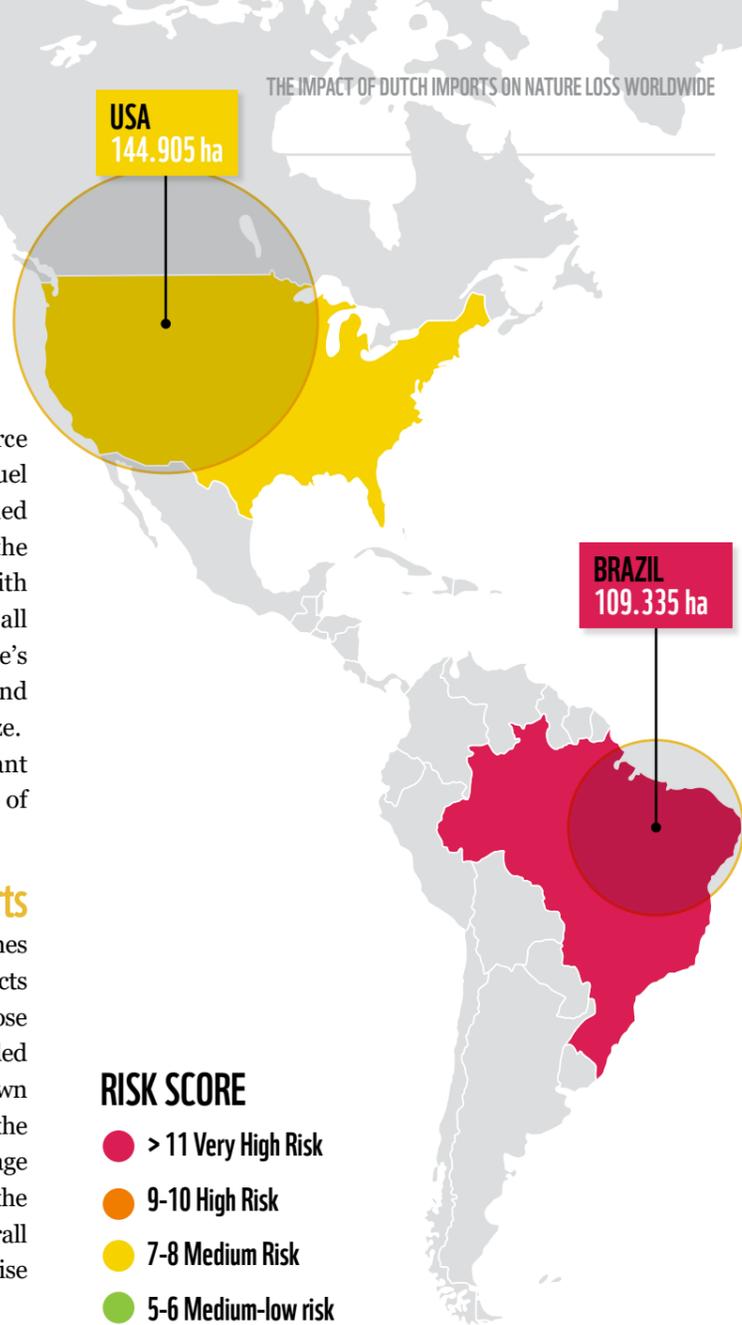
The United States and China are the predominant producers of maize, accounting for 33% and 23% of global production respectively.

The Netherlands' imports, consumption, exports

The Netherlands imported an average of 10.1 million tonnes of maize each year between 2017-21, as maize, as products derived from maize (e.g., vegetable oil, high fructose corn syrup) or products in which maize is embedded in production (e.g., ethyl alcohol). The country's own production averaged 0.13 million tonnes per year over the same period – equivalent to 1.3% of imports. An average of 3.7 million tonnes were exported each year (36% of the combined domestic production plus imports). The overall trend is a decline in imports and consumption and a rise in exports.

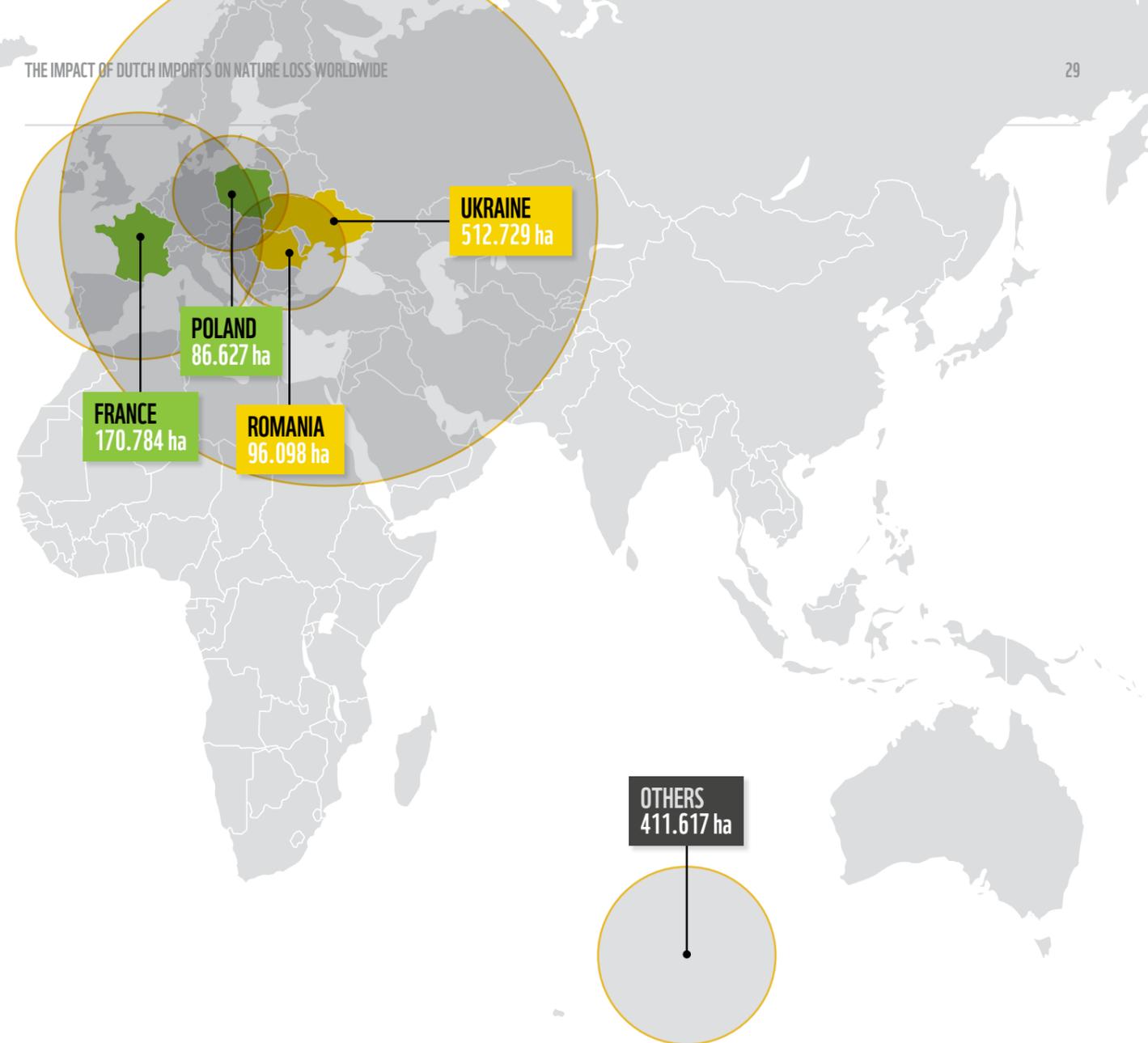
The land required to supply the Netherlands' maize imports was on average 1.53 million hectares each year, equivalent to over one third of the Netherlands' total land area. The Netherlands' imports are predominantly from two geographies: Europe and the Americas. One third of the land area required to supply the Netherlands with its demand for imports was in the Ukraine (33%), with a further 11% in France and 9% in the United States. The only major supplier to the Netherlands that ranks as very high risk is Brazil (7% of total land area).

The estimated GHG emissions from land use change for those imports was 6.9 million tonnes CO₂-equivalent per year, equal to approximately 4% of the Netherlands' domestic emission in 2019.



RISK SCORE

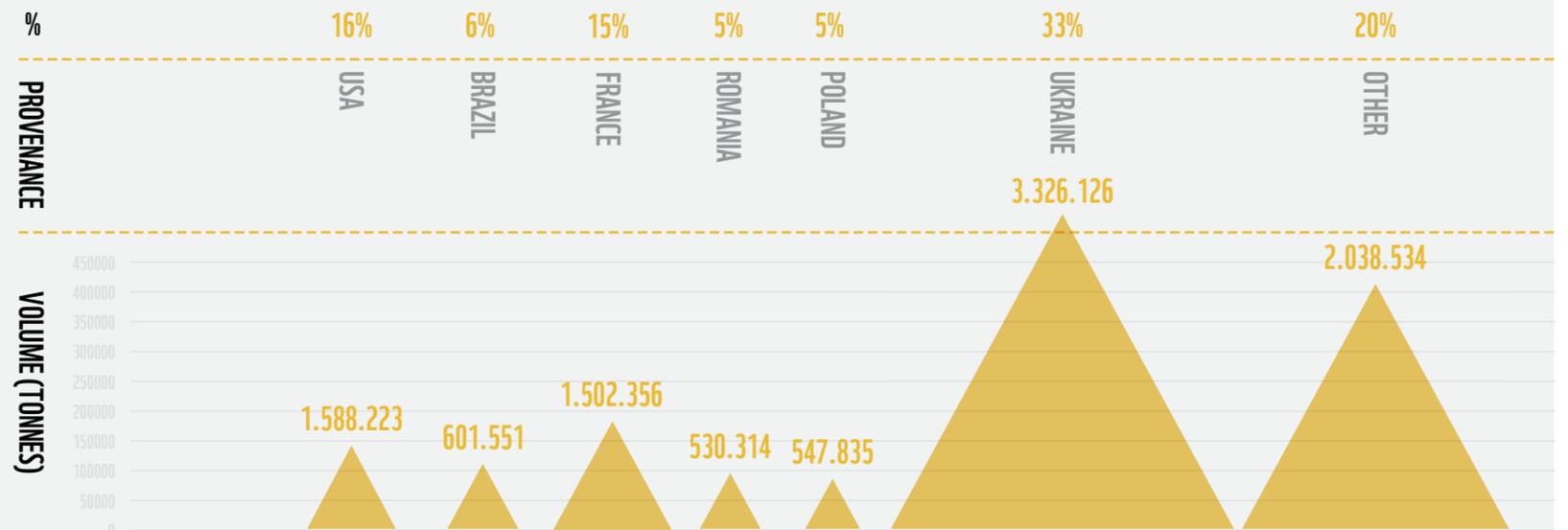
- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk



AVERAGE ANNUAL VOLUME OF IMPORTS



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Impacts and risks

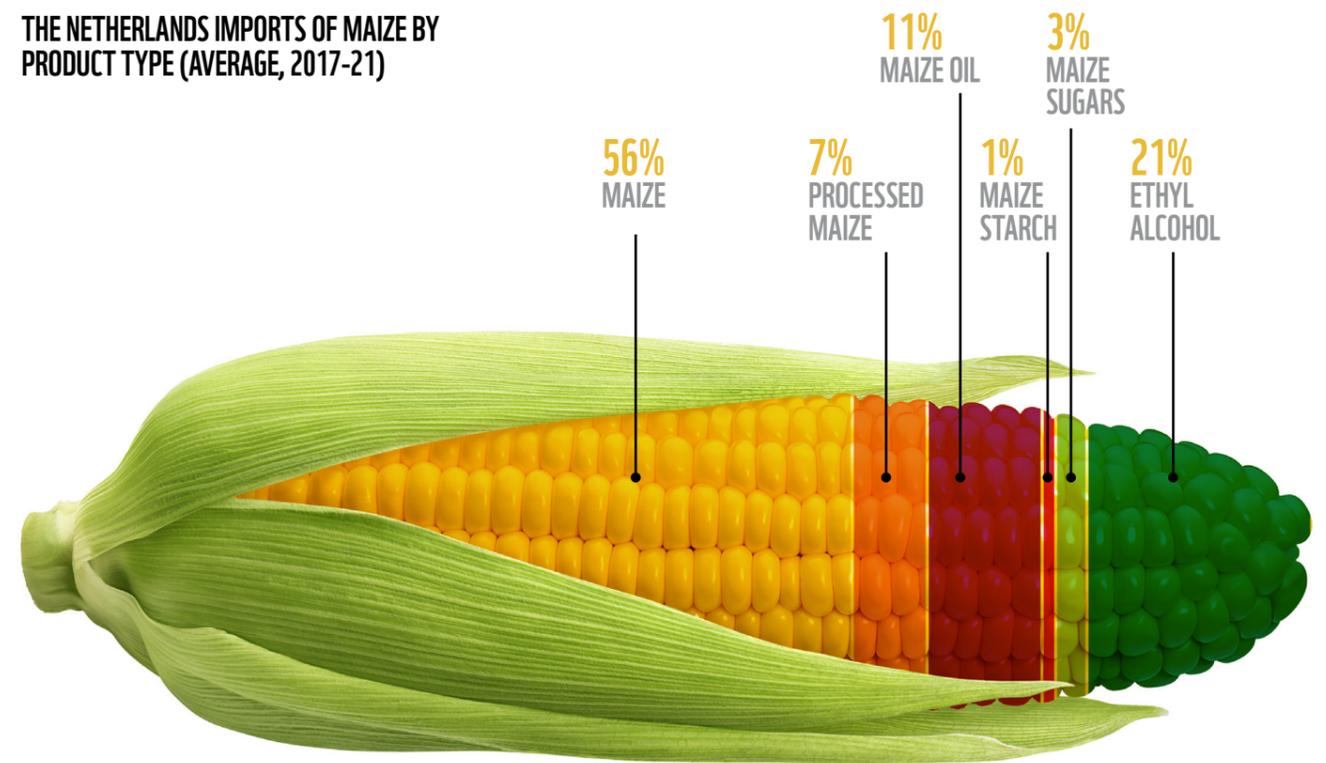
Maize has drawn less scrutiny for its environmental and social impacts than many other crops. However, it is one of the main drivers of the conversion of the Great Plains ecosystem in the United States: approximately 70% of the conversion of grasslands between 2018-2019 was for three crops: maize (25%), soy (22%), and wheat (21%)³⁸. In Brazil, maize is often cropped alternately with soy, meaning that it has a significant role in conversion of natural ecosystems and the resulting GHG emissions from land use change in that country.

There is no sector-specific certification system for maize that operates at a significant scale, nor significant overarching efforts to reduce the deforestation and conversion impacts of the crop (although some of maize's products, such as ethanol

used in biofuels, are covered by The EU Renewable Energy Directive (EU RED) and certification schemes designed to verify compliance with EU RED, such as the ISCC certification system).

THE LAND REQUIRED TO SUPPLY THE NETHERLANDS' IMPORTS OF MAIZE IS OVER 1.5 MILLION HECTARES EACH YEAR AN AREA EQUIVALENT TO ONE THIRD OF THE NETHERLANDS' LAND AREA"

THE NETHERLANDS IMPORTS OF MAIZE BY PRODUCT TYPE (AVERAGE, 2017-21)



MAIZE IS A MAJOR DRIVER OF ECOSYSTEM CONVERSION AND THE RESULTING GREENHOUSE GAS EMISSIONS IN BRAZIL AND THE USA

COCOA

The majority of cocoa is produced by smallholders, with more than 90% of global cocoa production originating from farms covering only 2-5 hectares. Côte d'Ivoire and Ghana are the major global exporters, whilst the Netherlands is the world's largest importer of cocoa beans and the world's second largest cocoa processor³⁹ (behind Côte d'Ivoire).

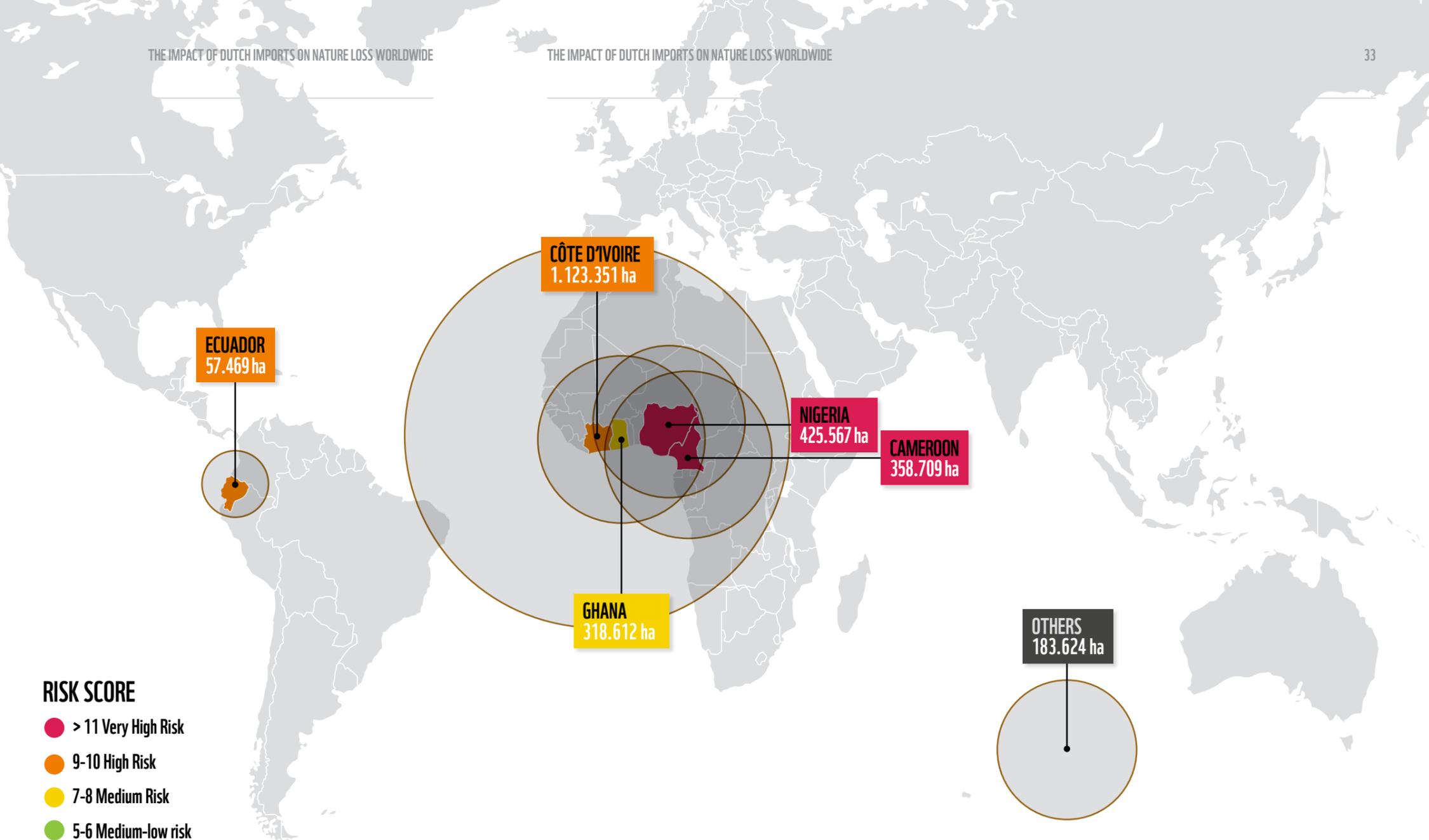
The principal end use of cocoa beans is chocolate and chocolate products which are manufactured from the intermediate products of cocoa beans: cocoa paste (also known as cocoa liquor), cocoa butter and cocoa powder, with cocoa butter also used in cosmetic products:

The Netherlands' imports, consumption, exports

On average between 2017 and 2021, the Netherlands imported 1.29 million tonnes of cocoa each year, in the form of cocoa beans, primary processed products of cocoa (cocoa butter, paste and powder) or as ingredients in imported food (especially chocolate). This is equivalent to 23% of global production. An estimated 1.05 million tonnes were exported each year, meaning that 81% of imports were exported and 19% of imports were consumed within the Netherlands. Seventy per cent of the cocoa imported to the Netherlands is in the form of cocoa beans, whereas the Netherlands adds significant value to these imports by processing and exporting cocoa paste, butter, powder and chocolate.

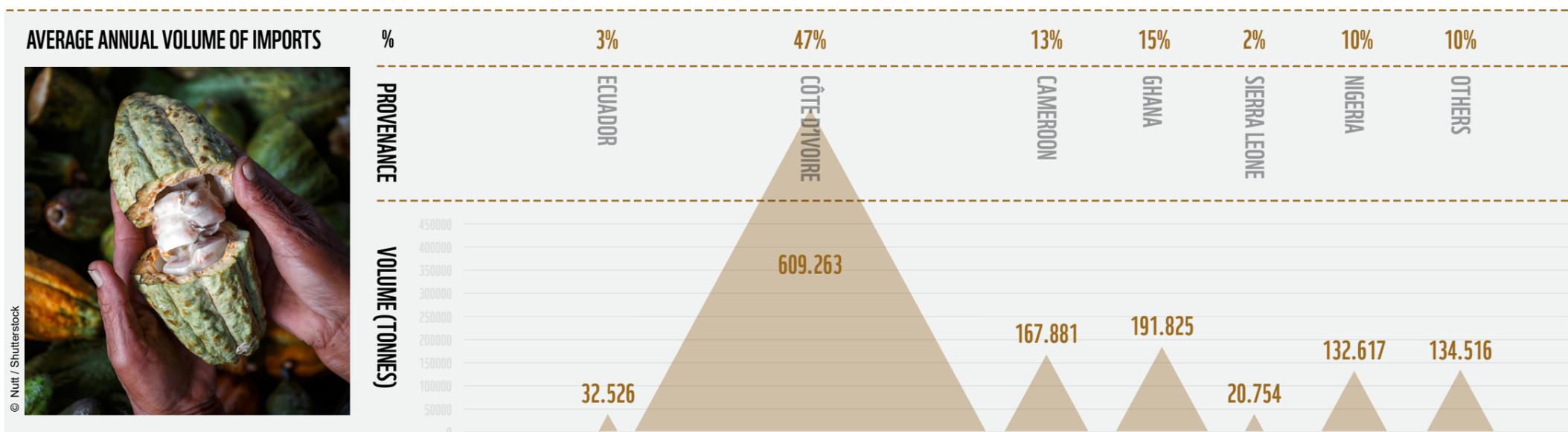
The land required to produce the Netherlands' cocoa imports was on average 2.5 million hectares per year, an area 60% the size of the Netherlands. The Netherlands' sourcing is heavily focused on West Africa: 45% of the Netherlands' land footprint was in Côte d'Ivoire, followed by Nigeria (17%), Cameroon (14%) and Ghana (13%). Except for Ghana (medium risk), the other major sourcing countries rate as high- or very-high risk on account of very high deforestation rates, poor records on workers' rights and low levels of rule of law. Consequently, at least 80% of the Netherlands' imports come from high- or very-high risk countries.

The estimated GHG emissions attributed to the Netherlands' cocoa land footprint between 2017 and 2021 were 11.3 million tonnes CO₂-equivalent per year – equivalent to over 6% of the Netherlands' domestic emissions in 2019.



RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk



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Impacts and risks

Despite the potential for cocoa to be grown in agroforestry systems, cocoa production is driving deforestation in major producing countries. Global forest loss driven by cocoa expansion is estimated to be around 2-3 million hectares from 1998-2008, accounting for roughly 1% of all forest loss during this period⁴⁰. Deforestation in the sector is in part driven by low investment in smallholder farmers (financially, and in terms of skills and management training), and in part because aging trees have lower yields, which means that farmers tend to expand production by cutting down trees for new cocoa fields.

Cocoa cultivation provides a livelihood for millions of smallholders in countries such as Côte d'Ivoire, Indonesia, Ghana, Cameroon and Nigeria. However, cocoa farmers are often living in poverty and receive a small percentage of overall cocoa price – between 3 and 5% of the value of a chocolate bar. Child and forced labour are endemic in the sector, particularly in some West African countries. It is estimated that a total of 1.56 million children – the majority of who are exposed to hazardous working conditions⁴¹ – worked illegally in the cocoa sector in Ghana and Côte d'Ivoire during the 2018-19 season⁴². The incidence of child labour is increasing.

There are numerous certification schemes aimed at mandating minimum sustainability standards for cocoa producers. These include voluntary standards schemes such as Rainforest Alliance, Fairtrade and organic.

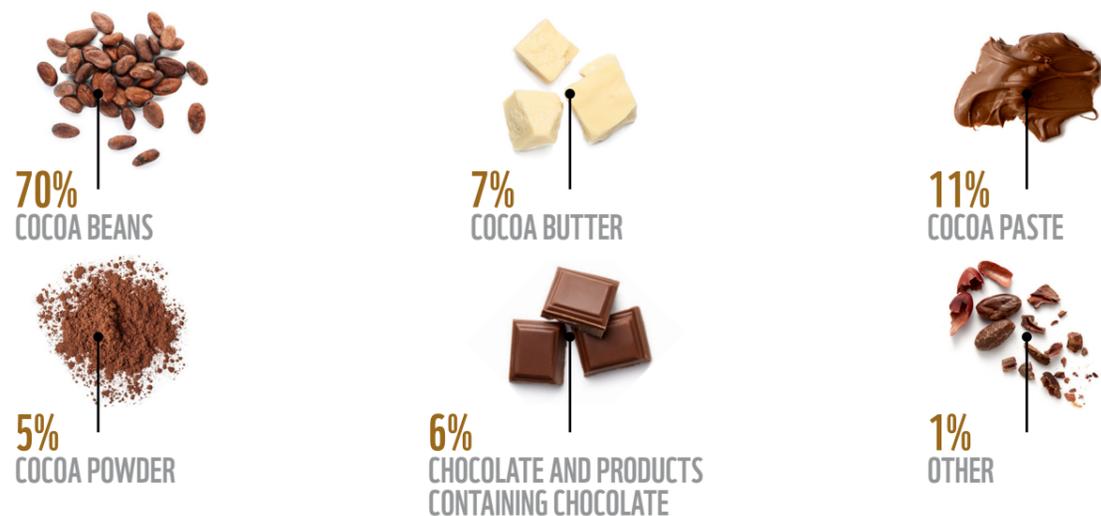
The global area of cocoa certified by one of more of the voluntary standards schemes reaches 25% of the global cocoa area⁴³. The above schemes provide varying levels of protection against deforestation. By contrast, Fairtrade is the only certification scheme that has a minimum price for cocoa as well as a fixed premium of US \$400 per tonne of cocoa. This helps provide farmers with greater financial security during periods of price volatility and decline on the world market for cocoa. In addition, many of the major manufacturers and traders run their own proprietary sustainability schemes.

The World Cocoa Foundation⁴⁴ is a grouping of cocoa industry actors that was established to improve environmental and social sustainability within the sector. It created the Cocoa and Forests Initiative (CFI) in 2017, with the aim of ending deforestation and restoring forests in Côte d'Ivoire and Ghana. The group includes the governments of those two countries, along with 35 leading cocoa and chocolate companies⁴⁵.

The Dutch cocoa sector increased its use of sustainable cocoa from 21% to 30% between 2014 and 2016⁴⁶. The Dutch Initiative on Sustainable Cocoa – a collaboration of business and civil society – aims to end deforestation associated with Dutch cocoa sourcing by 2025⁴⁷.

The above suggests increasing efforts by cocoa traders and chocolate companies, but these have so far failed to drive meaningful change in the industry, as cocoa production continues to be linked to deforestation, child and forced labour, and farmer poverty.

THE NETHERLANDS IMPORTS OF COCOA BY PRODUCT TYPE (2017-21)



© WWF / Jaap van der Waarde

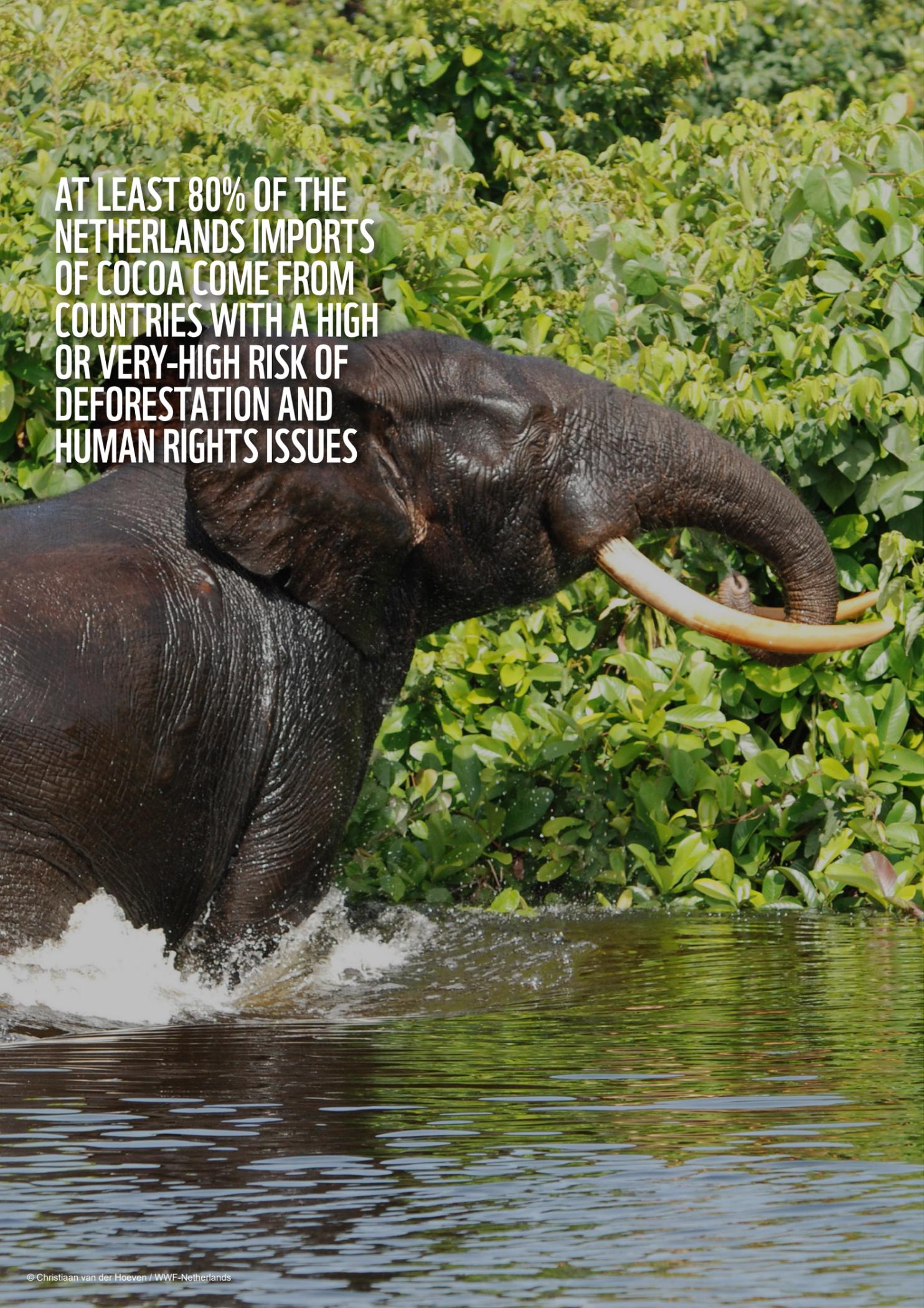
Key sourcing country: Cameroon

Cameroon is the fourth largest cocoa producer in West Africa and fifth globally. The area of cocoa harvested in Cameroon has almost doubled since the early 1960s, from around 380,000 hectares in the early 1960s to nearly 700,000 in 2020, with production of cocoa increasing nearly four-fold over the same period. The country has ambitions to more than double cocoa production in the next decade⁴⁸.

Smallholders account for 89% of production, but many receive an income from cocoa that is less than the national minimum wage⁴⁹. Although the government of Cameroon has made advances in eliminating the worst forms of child labour, it is still prevalent within the cocoa sector⁵⁰.



AT LEAST 80% OF THE NETHERLANDS IMPORTS OF COCOA COME FROM COUNTRIES WITH A HIGH OR VERY-HIGH RISK OF DEFORESTATION AND HUMAN RIGHTS ISSUES



The forest zones of the Centre and South West Regions are the main cocoa producing areas, with some production also occurring in the mangrove and savannah ecosystems. Cocoa is one of the major drivers of deforestation and biodiversity loss in Cameroon, which is one of the most biodiverse countries in Africa. The country includes part of the critical cross-border Tri-National Dja-Odzala-Minkébé (TRIDOM) forest, which it shares with the Republic of Congo and Gabon, and which covers 178,000 square kilometres. The area provides a habitat for elephants, chimpanzees and western lowland gorillas but is threatened by illegal logging, large-scale mining, poaching, and forest conversion for commodity crops⁵¹.

A roadmap towards deforestation-free cocoa was signed by the Government of Cameroon, international development partners, businesses and civil society in January 2021. Although too early to tell whether it will be effective, the agreement aims to decouple cocoa production from deforestation by driving more sustainable production and forest protection while ensuring social inclusion⁵².

The Netherland's imports from Cameroon

The EU is by far the biggest consumer of cocoa, responsible for 60% of global imports, with the Netherlands alone importing 23% of the world's cocoa production. Amongst these imports are an average of 168,000 tonnes per year from Cameroon, equivalent to more than half of Cameroon's national production⁵³. The Netherlands therefore has a disproportionate influence on, and responsibility for, the environmental and social issues associated with cocoa production in the country. Some of the largest cocoa traders globally, including ADM Cocoa, Cargill and Olam have cocoa operations in the Netherlands, along with Dutch companies that are part of the Swiss headquartered ECOM group, including Dutch Cocoa, Daarnhouwer and Theobroma⁵⁴. Cargill and Olam are globally the second and third largest traders and grinders of cocoa beans⁵⁵.

The cocoa sector has little supply chain transparency, with pledges to improve transparency as yet largely unfulfilled⁵⁶. Imports of cocoa from Cameroon to the Netherlands are no different, and so it is not possible to directly match imports as a whole or those of individual companies to specific incidents of deforestation. Given the disproportionate role that the Netherlands plays in exporting Cameroon's cocoa, and the absence of supply chain transparency, it appears likely that some of the Netherlands' imports are associated with deforestation, child labour, and other environmental and social harms.

COFFEE

Brazil and Vietnam are the world's largest coffee producers, with a 32% and 16% share of global production respectively, whilst the United States, Germany, Italy, Japan, and Spain rank as the main importing countries⁵⁸.

The primary end use for coffee beans is for the coffee beverage, though there is a small but growing use of coffee extract in food products and coffee bean extract for food supplements. Green coffee beans purchased for coffee production are first tasted for quality before they are roasted to either a light, medium, or dark roast level. The roasted coffee beans are either sold as whole beans to consumers of ground to varying levels of coarseness.

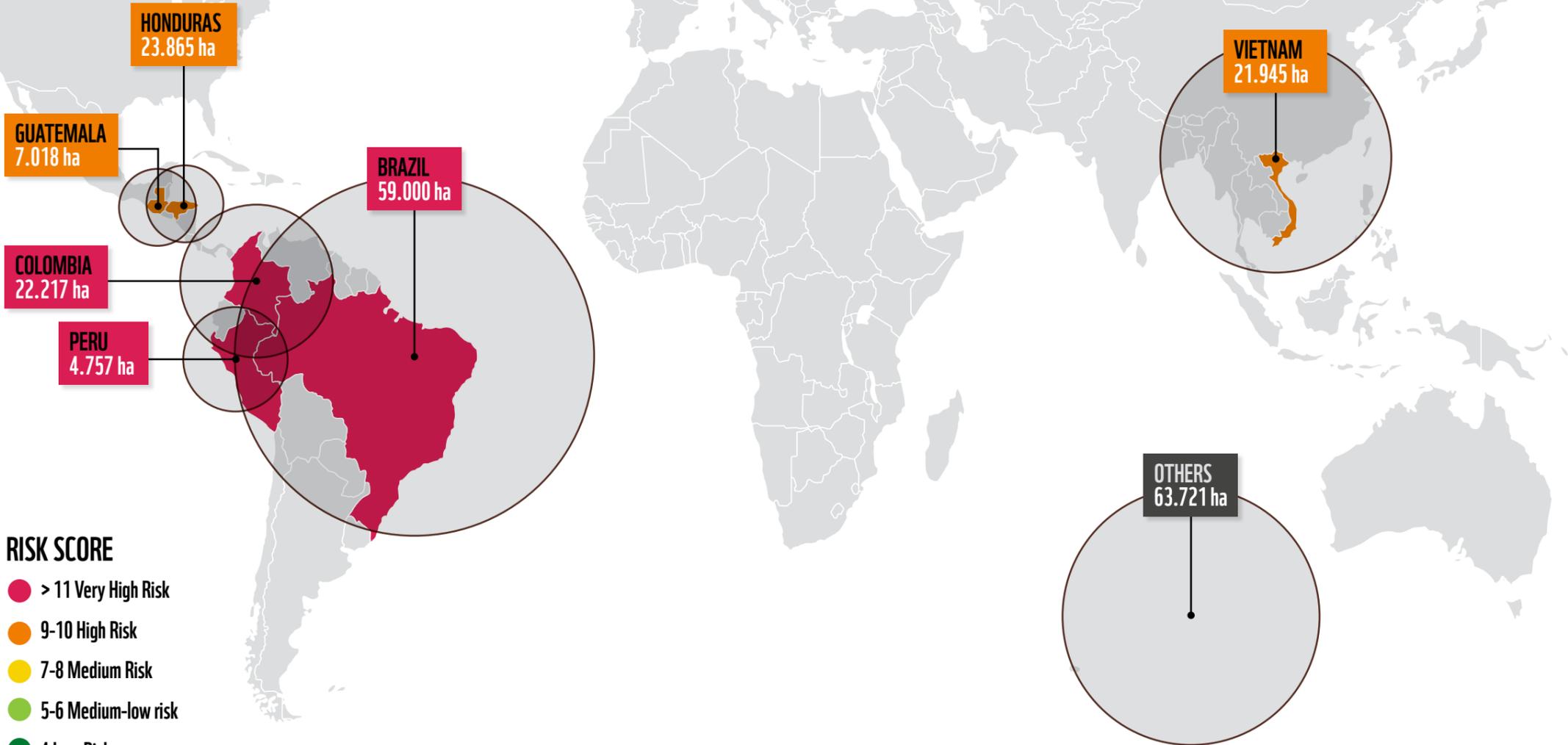
The Netherlands' imports, consumption, exports

On average between 2017 and 2021, the Netherlands imported 0.29 million tonnes of coffee, in the form of coffee beans, roasted and/or decaffeinated coffee, or extracts and food preparations with coffee as a major ingredient. This is equivalent to 2.9% of global production. An estimated 0.15 million tonnes were exported each year, meaning that an estimated 47% of imports were consumed.

Most of the coffee imported into the Netherlands is in the form of coffee beans or roasted coffee. The largest exports are of roasted coffee: the Netherlands is the third largest exporter of roasted coffee in the world, principally supplying European countries. Unlike most of the other commodities assessed in this report, a large volume of coffee imports arrives in the Netherlands via third-party countries: 40% via Belgium and a further 23% via Germany.

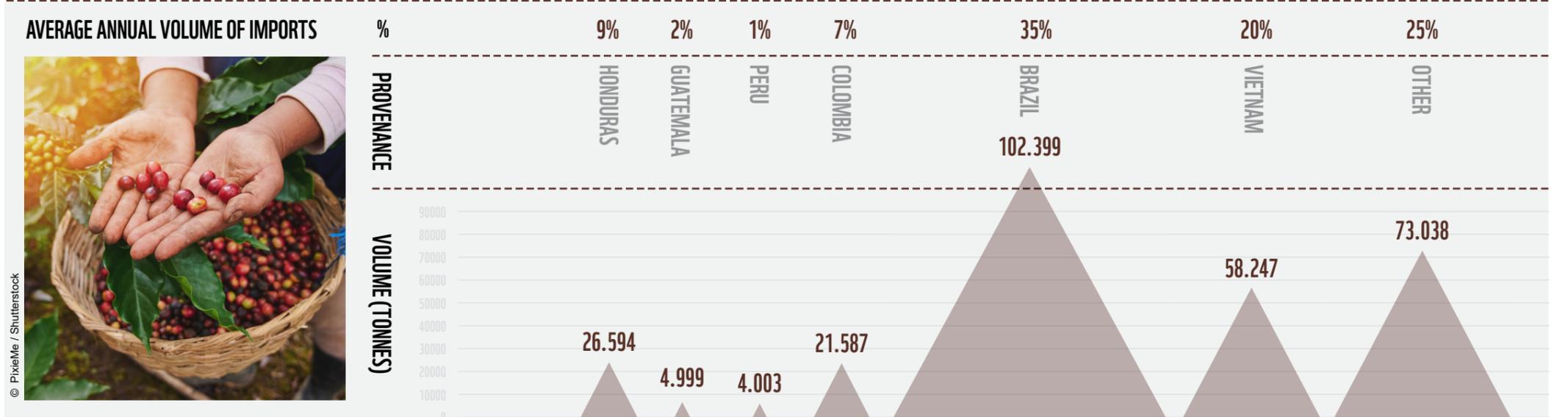
The land required to produce the Netherlands' coffee imports was on average 203,000 hectares per year – equivalent to about 2% of the world's land footprint for coffee and almost the same area as the Dutch province of Limburg.

Apart from Vietnam (20% of the import land footprint), the Netherlands' sourcing is heavily focused on South and Central America: Brazil (35%), Honduras (9%), Colombia (7%) and Guatemala (2%). All of these countries rank as high- or very high risk as a result of rapid deforestation, poor labour rights and low rule of law scores. Consequently, at least 69% of the Netherlands' imports come from high- or very-high risk countries (the remainder is the portion that has not been assigned a provenance).



RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk



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The estimated GHG emissions attributed to the Netherlands' coffee land footprint between 2017 and 2021 were around 0.198 million tonnes CO₂-equivalent per year.

Impacts and risks

Coffee is traditionally grown under shade trees, which provides a multitude of ecosystem services, including pest control, carbon sequestration, watershed protection, and a habitat for wildlife. However, in the 1970s, a movement began in Central America towards open-sun coffee production systems to increase yields. Accompanying this move away from shade management was an uptake in the use of agrochemical inputs to combat pests and diseases. Recent analysis of land use data indicates that many countries where coffee production is rapidly expanding (e.g. Vietnam, Indonesia, Ethiopia, and Peru) create new land for coffee through deforestation, using lightly shaded or full-sun production systems⁵⁹.

There are significant economic and social issues surrounding coffee production. World coffee prices have fallen by two-thirds since the early 1980s, and the earnings of coffee farmers have halved during that time, and it is becoming questionable whether coffee is still a profitable crop. Most of the value produced by coffee goes to major retailers and brands rather than the farmers, who receive only 7–10% of the retail price of coffee⁶⁰.

Given the pressure to cut economic costs, there are increasing reports of exploitation in coffee production. This includes accounts of debt bondage, child labour, exposure to deadly pesticides, a lack of protective equipment, especially in Brazil⁶¹. In 2016, two of the largest coffee companies, Nestlé and the Dutch company JDE Peet's, admitted that the coffee they sourced from Brazil may come from plantations where forced labour is practiced⁶². While the two companies claim not to purchase directly from plantations with a history of labour violations, they do purchase from exporters and middlemen who might be sourcing the beans from these plantations.

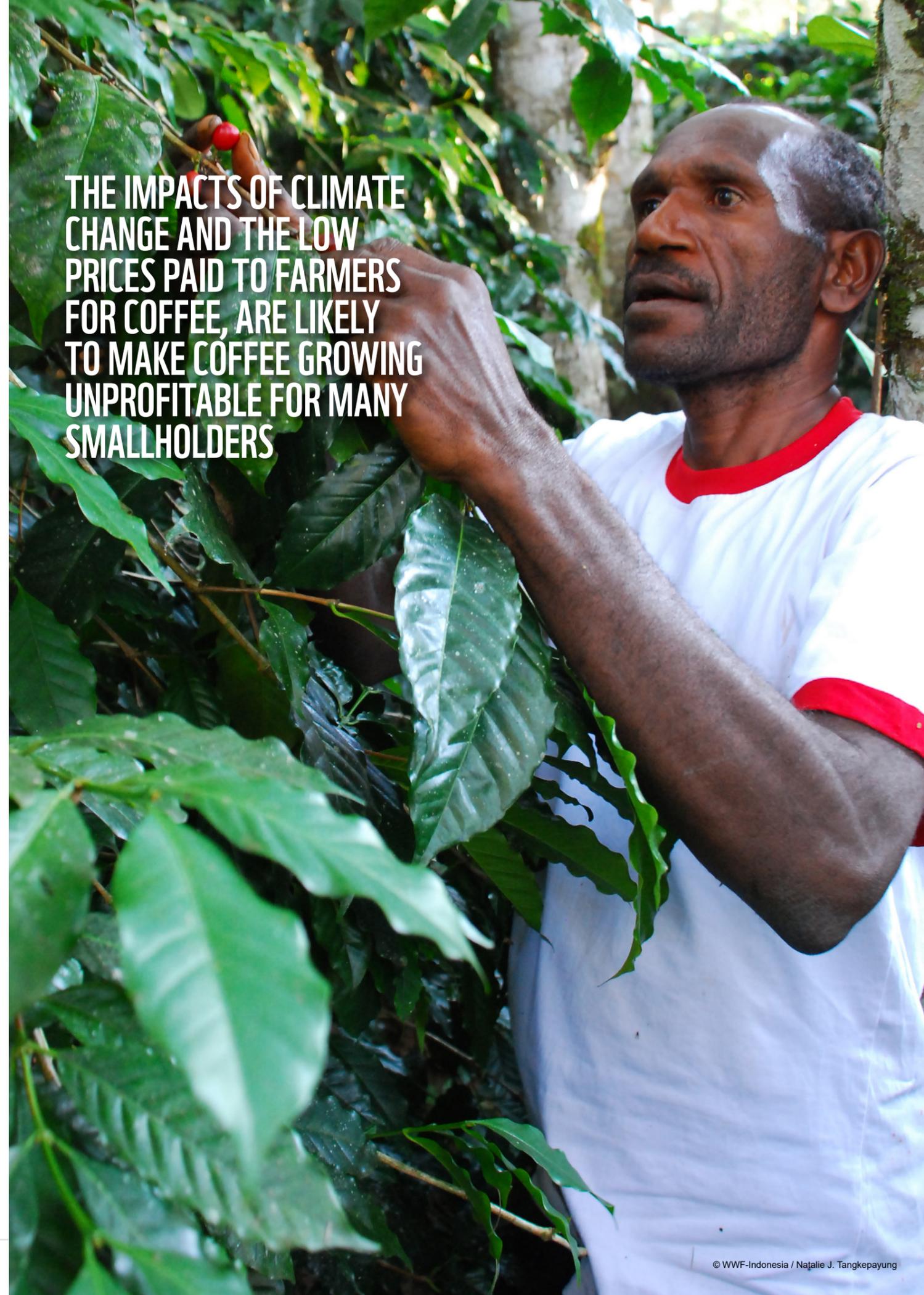
Climate change poses a substantial risk to coffee production. Changes in temperature and rainfall will both increase pressure from pests and diseases and decrease the area suitable for coffee cultivation, particularly in the largest coffee producing countries, Brazil and Vietnam⁶³.

Certification of coffee is well-established and growing, providing assurance against some forms of deforestation, with variations between schemes. The most common standards are the 4C code, Fairtrade, Rainforest Alliance, and organic which together covered an estimated 22% of the global coffee area in 2017. Private corporations, including Nespresso and Starbucks, also have their own standards and global initiatives.

THE NETHERLANDS IMPORTS OF COFFEE BY PRODUCT TYPE (AVERAGE, 2015-19)



THE IMPACTS OF CLIMATE CHANGE AND THE LOW PRICES PAID TO FARMERS FOR COFFEE, ARE LIKELY TO MAKE COFFEE GROWING UNPROFITABLE FOR MANY SMALLHOLDERS



COCONUT

Coconut is used for a large variety of end products: fresh coconut and coconut water are major uses in producer countries, with desiccated coconut and coconut milk the other uses for human consumption; coconut oil and its derivatives are predominantly used in personal care products; and coir (the fibres from the coconut husk) is used to make carpets, twine and matting.

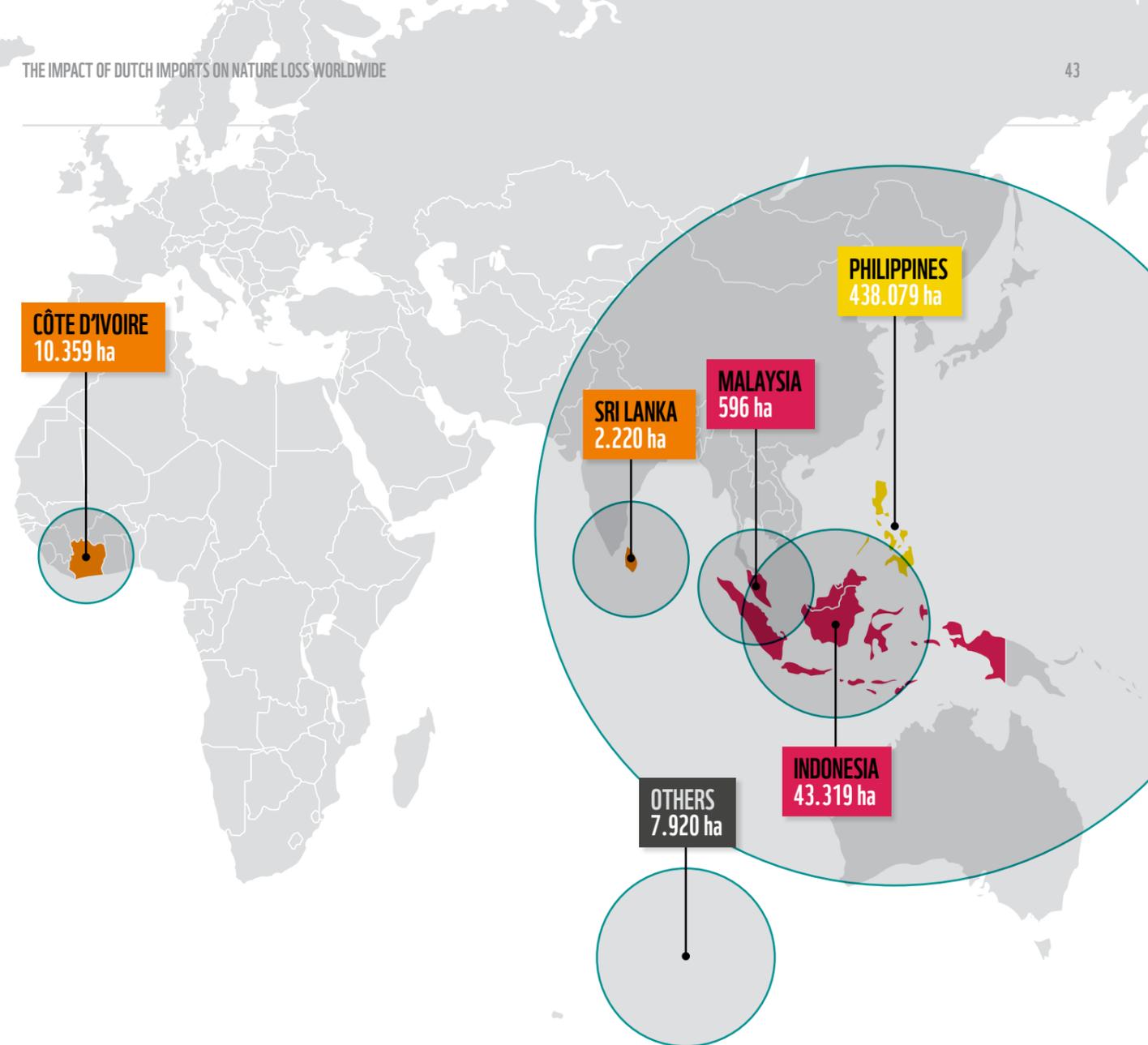
Indonesia (28%), the Philippines (24%) and India (23%) share three quarters of global production, with China (29% of global trade), Thailand (16%) and Malaysia (13%) the largest importers. Within the EU, the Netherlands is the predominant importer, importing almost twice the quantity of the next largest importer, Germany⁶⁴.

The Netherlands' imports, consumption, exports

On average between 2017 and 2021, the Netherlands imported 2.1 million tonnes of coconut equivalent, predominantly in the form of crude coconut oil. This is approximately 3.5% of global coconut production. An estimated 1.3 million tonnes were exported each year, meaning that an estimated 37% of imports were consumed within the Netherlands. Most of the coconut imported into the Netherlands is in the form of crude coconut oil, which is refined and used in the food and cosmetics sectors. By contrast, exports are dominated by refined coconut oil (which is largely used in food, cosmetics, personal hygiene products).

The land required to produce the Netherlands' coconut imports was on average 0.5 million hectares per year – equivalent to about 4.3% of the world's land footprint for coconut and an area the size of the Dutch province of Gelderland. The Netherlands' sourcing is overwhelmingly from the Philippines (87% of the land area), Indonesia (9%) and Côte d'Ivoire (2%). The Philippines is ranked as medium risk country: rates of tree cover loss and natural forest loss are relatively low, although it ranks poorly on rule of law and labour rights. The other main sourcing countries rate as high or very-high risk. As a consequence, 11% of the Netherlands' coconut sourcing is from high or very-high risk countries.

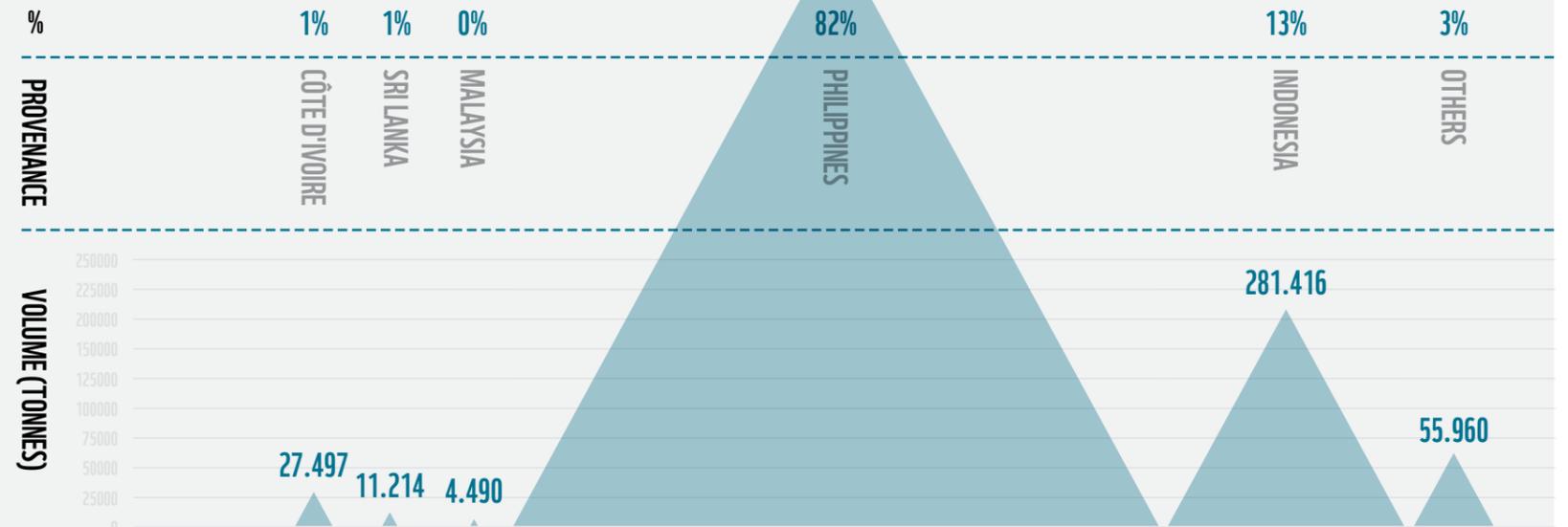
The estimated GHG emissions attributed to the Netherlands' cocoa land footprint between 2017 and 2021 were around 0.43 million tonnes CO₂-equivalent per year.



RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk

AVERAGE ANNUAL VOLUME OF IMPORTS



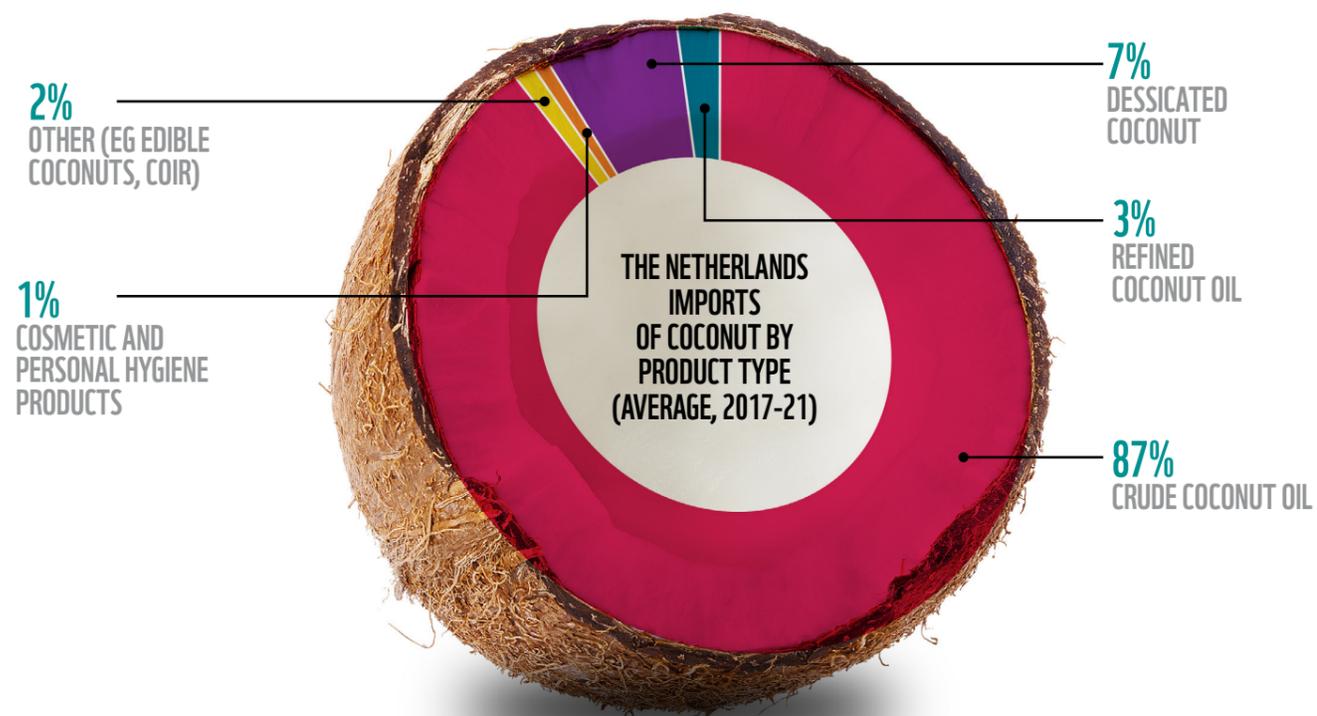
Impacts and risks

A recent paper suggests that coconut oil has the largest impact on biodiversity of any vegetable oil⁶⁵. The analysis has been criticised, as the methodology is biased towards small island nations that have high levels of endemic and threatened species, but which produce little coconut oil for the international market⁶⁶, but the central point – that the expansion of coconut production is not without ecological consequence – remains valid.

Incomes from coconut farming are very low. For example, the majority of the 3.5 million coconut farmers

in the Philippines live below the poverty line, earning less than \$1 per day⁶⁷. Low incomes also encourage the use of unpaid or child labour and coconut production is listed on the US Department of Labour’s list of goods produced by child labour or forced labour in the Philippines⁶⁸.

There is so far very limited certification of coconuts, meaning that the overwhelming majority of the Netherlands’ imports are not covered by any independently verified assurance of being deforestation free.



THE LAND AREA REQUIRED TO SUPPLY THE NETHERLANDS IMPORTS OF COCONUT EACH YEAR IS EQUIVALENT TO AN AREA THE SIZE OF THE DUTCH PROVINCE OF GELDERLAND



AT LEAST 11% OF THE NETHERLANDS IMPORTS OF COCONUT COME FROM COUNTRIES WITH A HIGH OR VERY-HIGH RISK OF DEFORESTATION AND HUMAN RIGHTS ISSUES

BEEF AND LEATHER

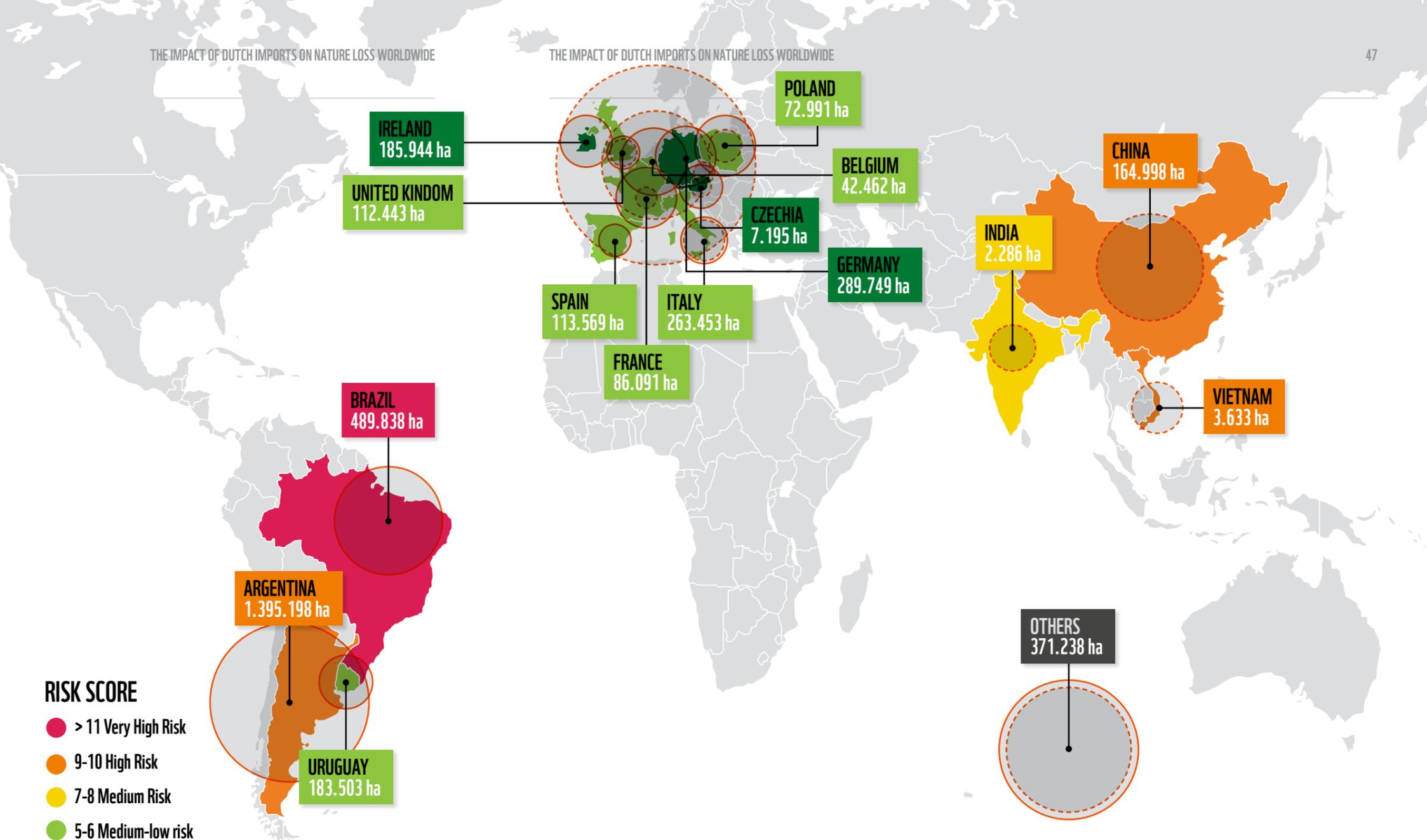
The world's land footprint for beef & leather (i.e. the grazing area dedicated for cattle globally, excluding dairy cattle) encompasses an estimated 1.6 billion hectares⁶⁹ – an more than one and a half times the area of the European continent.

The majority of beef is purchased and consumed as fresh or frozen cuts, e.g. steaks, mince and roasting joints. However – like most meats – it is also found in a range of food products, e.g. burgers and ready meals. Nearly half of all bovine leather is used to manufacture shoes, with a further 17% used in automobile seats. Furniture upholstery, clothes, and various leather goods make up the rest.

The Netherlands' imports, consumption, exports

The Netherlands imported an average of 382,000 tonnes of beef (Carcass Weight Equivalent) each year between 2017-21. The majority is imported in the form of fresh or chilled beef (55%) and live animals (32%). Over the same period, the Netherlands imported 110,000 tonnes of bovine leather, predominantly as raw hides (64%) and manufactured leather cases and bags (20%). This compares with an average annual domestic production of 290,000 tonnes beef and 38,000 tonnes leather over the same period. Exports were on average 399,000 tonnes of beef per year and 123,000 tonnes of leather. Consumption averaged 274,000 tonnes of beef per year and 26,000 tonnes of leather.

The Netherlands' external footprint for beef & leather is equal 3.9 million hectares each year, an area equivalent to nearly 90% of the Netherlands. The majority of this, 78% of the land area, was for beef. The EU dominates the Netherlands imports of beef, with 75% of the quantity coming from Belgium, Poland, Germany, France, Ireland and Italy alone. A small proportion comes from South American countries including Brazil (4%), Uruguay (2%) and Argentina (3%), but as these countries have comparatively extensive beef systems, they dominate the land



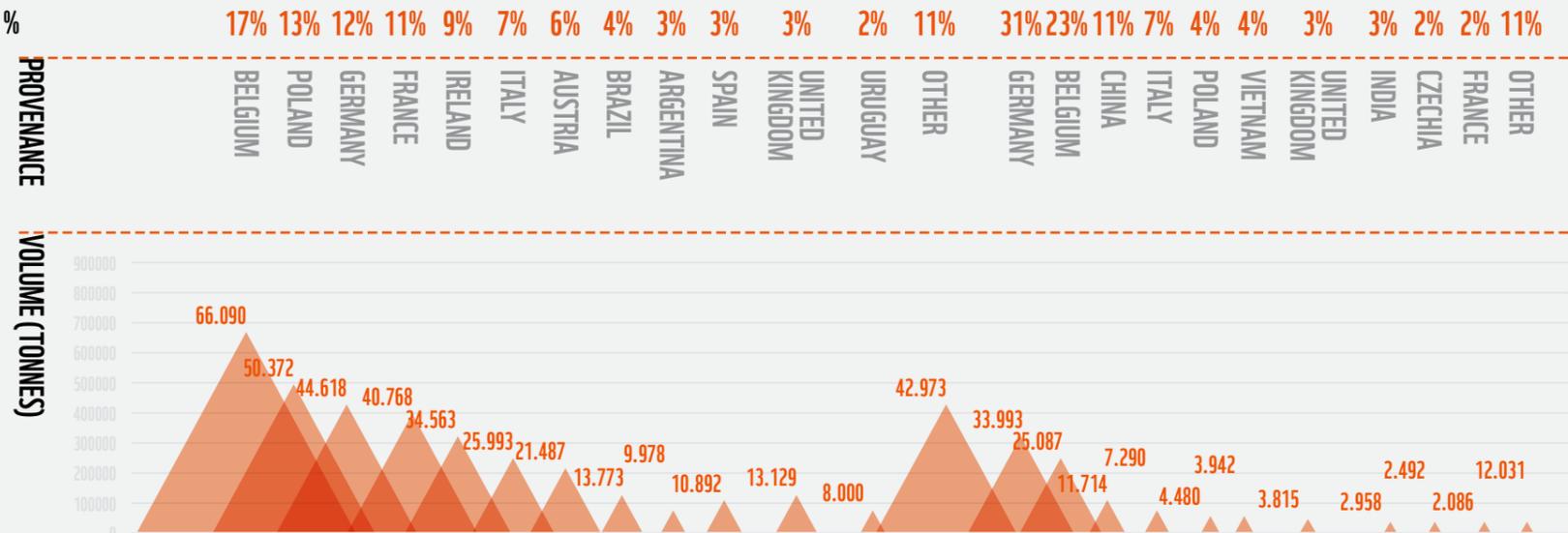
RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk

AVERAGE ANNUAL VOLUME OF IMPORTS



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42% OF THE LAND AREA OF THE NETHERLANDS' IMPORTS OF BEEF – BUT ONLY AROUND 8% OF THE QUANTITY OF IMPORTS – COMES FROM HIGH AND VERY-HIGH RISK COUNTRIES

are rated high- and very-high risk respectively, resulting in 42% of the external land footprint of the Netherlands' imports being from high- or very high risk countries. Note that intensive livestock systems have other risks associated with them, including the import of feed (see soy and maize, above) and local nitrogen pollution.

Whilst imports of leather are also dominated by the EU, China and Vietnam are also significant sourcing countries. China dominates the land area required, due to its low productivity per hectare, and is largely responsible for 44% of the external land footprint of the Netherlands' imports being from high- or very high risk countries.

It was not possible to quantify the GHG emissions of the beef and leather imported by the Netherlands (see Methods, below). However, beef cattle are one of the major drivers of deforestation worldwide – in fact some research indicates it as the single largest cause of deforestation and conversion⁷⁰– and hence the greenhouse gas emissions from land use change associated with the Netherlands' imports are likely to be significant.

Impacts and risks

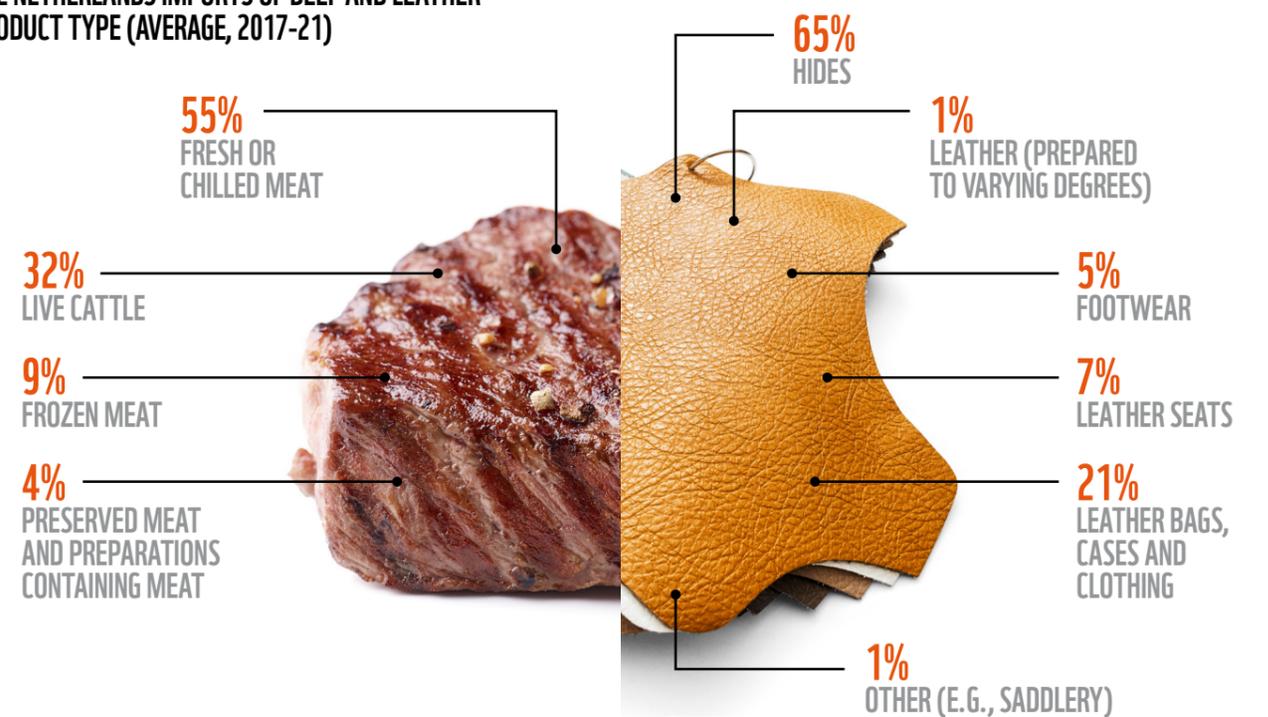
Cattle production is the dominant agricultural driver of deforestation globally, accounting for more than 45

million hectares of deforestation between 2001-2015⁷¹. It is the predominant land use following deforestation in several WWF Priority Places such as the Amazon, Cerrado and Pantanal. Pasture can also be an intermediate step between conversion and the final land use (e.g. soy). According to the International Labour Organisation, some 62% of slave labour in Brazil is employed in livestock farming-related businesses⁷².

There are limited options available for companies and consumers wishing to purchase sustainable beef and leather. The Sustainable Agriculture Network (SAN) Standard for Sustainable Cattle Production Systems (Rainforest Alliance) has had very limited uptake, and the Global Roundtable for Sustainable Beef have developed a standard but the process of verification and levels of uptake are unclear⁷³.

THE AREA OF LAND REQUIRED TO SUPPLY THE NETHERLANDS' IMPORTS OF BEEF AND LEATHER IS EQUIVALENT TO 90% OF THE NETHERLANDS' LAND AREA

THE NETHERLANDS IMPORTS OF BEEF AND LEATHER PRODUCT TYPE (AVERAGE, 2017-21)



TIMBER

There are two major production systems for timber: plantations and natural forest. India, the USA, Brazil and the Russian Federation are the largest producers of wood globally, with the USA and the Russian Federation exporting the greatest quantity in terms of weight (and noting the majority of production in India is used domestically as fuel). The USA and China dominate global imports⁷⁴.

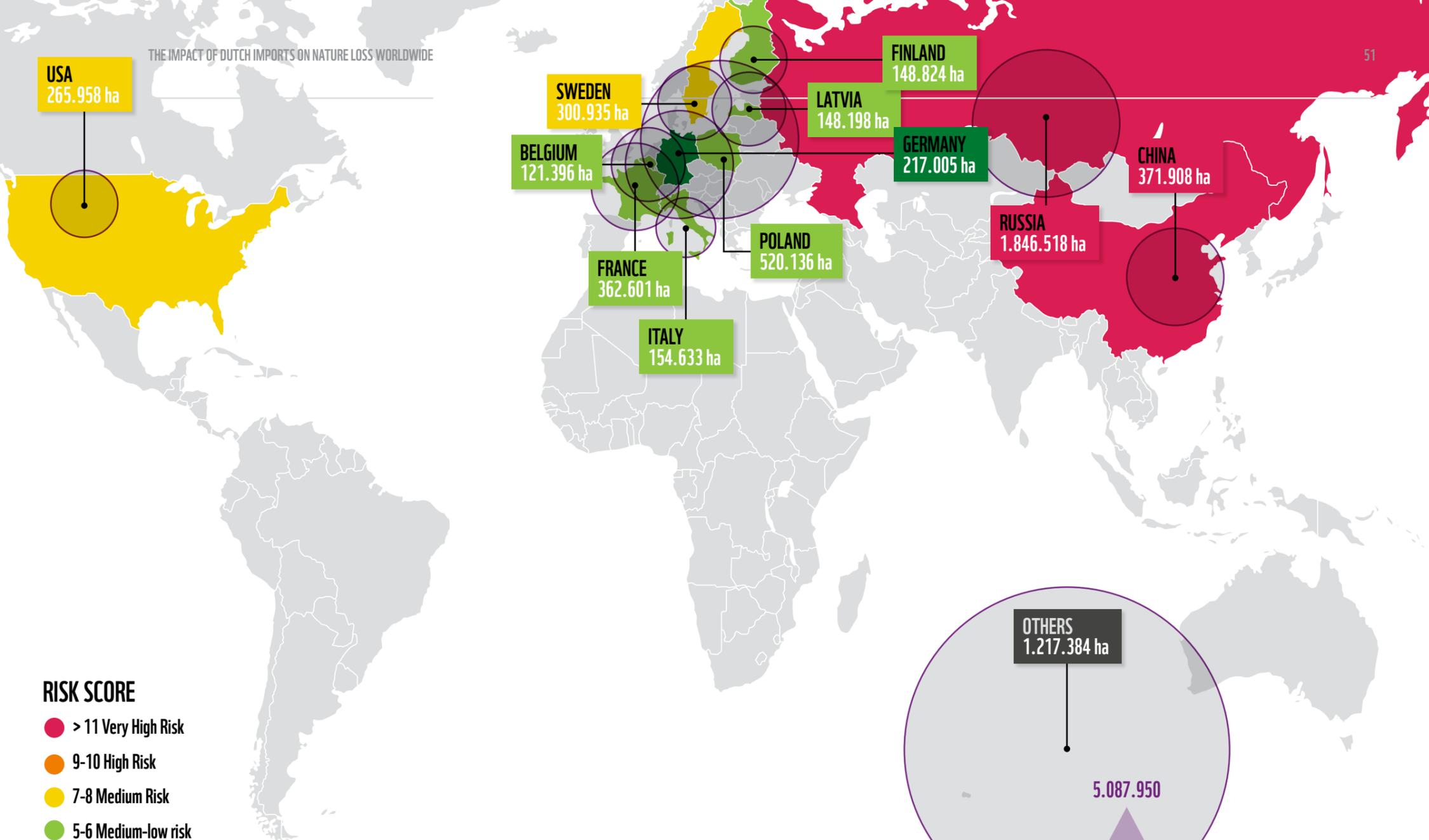
Wood is extremely versatile, and has a wide variety of end uses, including fuel, construction, furniture, various manufactured items (e.g., musical instruments and kitchenware), industrial processes (e.g. electricity generation), and paper and card. Note that the analysis presented below does not include pulp and paper, as this has separate supply chains.

The Netherlands' imports, consumption, exports

The Netherlands' external timber footprint, though only 0.3% of the world's timber footprint, is the largest in absolute area of all the commodities studied in this report, averaging 5.1 million hectares each year. This is 1.2 times larger than the land area of the Netherlands, and it is increasing.

On average, 22.2 million m³ of wood raw material equivalent (WRME) were imported to the Netherlands every year between 2017 and 2021. The Netherlands produced an average of 7.1 million m³ each year over the same period. 15.5 million m³ was exported each year, meaning that on average 62.5% of all imports and domestic production were consumed within the Netherlands. The largest proportion of timber imported to the Netherlands consisted of sawn wood (22%), fibreboard (17%) and fuel wood (11%). Fuelwood has shown a dramatic increase over the period, from 0.87 million m³ in 2017 to over 4.5 million m³ in 2021 and is largely responsible for the increased imports in timber over the period.

Most of the Netherlands' imports are from the EU, with only China, the Russian Federation (both high risk countries) and the USA being the only non-EU countries to supply at least 2% of the Netherlands' imports. EU countries have generally low deforestation rates, good rule of law and labour rights. Nonetheless, at least 30%



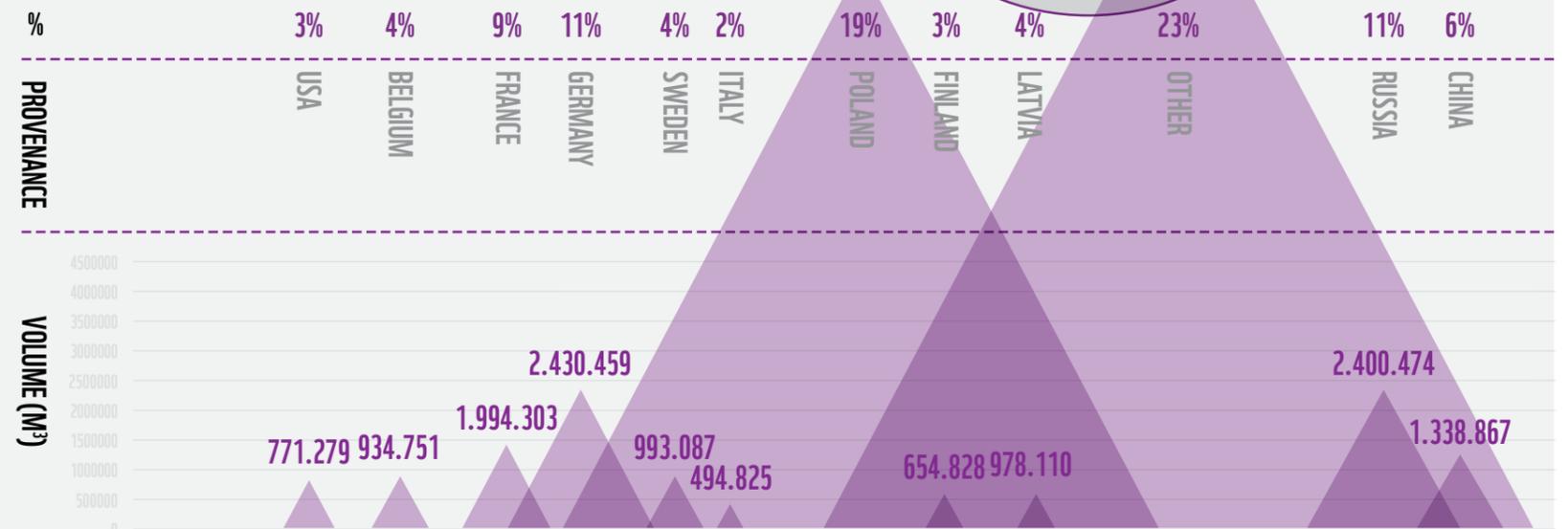
RISK SCORE

- > 11 Very High Risk
- 9-10 High Risk
- 7-8 Medium Risk
- 5-6 Medium-low risk
- 4 Low Risk

AVERAGE ANNUAL VOLUME OF IMPORTS



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of the Netherlands' land footprint for timber imports is from high and very-high risk countries. In practice, the proportion is likely to be significantly higher than this: the Netherlands imports timber and timber products from 152 countries, and a total of 23% of the land footprint is from countries that supplied less than 2% of the total and hence were not assessed in this study.

Impacts and risks

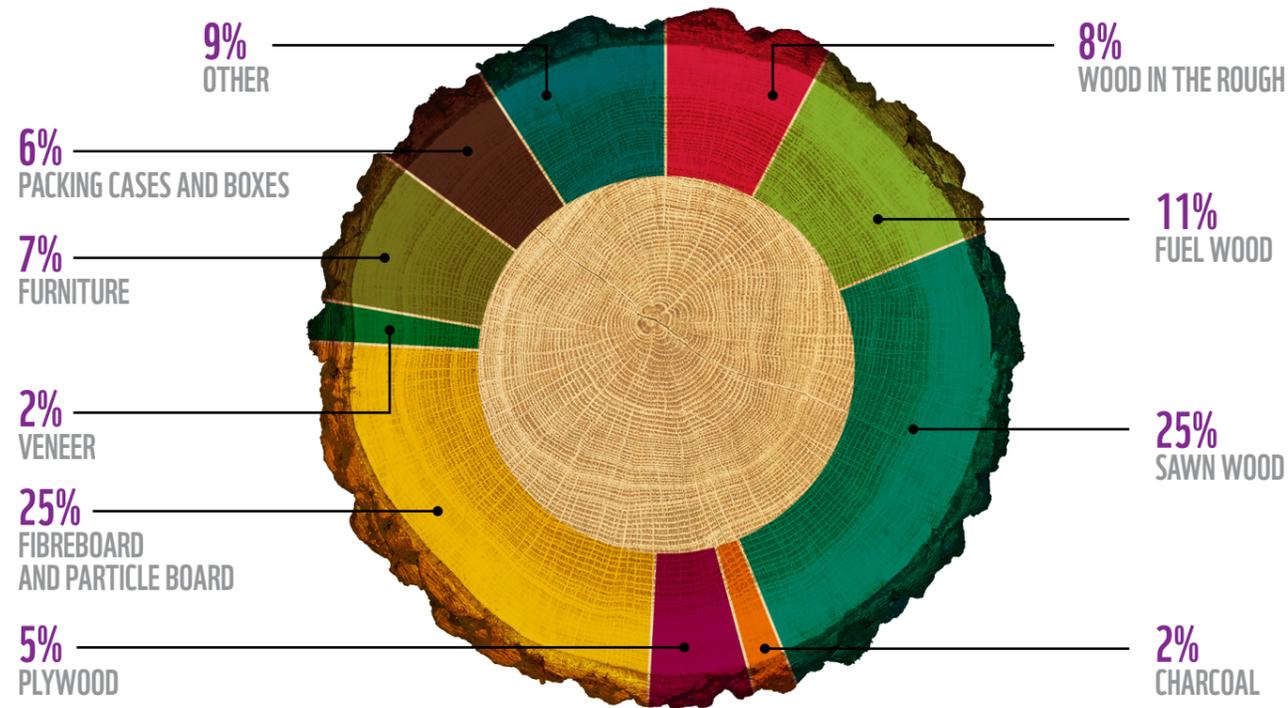
The trade in timber and timber products has long been linked with deforestation and forest degradation⁷⁵. The most obvious direct impact of the timber industry is when natural and semi-natural forest is replaced by tree plantation monocultures. Moreover, timber harvesting can play an indirect role in deforestation, with logging access roads opening up areas of forest to ranchers and farmers.

Within the forestry sector, there are two main forest certification schemes covering timber: the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). By mid-2013, these initiatives had together certified 23% of the world's managed forests⁷⁶. Canada, the United States, Russia, Finland and Sweden were the top five countries in terms of certified forest area.

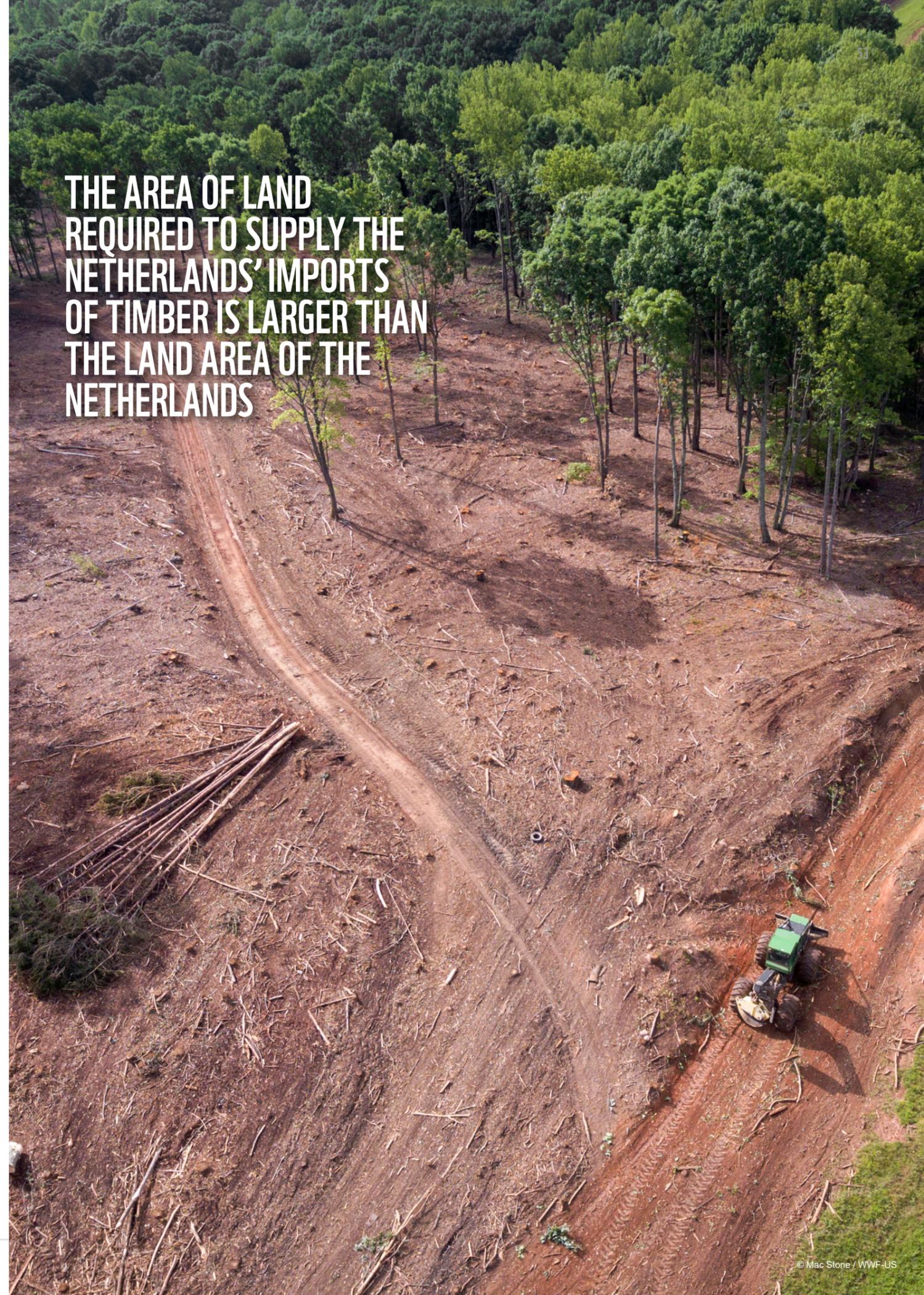
The FSC and PEFC standards have broadly similar requirements, although the FSC is regarded as having more rigorous requirements on some key outcome requirements (e.g. maintenance of High Conservation Values, workers' rights) and process aspects (e.g. multi-stakeholder engagement and formulation of audit teams)⁷⁷. The FSC also has a greater certified area in the tropics than PEFC and is supported by leading environmental NGOs. The FSC Principles and Criteria exclude certification of plantations established on areas converted from natural forest after November 1994, unless the plantation is a small part of the certified area, or if the management organisation was not responsible for the conversion. The PEFC standard is broadly similar, but with a cut-off date of 2010.

A recent survey of Netherlands Timber Trade Association (VVDH) members estimated that nearly 99% of softwood and 67% of hardwood (including tropical species) imported into the Netherlands in 2020 was FSC or PEFC certified⁷⁸. The survey covered 2 million m³ of timber, which is less than 10% of total imports, and it is not clear whether the survey results are applicable to the entirety of the Netherlands' imports.

THE NETHERLANDS IMPORTS OF TIMBER BY PRODUCT TYPE (AVERAGE, 2017-21)



THE AREA OF LAND REQUIRED TO SUPPLY THE NETHERLANDS' IMPORTS OF TIMBER IS LARGER THAN THE LAND AREA OF THE NETHERLANDS



OVERVIEW OF METHODS

Commodity footprinting

Import data from UN Comtrade⁷⁹ was used to estimate the net weight of imports for the period from 2017 to 2021. We examined imports of raw materials (e.g. palm oil, soymeal, cocoa beans), commodities as components or ingredients of imported manufactured goods (e.g. palm oil in margarine), and commodities embedded within imported products as part of the upstream production process (e.g. soymeal used in chicken feed embedded in imported chicken). Where a commodity is imported as an ingredient or is embedded, the weight of imported goods was adjusted to an estimated weight of the commodity using a mid-range conversion factor derived from published literature. As many commodities are used in thousands of different products, analysis was confined to those product categories that are cited in the literature as being major uses of the commodity. The estimates provided are therefore conservative.

Provenance analysis

It is not straightforward to work out where the Netherlands' imported commodities were originally grown. The first step was to take the direct country of origin for imports to the Netherlands as reported in UN Comtrade data. The Netherlands' imports from these exporter countries were then assumed to come from the countries that supplied that country in the same proportion plus domestic production (if any). For example, imports of cocoa into the Netherlands from Germany (which does not grow any cocoa domestically) were re-assigned to the countries supplying cocoa to Germany, in the same proportions. The sourcing provenance of all countries responsible for at least 2% of the Netherlands' imports of each commodity were assessed.

Land footprints

For the majority of commodities, estimating the land area required to produce the quantities of commodities imported by the Netherlands was relatively straightforward, as yield data is readily available for each country in each year of production from FAO STAT.

For crops that produce co-products yield was allocated to the co-products. This applied to soy (soymeal and soy oil), cocoa (butter, paste and powder), palm oil (palm oil, palm kernel oil and palm kernel meal). We allocated land use to co-product fractions. In this case, imported goods are first assigned to the fraction of the commodity they contain, and then yield is assigned to that fraction in the same proportion that the fraction is derived from the harvested crop.

No yield data is available for beef & leather and timber. For beef and leather, we adapted a method used by de Ruiter et al. (2017)⁸⁰ that allocates total country pastureland to different grazing animals based on the relative feed conversion efficiencies and overall sector production. The area assigned to beef cattle is then divided by the national production of beef and leather to give a hectare per tonne estimate. Given that beef cattle have two products (i.e. meat and leather), we allocated a share of the land footprint to beef and leather co-products on the basis of their mass.

The Netherlands' imports of timber were converted from tonnes of imports to wood raw material equivalent (WRME). The area of forest required to produce the total imported volume was estimated by dividing the total WRME by the producer country's Net Annual Increment⁸¹

Estimation of GHG from land use change

The Land Use Change Impact Tool⁸² was used to estimate commodity specific per-hectare CO₂e emissions for soy, cocoa, coffee, coconut, palm oil and maize. The tool allows emissions from land use change to be assessed when the country of production is known, but the exact parcel of land used to produce the crop is unknown. This matches the level of detail of our provenance calculations, which is determined by the available data. The associated emissions per hectare are then calculated based on methods consistent with the Intergovernmental Panel on Climate Change (IPCC) and the PAS 2050-1 framework, in including 'amortisation' so that the total emissions from the 20-year period of the land-use change are apportioned equally over the 20 years (see tool's methodology for further details). The commodity-specific

Full details of the method are available in the accompanying technical report 'Risky Business Netherlands: deforestation, conversion and social risks in the Netherlands' commodity supply chains'

per-hectare CO₂e emissions was then multiplied by the Netherlands' land footprint per commodity to estimate the GHG emissions associated with LUC per country, for each crop in each year.

The Land Use Change Impact Tool is one of the most comprehensive tools for estimating GHG emissions from direct LUC with global coverage. However, there are still significant data gaps. For example, there is no data available for forest products nor livestock. Therefore, no GHG emissions estimates were made for beef & leather, or for timber products.

Environmental and social risk rating

Having derived a minimum estimate of the provenance of the Netherlands' imports and the associated land footprint, this study explored the potential risks linked with imports from these countries. Only countries that account for at least 2% of the volume imported into the Netherlands were included.

We used four indicators to explore deforestation and key social and governance risks (see table bottom page).

For each producer country the criteria were scored and summed to give a total out of 12. These were then allocated to five categories: very high risk (total score of 11 or more), high risk (9-10), medium risk (7-8), medium-

low risk (5-6) and low risk (4 or less). Being based on national-level datasets, these represent the generic level of risk, not the risk specific to a commodity or the part of the country it may be sourced from. It also represents an unmitigated level of risk, i.e. before any action may have been taken to ensure that production is not linked to deforestation or social challenges.

The approach used provides some estimates of the risks to ecosystems with at least 10% tree cover, therefore not only considering forests but also other ecosystems with partial tree cover, including most of the Cerrado. However, we were unable to assess risks due to conversion of grasslands or other ecosystems with a lower tree density as there are no global datasets for these ecosystems: the text highlights where the risks of conversion of ecosystems with low or no tree cover are associated with a particular commodity.

It is important to recognise that the limited traceability of supply chains means that most of the Netherlands' imports can not be traced back to specific sub-national locations or risks. Despite its limitations, the risk-based approach highlights the need for Dutch actors to manage their potential risk of creating negative impacts overseas.

Risk Factor	Description	Rationale	High Risk	Medium Risk	Low Risk
Deforestation extent	Area of forest cover loss 2017-21 (Global Forest Watch)	Amount of deforestation	>1 Mha	0.5 Mha-1 M ha	< 0.5 Mha
Deforestation rate	% net natural forest loss 2010-20 (FAO)	Rate of deforestation	>1%	0% - 1%	< 0%
Labour rights	Labour standards score (ITUC)	Reported incidence of major labour rights violations	4 - 5	2 - 3	1
Rude of Law	Rule of Law score (World Bank)	Perception of how good laws are and how well they are implemented	<-0.3	0.3 - 1	>1

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- We distinguish between the consumption of a commodity (direct human consumption or embedded in the production of other products - e.g. feed embedded in animal products) and the use of a commodity (what is used in the Netherlands, for example as feed, that is later exported in the form of animal products) in this report
- A recent EU-wide estimate put the figure at 90% (Kuepper, B. & Manon Stravens, M. (2022). Mapping the European Soy Supply Chain Embedded Soy in Animal Products Consumed in the EU27+UK. ProFundo), whilst an older estimate specifically for the Netherlands estimated that 88% of combined quantity soybeans, meal and oil was used as animal feed (BothEnds (2014). Soy Barometer 2014. http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf
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Our Mission

Together, we protect the environment and create a future worth living for generations to come.

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