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€ 0.7 billion in profits, € 66 billion in damages

Rabobank's destructive financing of deforestation in Brazil

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About this report

This report has been commissioned by Greenpeace Netherlands.

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Disclaimer

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Summary

There is broad international agreement that climate change and biodiversity loss driven by human activity must urgently be halted. This need for action is reflected in the Paris Agreement to limit the global temperature increase to 1.5 degrees and the Global Biodiversity Framework (GBF) to halt and reverse nature loss. Financing forest-risk sectors exposes financial institutions to the risk of enabling further nature conversion and greenhouse gas emissions. This report estimates the profits that Rabobank made over the period 2000-2022 on financing forest-risk activities related to soy, beef, and pulp & paper that put pressure on Brazilian biomes, and estimates the costs of the damages that resulted from this. As more stringent deforestation policies at Rabobank were not in place for a large part of the 2000-2022 period and data are lacking, it is assumed that the bank's financing was equally exposed to deforestation as other rural credits in the same Brazilian state.

Over the past 23 years (period 2000-2022), Rabobank's financial support to Brazilian forest-risk sectors, including financing the Dutch livestock industry that depends on Brazilian soy, has increased sevenfold to € 8.8 billion in 2022 and generated € 717 million in accumulated gross profits based on € 1.9 billion in net interest income. However, the estimated environmental, health, and social damage caused by these financial flows to Brazilian forest-risk sectors is much higher: at least € 66 billion. Rabobank did not pay for these costs but externalised them to society. In all calculations, Rabobank's financing of activities outside Brazil and the Netherlands that might also have an impact on Brazilian forest footprint were not considered. This implies that the estimates are probably 'conservative'. Finally, the analysis in this report is based on various assumptions and estimates by Profundo, as Rabobank has not been able to provide the requested data.[a]

In the period 2003-2022, Rabobank (Brazil) provided approximately US$ 9.7 billion (Figure 2) in forest-risk loans and underwriting services to companies engaged in beef, soy, and pulp & paper in Brazil. Rabobank's Brazilian local bank operations really took off from 2003 onwards. Pulp & paper accounted for approximately half of all identified forest-risk attributable financing, while the beef and soy sectors accounted for approximately a quarter each. Rabobank's 15 largest forest-risk clients in Brazil accounted for 99% of the total identified forest-risk finance provided by Rabobank in the period of study. The two largest clients were pulp & paper company Suzano (US$ 4.5 billion) and financing provided through Brazil's National Rural Credit System (SNCR) programme (US$ 4.7 billion). Moreover, between 2013 and 2022, the value of Rabobank's forest-risk adjusted outstanding loans increased from US$ 1.5 billion to US$ 6.3 billion. An increase of more than 300%.

At the end of 2022, Rabobank had € 8.8 billion (Table 13) outstanding in activities with high forest-risk in Brazil, including the loans to the Dutch soy-sourcing agricultural sector. The Brazilian portfolio grew from zero in 2000 to € 5.9 billion at the end of 2022. The loans to the Dutch sectors sourcing Brazilian soy more than doubled to € 2.8 billion (adjusted for relevance of soy in activities).

Rabobank has made accumulated gross profits of € 717 million on activities with high forest risk in Brazil in the period 2000-2022, based on € 1.9 billion in net interest income (Table 12). The

[a] Rabobank shows a strong progress in reporting on emissions and loan categories, but the current report makes an additional deep-dive in other data. Many gaps remain in Rabobank's Scope 3 reporting and no attention is given to external damages to climate, biodiversity, health, and social impacts of their financing activities that affect crucial Amazon and Cerrado biomes. The current report made a deep-dive into financial databanks, carbon and methane price accounting, and scientific publications on valuing biodiversity, air pollution and pesticide damage. Scope 1, 2, and 3 emissions is a classification system to help an organization to measure, manage and reduce business emissions. Scope 1 emissions are emissions generated onsite from the activities an organization owns or controls. Scope 2 emissions are indirect emissions generated from purchased energy. Scope 3 emissions are all those emissions a firm is responsible for but which happen outside of its walls and are controlled by other parties up and down the value chain. Scope 1 and 2 emissions are mandatory to report. Scope 3 emissions are voluntary and the hardest to monitor.

current report distinguishes 'net interest income' and 'gross result or profit'. The net interest income, which is the difference between received interests and paid interest on financial products, amounted to € 1.9 billion. This is the sum of net interest income on local, Brazilian, products provided to Brazilian farmers in the form of rural credits, net interest income on loans and underwriting services to larger companies, and the net interest income on Dutch activities linked to Brazilian soy-use. The gross result or gross profit in 2000-2022 was € 717 million, which is the balance of total income (net interest income plus fees) and expenses. The profit streams have increased strongly in the last 23 years. The 2022 net interest income was six times higher than in 2000, the gross result was nine times higher.

Rabobank's financing may have been tied to 108 million tons CO_2e emissions from deforestation and an additional 148 million tons CO_2e from methane linked to Brazilian cattle. The high methane estimates are related to the financing of Brazilian meat processors and beef ranching activities, which have an extremely high impact on climate change. In the 108 million tons CO_2e linked to deforestation, Brazilian forest-risk financing accounts for around 94%, while the financing of Dutch activities based on Brazilian soy accounts for 6%. All numbers are adjusted for Rabobank's estimated share in the total financing of the enterprise value. The total of 256 million tons CO_2e equals 2x the total emissions of the Netherlands in 2022, and 10%-60% of total annual emissions of Brazil, depending on the applied definition.

Over the period 2000-2022, it is estimated that Rabobank's financing in Brazil may have been directly or indirectly linked to 387,700 hectares of deforestation. This equals 2.6x the size of the Dutch Province of Utrecht, or 24x the land surface of the island of Texel. From this total estimate, 330,600 hectares is related to financing Brazilian forest-risk sectors and 57,100 hectares is related to financing the Dutch dairy and animal protein farming sectors. Rabobank's rural credits linked to Amazon states as well as the agricultural frontier region Matopiba in the Cerrado biome, relatively high before 2019, have decreased considerably since 2019. Therefore, the estimated deforestation and emissions outcomes for recent years are probably lower than those for the average bank active in rural credits in Brazil. The Dutch business model is strongly based on Brazilian soy; between 46% and 61% of all soy used in the Netherlands in the 2000-2022 period came from Brazil. All these outcomes are adjusted for enterprise value and market share.

The environmental, health and social damage linked to Rabobank's financing of Brazilian forest-risk activities is assessed at a low estimate of € 66 billion and a high estimate of € 458.8 billion. These are all societal, externalised costs. The low-end estimate is dominated by the value of biodiversity loss during 23 years (€ 26.6 billion. Mainly ecosystem services and excluding the loss of intrinsic value of nature). Another large external damage cost comes from the estimated CO_2e emissions from deforestation (108 million tons CO_2e) and methane from cattle ranching (148 million tons CO_2e) attributed to Rabobank. Charged against the current CO_2-cost per ton in the European Union of € 86, the total climate damage bill would be € 22 billion. A third large cost item is air pollution, related to burning carbon from forests, which affects the number of healthy life years. The value is estimated to total at least € 17.3 billion. In a high-end scenario, the concept of societal costs of carbon dioxide ($SCCO_2$) is applied: based on various studies, Profundo calculated an average CO_2e price of € 1,160 per ton, leading to a much higher climate bill of € 296.6 billion. In the high-end scenario, biodiversity costs also rise strongly if forests are not restored. In this scenario the total environmental and social costs of Rabobank's forest-risk financing between 2000 and 2022 would be € 458.8 billion. Of course, not all social and environmental harms can be covered by a value number. For example, the costs of the loss of intrinsic value of nature, and the loss of culture and cultural diversity cannot be calculated and are not included in this report.

The net interest income on the forest-risk loans was 0.7% of Rabobank's global interest income in 2000 and increased to 2.1% in 2022. For the gross result, the percentages of the global result were respectively 0.4% and 1.8%. The investigated forest-risk loans rose from 0.7% to 2.0% of the global loan portfolio. These percentages indicate that although these activities represent a small stake in Rabobank's global profits and loan portfolio, the growth has been strong and tends to increase further, despite the risks for the climate and valuable biomes in Latin America.

Table 1 Rabobank's exposure to Brazilian forest-risk sectors soy, beef, pulp & paper

€ million	2000	2005	2010	2015	2020	2021	2022
Loans, investments							
Dutch activities Brazilian forest-risk[b]	1,307	1,464	2,093	2,752	3,001	2,945	2,845
Brazil activities[c]	0	69	107	2,789	9,059	6,014	5,926
Total loans, investments	1,307	1,533	2,200	5,541	12,060	8,958	8,770
As % of total Rabobank global loan portfolio	0.7%	0.6%	0.5%	1.3%	2.9%	2.1%	2.0%
Net interest income							
Dutch activities Brazilian forest-risk	33	30	36	50	47	45	49
Brazilian activities forest-risk	0	2	2	62	188	135	141
Total net interest income Brazilian forest-risk	***33***	***32***	***38***	***112***	***235***	***181***	***191***
as % of global net interest income Rabobank	0.7%	0.5%	0.4%	1.2%	2.9%	2.2%	2.1%
Global net interest income	4,585	6,407	8,614	9,139	7,997	8,351	9,149
Gross result							
Dutch activities Brazilian forest-risk	10	10	15	16	18	15	21
Brazilian activities forest-risk	0	1	1	22	79	69	70
Total gross result Brazilian forest-risk	***10***	***10***	***15***	***38***	***97***	***84***	***90***
as % of global gross result Rabobank	0.4%	0.3%	0.3%	0.8%	2.3%	1.6%	1.8%
Global gross result	2,292	3,199	4,520	4,869	4,240	5,125	5,035
US$ to 1 €	0.96	1.19	1.32	1.09	1.22	1.14	1.07

Source: Profundo

[b] Rabobank's loans to Dutch dairy and protein sectors, using Brazilian soy.

[c] Rabobank's Brazilian activities providing loans and underwriting services to Brazilian forest-risk actors.

Table 2 Environmental and social damage by Rabobank in 2000-2022*

	Damage - Low	Damage - High
Climate damage		
Climate damage (CO_2e mln tons), deforestation	108	108
Costs per ton (€)	86	1,160
Climate damage (€ mln), deforestation	9,254	124,816
Climate damage (CO_2e mln tons), beef/cattle ranching	148	148
Costs per ton (€)	86	1,160
Climate damage (€ mln), beef/cattle ranching	12,736	171,794
Total climate damage 2000-2022 (€ mln)	21,990	296,610
Biodiversity damage, excluding intrinsic value of nature		
Biodiversity (hectares)	434,224	434,224
Biodiversity damage (€ mln) [d] [e]	26,606	142,746
Health damage		
Air pollution (€ mln)	17,330	19,379
Pesticides (€ mln)	99	99
Other social/socio-economic impact (€ mln)	Na	Na
Total health and other social damage	17,429	19,478
Absolute and relative damage		
Total damage (€ mln), excluding intrinsic value nature	**66,025**	**458,834**
Group equity and reserves Rabobank 2022 (€ mln)	46,358	46,358
Damage as % of equity/reserves	142%	990%

Source: Profundo; *) Brazilian damage, through financing forest-risk activities in Brazil and indirectly through soy-sourcing sectors in the Netherlands.

[d] There are stakeholders that are opposed to focus on a value approach for biodiversity as all valuation methodologies are partly, and often only, based on ecosystem services (for mankind) and the value for tourism (idem).

[e] See in relevant chapter for calculation methodology.

Abbreviations

Abbreviation	Definition
CAGR	Compounded Average Growth Rate
CBS	Dutch Statistical Office (Central Bureau voor de Statistiek)
CH_4	Methane
CO_2e	Carbon Dioxide Equivalent
EU ETS	European Emission Trading System
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GHG	Greenhouse Gas
Gross result	Total income minus operating expenses
Gross result margin	Gross result divided by total income
GWP	Global Warming Potential
HHP	Highly Hazardous Pesticide
IEPS	Institute for Health Policy Studies (Instituto de Estudos para Políticas de Saúde)
iLUC	Indirect Land Use Change
IMF	International Monetary Fund
IPAM	Amazon Environmental Research Institute (Instituto de Pesquisa Ambiental da Amazônia
IPEA	Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada)
MSA	Mean Species Abundance
N_2O	Nitrous Oxide
n/a	Not Available
NAICS	North American Industry Classification System
Net interest income	Gross interest income minus interest expenses
NZBA	Net Zero Banking Alliance
PM	Particulate Matter
PMD	Phillips McDougall (a market analysis company)
$SCCO_2$	Social Cost of Carbon Dioxide
SNCR	National Rural Credit System (Sistema Nacional de Crédito Rural)
Total income	Interest income + fee income + other income
WHO	World Health Organisation

Introduction: sectors and methodology

This report explores the profits that Rabobank has made over the period 2000-2022 on forest-risk activities related to soy, beef, and pulp & paper that put pressure on the Brazilian Amazon and Cerrado biomes. In addition, it describes the size and value of the environmental and social damage created by these activities. These analyses were commissioned by Greenpeace Netherlands.

Scope of analysis

In this report, we analyse two groups of activities:

- Brazilian forest-risk activities in soy, beef, and pulp & paper directly financed by Rabobank.
- The Dutch soy-sourcing agricultural sector, financed by Rabobank. This group of companies consists mainly of dairy and animal protein producing businesses.

The current report does not consider Rabobank's financing of activities in other parts of the world that source Brazilian soy, beef, and/or pulp & paper, like financing of dairy activities in France. The focus is on the environmental and social impacts by the Rabobank through its Brazilian activities and by the Rabobank's financing of Dutch activities which have a direct link with Brazilian forest-risk sectors.

Lack of data

In the first instance, Rabobank's own publications were investigated to understand what is already available and calculated by the bank. This concerns data on outstanding loans, large clients, interest margins and fee income on specific categories of loans, climate, and greenhouse gas (GHG) emission data (carbon dioxide (CO_2) and methane (CH_4)), climate damage costs, biodiversity impact, and social impacts including health effects and costs. Subsequently, the current research applies various methodologies to fill the gaps in all these items with estimates.

In every section, the applied methodology will be explained.

Rabobank's financing is only one of the money flows

Over the period 2000-2023 Rabobank had a leading market share of 75%-87% in the Dutch farming sector. The Brazilian soy-sourcing outcomes in the Netherlands are adjusted for the bank's relevant market share for every year in 2000-2023. Moreover, it must be considered that farmers also use own equity and other financial streams (circa 63%) for their operations. Finally, we note that dairy and meat farmers do not only use Rabobank's financial support for soy-related activities, although Brazilian soy forms an essential part of the business-model of the Dutch intensive livestock industry. 46-61% of all soy imported in 2000-2022 came from Brazil. Therefore, the adjustment factor will be 25% Brazilian soy-related, and 75% other (this means the majority of 75%, will not be included in the calculation of profits, emissions, and damage).

In the Brazilian financing, equal adjustment factors will be applied as also here the financing by Rabobank is only a share of the total financing.

Besides money flows, Rabobank is just one of many actors that have made profit over the years. Other players in the value chain have also made profit at the cost of climate, people and nature: trading companies like Cargill, feed companies like ForFarmers, protein processors like dairy companies and slaughterhouses, and supermarkets like AholdDelhaize.

Environmental and social damage and costs

The environmental and social damage consists of three categories:

a. Climate change, based on CO_2-equivalent (CO_2e) GHG emissions from deforestation linked to financing of beef, soy, and pulp & paper activities, and CH_4 emissions linked to cattle ranching. Climate damage costs have been calculated in two value scenarios.
b. Biodiversity damage, based on lost hectares. The total damage value (including climate, health, social) has an outcome including and excluding biodiversity value loss.

c. Social damage and health costs. In this group, the focus is on the impact of air pollution, due to deforestation and forest fires, and the impact of the use of pesticides in soy cultivation.

Final outcome and shortcomings

The impacts on climate, environment and health are presented in volumes as well as in values. These values are confronted with the realised net interest income and/or gross result on the 'Brazilian' activities of Rabobank, as well as with Rabobank's current own equity position.

In our analysis it should be considered that some double counting may occur. For example, a Dutch farmer financed by Rabobank Netherlands client may use imported Brazilian soy, which was harvested by a Brazilian farm financed by Rabobank Brazil. However, due to Rabobank's small market share in Brazil soy financing, the double-counting risk will be limited.

It should be noted though that including the financing of non-Dutch and non-Brazilian activities linked with Brazilian forest-risk sectors would lead to a further increase of the outcomes. For example, animal farming in Poland is also exposed to Brazilian soy, but outside the scope of this research. Furthermore, loans to, for instance, JBS entities outside of Brazil are not taken into account, therefore understating the flows.

As explained in section 4.2.3, due to the lack of data to calculate Suzano's on-balance land use change/deforestation and accompanying emissions, Suzano's impacts are left out of the calculations.

Regarding the social impacts, the focus is on air pollution from deforestation and fires, and the impact of the use of pesticides in soy cultivation. These are not the only social impacts. Land grabbing, cultural/culture destruction, and social unrest are also important social impacts. However, methodologies to quantify and/or value these are not available.

1

Rabobank's reporting on Brazilian exposure

Rabobank's own reporting on specific Brazilian exposure lacks consistency and granularity. Although the reporting shows progress, including the first steps in Scope 3 calculations, no data are available about financing links to deforested hectares in Brazil, climate damage, environmental damage, and health and social damage.

1.1 Introduction

This section describes the information published by Rabobank on its activities linked to the Brazilian forest-risk sectors soy, beef, and pulp & paper.

Rabobank started working in Brazil in 1989 through a representative office. In 1995 the bank was formally authorised to operate as a commercial bank. In 2000, Rabobank began to operate as a diversified bank, adding an investment portfolio. Since then, Rabobank has invested in long-term relationships and in services for corporate clients in the food sector.

In 2004, Rabobank Brazil began to provide financial products and services directly to farmers to serve the rural sector as well. In this process, it opened branches in the main agribusiness hubs throughout the country. Today, with a headquarter in São Paulo, Rabobank Brazil has fourteen branches in the states of Bahia, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo, Goiás, Maranhão, and the Federal District, which serve Brazil's farmers.[1]

The services to Dutch farmers date back to 1898, when the Cooperative Association of Raiffeisen Banks, and Cooperative Central Boerenleenbank started. In 1972, they merged into Rabobank. In 1981, Rabobank opened its first overseas branch, in New York. Now the company is active in 38 countries globally.[2]

1.2 Rabobank's own data on activities linked to Brazil

Table 3 provides a breakdown of Rabobank's loan portfolio. Relevant sectors in the current report are Dutch Food & Agri (2022: € 22,500 million) and Wholesale & Rural Agri (2022: € 76,200 million). Part of these activities will contain loans that might be linked to environmental and social damage related to soy, beef, and paper & pulp activities.

The Brazilian loan portfolio 'rural' (excluding wholesale) had a value of € 4,200 million in 2022. The Dutch loans to dairy and animal protein sectors totalled € 11,379 million (€ 7,858 million + € 3,521 million) but lack detailed data back to 2000 (see Table 3).

Finally, Rabobank's market share in the Dutch Food & Agri market is proudly published, already since the start of the current analysis (2000: 87%) and has been stable until 2020 (85%).

Table 3 Rabobank: key data – global and regional

€ million	2000*	2005	2010	2015	2020	2021	2022
Loan portfolio							
Total assets	342,920	506,204	652,536	670,373	632,258	639,231	628,513
Total loans	179,137	278,095	436,292	426,157	409,380	417,684	432,121
Total Food & Agri	n/a	48,200	80,600	97,800	95,465	102,941	113,305
Dutch total private sector loans	179,137	200,700	286,900	313,895	293,739	293,286	274,000
Dutch Food & Agri	n/a	21,500	29,100	28,400	22,600	22,400	22,500
Wholesale & rural private sector loans	n/a	54,200	99,100	98,800	105,900	108,700	119,800
Wholesale & rural Agri		23,100	n/a	n/a	n/a	67,700	76,200
Latin America	n/a	n/a	n/a	12,741	11,852	13,068	n/a
Brazil loan portfolio rural (no wholesale)	n/a	n/a	n/a	n/a	3,000	3,300	**4,200**
Dairy							
Dutch 'Retail'	n/a	n/a	Down**	n/a	8,322	8,193	**7,858**
Wholesale & rural	n/a	n/a	n/a	n/a	9,817	10,872	11,844
Leasing	n/a	n/a	n/a	n/a	915	1,118	1,300
Total	n/a	n/a	14,508	14,373	19,054	20,183	20,183
Animal protein							
Dutch 'Retail'	n/a	n/a	Up**	n/a	3,681	3,586	**3,521**
Wholesale & rural	n/a	n/a	n/a	n/a	13,697	15,142	16,534
Leasing	n/a	n/a	n/a	n/a	1,942	2,135	2,182
Total			14,508	23,769	19,320	20,863	22,237
Dutch primary agricultural sector	15,400	17,800					
Market share Dutch Food & Agri market	87%	83%	84%	85%	85%	75%	Na

Source: Profundo, based on Rabobank annual reports 2000, 2005, 2010, 2015, 2020, 2021, 2022, and Rabobank's Impact 2021 report. *) 2000: Total Rabobank; **) terminology by the Rabobank about annual change.

In the further analysis on the size of the loans and other financial products, the Dutch Retail Dairy and Animal Protein value numbers form the basis for the Dutch farm activities sourcing Brazilian soy.

For the direct loans, financial services, and investments to companies and sectors active in the Brazilian forest-risk commodities soy, beef, and paper & pulp, the NAICS (North American Industry Classification System) codes in the loan portfolio document give some transparency.[3] Rabobank has large loans to livestock-related sectors, while the loans to timber- and paper-related sectors, according to Rabobank's own reporting, is relatively small with respectively 1% and 5% of the selected categories (0).

In total, the selected NAICS forest-risk (global), not only Brazil) categories (total value 2022: € 43,496 million) account for 19% of the total NAICS portfolio of Rabobank (2022: € 227,982 million) and 10% of the total loan portfolio (€ 432,121 million).

Table 4 Rabobank: loans to deforestation-risk sectors - global

EUR million	# NAICS	2015	2021	2022	As % (2022)
Soy and beef					
Soybean farming	111110	1,687	2,795	3,694	8%
Soybean and other processing	311224	747	1,184	1,466	3%
Beef cattle ranching and farming, incl. feedlots	112110	14,937	6,958	7,315	17%
Dairy cattle and milk production	112120	11,953	17,009	17,384	40%
Dual purpose	112130	687	464	470	1%
Hog and pig farming	112200	2,294	1,713	1,719	4%
Poultry and egg production	112300	1,420	2,150	2,227	5%
Sheep and goat farming	112400	1,829	2,569	2,827	6%
Animal aquaculture	112500	561	634	728	2%
Other animal production	112900	613	1,833	1,849	4%
dairy product merchant wholesalers	424430	367	925	1,225	3%
Poultry and poultry product wholesalers	424440	12	29	37	0%
Livestock merchant wholesaler	424520	183	94	97	0%
Timber					
Timber tract operations	113100	1,187	104	91	0%
Forest nurseries and gathering forest products	113200	706	214	312	1%
Logging	113300	79	116	112	0%
Pulp & paper					
Pulp, paper and paperboard mills	322100	683	758	691	2%
Converted paper manufacturing	322200	898	715	1,223	3%
Paper and paper products	424100	42	58	29	0%
Total		40,885	40,322	43,496	100%

Source: Profundo, based on Rabobank overview loan portfolio 2022; NAICS = North American Industry Classification System.

From these Rabobank data, it seems logical to focus the current report's research resources on livestock-related sectors, but creditor research will check whether Rabobank's NAICS codes document shows a complete picture.

The Rabobank NAICS data can be combined with data from its annual reports, in which Rabobank shows bar charts with geographical segmentation for loans to climate-risk sectors. This shows that 'Beef' exposure in Brazil is € 406 million (2021), and that 'Dairy cattle and milk production' in the Netherlands is € 9,497 million (2021), which is quite comparable to the € 8,193 million (excluding wholesale and leasing) in Table 3. 2021 is the only year for which these numbers are available. Rabobank has no geographical data on pulp & paper, and no data on exposure to pigs, poultry, and egg sectors in both countries, which are also consumers of Brazilian soy. Also, Rabobank does not analyse Brazilian exposure of global companies.

Table 5 Rabobank NAICS data combined with annual report data - 2021

€ million	NAICS codes	Loan value	% Dutch*	% Brazil*	Dutch	Brazil
Beef cattle ranching and farming including feedlots	112110	6,958	16%	6%	1,102	406
Soy	111110/311224	3,979	n/a	52.8%	n/a	2,100
Pulp & paper	322100/322200/ 424100	1,531	n/a	n/a	n/a	n/a
Dairy cattle and milk production	112120	17,009	56%	3%	9,497	567
Food & Agri		**113,305**	**22%**	**7%**	**22,400**	**7,554**

Source: Profundo, based on overview loan portfolio 2021 (NAICS) in Rabobank (2022), *Annual Report 2021*, p. 79; *) The percentages can be deducted from a bar chart and these are most relevant for the current report when reporting on two group of activities/companies.

The current report uses Rabobank's data on Dutch dairy and protein as much as possible, but the financial data on Rabobank's relations with Brazilian and international companies active in the relevant Brazilian forest-risk sectors comes from the Forest & Finance database.[4]

2

Loans and profits on Brazilian exposure

In this section we explore the financing by Rabobank of Brazilian forest-risk activities in soy, beef, and pulp & paper and the Dutch soy-sourcing agricultural sector. Subsequently, the net interest margin and gross result are calculated.

2.1 Loans and profits on Dutch sourcing of Brazilian soy

2.1.1 Loans Dutch activities

The starting point for calculating the bank's Dutch profits is Table 3. The value data distinguish Dutch retail business in Dairy loans and in Animal Protein loans. In total, Rabobank lent in total € 11,379 million to both sectors in 2022. For 2021 and 2020 similar data is available. However, for many other years in the period 2000-2015 this data is lacking. Therefore, an estimate is made for 2010 and 2015 based on the 2020, 2021 and 2022 size of relevant Dutch loans relative to the global total of Dairy and Animal Protein financing (including leasing). For 2005 and 2000 data is fully lacking for dairy and protein. For these years a proxy is calculated based on the change in Dutch private sector loans in 2000 and 2005 versus 2010. The outcome is a growth of loans to Dutch Dairy and Animal Protein sectors/farmers from € 5,228 million in 2000 to € 11,379 million in 2022 (Table 6).

Table 6 Rabobank: Dutch loans linked to Brazilian forest-risk

€ million	2000	2005	2010	2015	2020	2021	2022
Dairy, Dutch Retail	n/a	n/a	Down	n/a	8,322	8,193	7,858
Animal protein, Dutch Retail	n/a	n/a	Up	n/a	3,681	3,586	3,521
Loans Dutch Retail Dairy + protein					12,003	11,779	11,379
Loans as % of 2020-2022*			8,374	11,007			
Loans based on 2010**	5,228	5,858					
Loans used as a basis for calculation	**5,228**	**5,858**	**8,374**	**11,007**	**12,003**	**11,779**	**11,379**
Market share Dutch Food & Agri market	87%	83%	84%	85%	85%	75%	80%

Source: Profundo; *) respectively, 2010 / 2015 total dairy and protein financing x average 2020-2022 relation (Dutch dairy+protein/total dairy+protein financing); **) based on change of Dutch private sector loans versus 2010 x 2010's € 8,374 million.

2.1.2 Profits Dutch activities

Rabobank is not able to provide data on interest margins on the relevant Dutch Dairy and Animal Protein loans (after a request by Profundo). The key financial data for Dutch retail activities form a proxy for the net interest margin (received minus paid interest, relative to loans) and the gross result margin (total income minus operating expenses, as percentage of total income). For instance, in 2022 Dutch retail earned a net interest income of € 4,739 million, which leads to an interest margin of 1.7% versus domestic loans of € 274,000 million. In the period 2000-2021, the interest margin fluctuates between 1.5% (2021) and 2.6% (2000).

As an example for the gross result margin in 2022, the gross result (€ 2,669 million) is divided by the total income (€ 6,375 million), leading to 41.9%. Between 2000 and 2022, the gross result margin fluctuated between 29.6% and 41.9%.

Both the net interest margin and the gross margin are applied, respectively, to the relevant Dutch loan portfolio and the relevant Dutch net interest income in this report. An additional correction is made as not every Euro that is borrowed by Dutch Dairy and Animal Protein farmers is used for financing the processing of embedded Brazilian soy. Farming is also based on the use of other goods and services, like wheat and US soy, and the acquisition of land, buildings, and equipment. The assumption in this report is that Brazilian soy has been crucial in the growth of the Dutch intensive livestock farming activities. In the period 2000 to 2022, the share of Brazilian soy in Dutch imports ranged between 46% and 61% (see section 4.2.1). A conservative adjustment factor of 25% is applied (Table 7). However, it is important to state that not all of this soy is related to deforestation.

Table 7 Rabobank: Profits on Dutch soy-sourcing sector (selected years)

€ million	2000*	2005	2010	2015	2020	2021	2022
Domestic retail							
Net interest income	4,585	4,176	4,894	5,661	4,615	4,520	4,739
Total income, including fee income	7,751	5,431	6,509	7,050	5,959	6,086	6,375
Gross result**	2,292	1,696	2,676	2,280	2,230	2,072	2,669
NL total private sector loans	179,137	200,700	286,900	313,895	293,739	293,286	274,000
Net interest income/domestic loans	2.6%	2.1%	1.7%	1.8%	1.6%	1.5%	1.7%
Gross result/total income	29.6%	31.2%	41.1%	32.3%	37.4%	34.0%	41.9%
Dairy + protein, based on Dutch data							
Loans NL Retail Dairy + protein	5,228	5,858	8,374	11,007	12,003	11,779	11,379
Net interest income	134	122	143	199	189	182	197
of which 25% on Brazilian embedded soy	**33**	**30**	**36**	**50**	**47**	**45**	**49**
Gross result**	40	38	59	64	71	62	82
of which 25% on Brazilian embedded soy	**10**	**10**	**15**	**16**	**18**	**15**	**21**

Source: Profundo; *) 2000: Total Rabobank; **) gross result = total income minus operating expenses

When these outcomes are translated into periods and a total for 2000-2022, the total net interest income linked to embedded Brazilian soy is € 915 million, and the gross result, after operating expenses, is € 320 million (Table 8).

Table 8 Rabobank: Profits on Dutch soy-sourcing sector (2000-2022)

€ million	2000-2005	2006-2010	2011-2015	2016-2022	Total
Net interest income	767	672	881	1,341	3,662
of which 25% related to Brazilian embedded soy	**192**	**168**	**220**	**335**	**915**
Gross result (total income minus operational expenses)	233	252	310	484	1,280
of which 25% related to Brazilian embedded soy	**58**	**63**	**78**	**121**	**320**

Source: Profundo, based on Table 7.

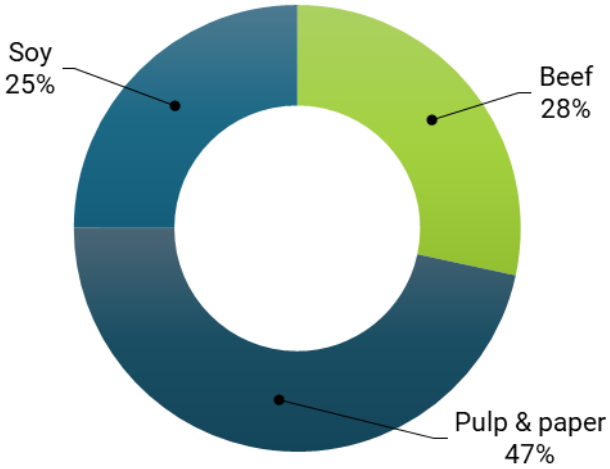
2.2 Loans and profits on Brazilian activities

2.2.1 Loans and underwriting services

In the period 2003-2022, Rabobank provided approximately US$ 9.7 billion (Figure 2) in forest-risk loans and underwriting services to companies engaged in beef, pulp & paper and soy in Brazil. Figure 1 shows that pulp & paper accounted for approximately half of all identified forest-risk attributable financing (US$ 4.5 billion). The beef and soy sectors accounted for approximately a quarter each – US$ 2.8 billion and US$ 2.4 billion respectively.

It should be noted that data for the period 2003-2012 is incomplete, particularly for Brazil's National Rural Credit System (SNCR) (see Box 1).

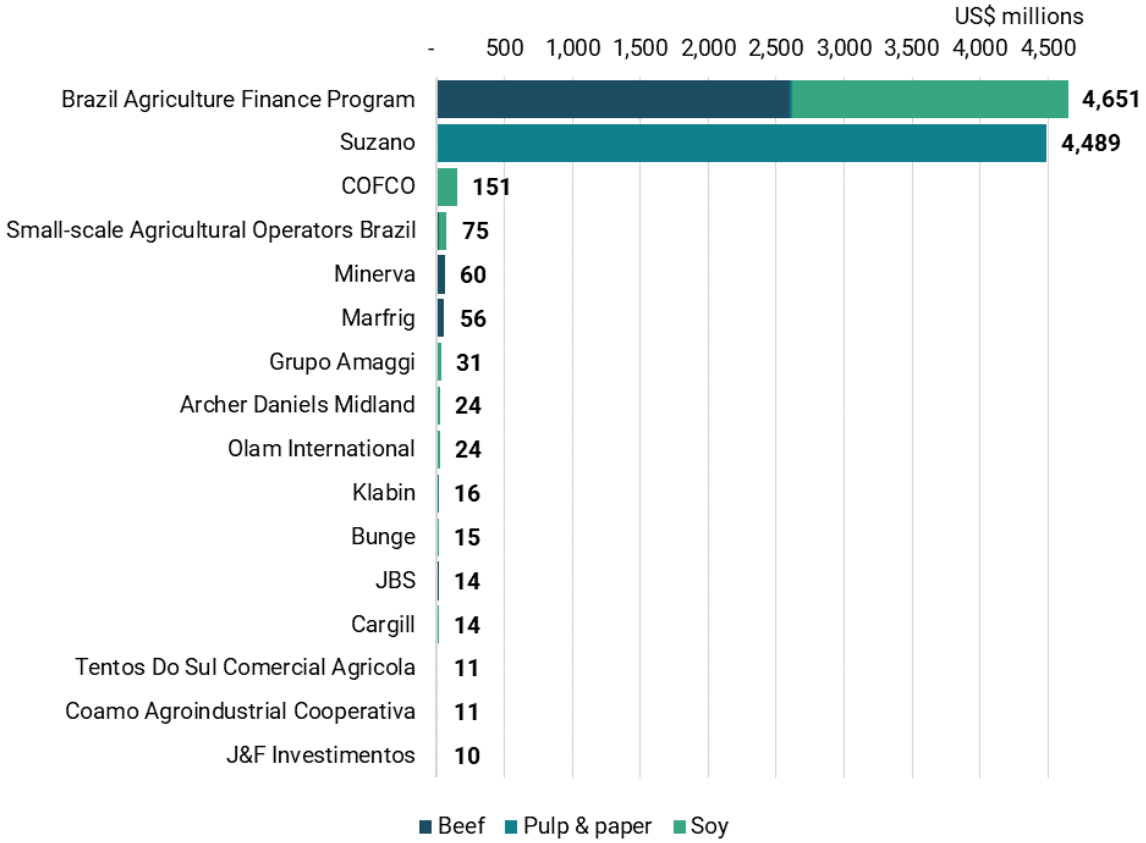
Figure 1 Rabobank: Loans & underwriting services to forest-risk companies in Brazil per commodity (2003-2022)



Source: *Forests & Finance*, retrieved May 2023.

Figure 2 presents Rabobank's largest forest-risk clients in Brazil. These 15 clients account for 99% of the total identified forest-risk finance provided by Rabobank in the period 2003-2022. The two largest clients are Suzano (US$ 4.5 billion) and financing provided through Brazil's SNCR programme (US$ 4.7 billion).

Figure 2 **Rabobank: Loans & underwriting services to forest-risk companies in Brazil per company (2003-2022, US$ mln)**



Source: *Forests & Finance*, retrieved May 2023.

Box 1 - Brazil's National Rural Credit System

The Brazilian government established the National Rural Credit System (SNCR) in 1965. The main purpose of the SNCR was to provide rural credit at low interest rates to assist producers in financing agricultural outputs and machinery, as well as operating costs and the marketing of their produce. About two thirds of the SNCR credit is obtained from the legal requirement for banks operating in Brazil to devote a portion of the deposits they hold to providing rural credit lines.

Financial institutions need to consider certain environmental criteria when providing rural credit, which has helped to reduce deforestation in the past.[5] However, exclusion criteria of the SNCR for deforestation are limited to the Amazon and only consider restriction to embargoed areas due to illegal deforestation. While access to rural credit is restricted to producers who are following the environmental criteria imposed by the Brazilian Central Bank (Resolução CMN 3545/2008 and BCB 140/2021 among others), the overall weakening of monitoring capacity under the Bolsonaro government led to a rapid decrease in environmental embargoes in recent years.[6] Moreover, there are loopholes, for instance there is no compulsory requirement of tracking indirect suppliers when loans are extended to cattle ranchers, despite cattle ranching being the main driver of deforestation in the Amazon.

Forests & Finance has included the available SNCR information since 2013 as "Brazilian Agricultural Finance Programme" in the financing data. The Central Bank of Brazil maintains data on the financing through this program per financial institution, per state, per year. It also includes data on financing per commodity, per state, per year. As it does not provide either company specific financing from financial institutions, or commodity specific financing from financial institutions, this research has estimated the financing per commodity per financial institution.[7]

Table 9 presents the forest-risk adjusted outstanding loans values per year-end for the period 2003 to 2022. This data is derived from the *Forests & Finance* database. Where data on maturity dates was not available – such as for financing through SNCR – these were assumed to be 36 months after the loan was provided. It should be noted that data for the period 2003-2012 is incomplete, particularly for Brazil's SNCR.

The table shows an increasing trend in the value of Rabobank's outstanding loans to clients in Brazil. Between 2013 and 2022, the value of Rabobank's forest-risk adjusted outstanding loans increased from US$ 1.5 billion to US$ 6.3 billion. An increase of more than 300%.

Table 9 Rabobank forest-risk adjusted outstanding loans to Brazilian clients per year-end (2003-2022, US$ mln)

Year-end	SNCR (US$ mln)	Non-SNCR (US$ mln)	Total (US$ mln)
2003-12-31	-	51	51
2004-12-31	-	71	71
2005-12-31	-	79	79
2006-12-31	-	80	80
2007-12-31	-	80	80
2008-12-31	-	77	77
2009-12-31	-	70	70
2010-12-31	-	58	58
2011-12-31	-	55	55
2012-12-31	-	82	82
2013-12-31	755	780	1,535
2014-12-31	1,200	1,409	2,610
2015-12-31	1,201	1,839	3,040
2016-12-31	1,223	1,977	3,199
2017-12-31	1,235	2,143	3,378
2018-12-31	1,185	4,915	6,100
2019-12-31	930	4,267	5,197
2020-12-31	601	10,452	11,052
2021-12-31	441	6,414	6,855
2022-12-31	329	6,011	6,340

Source: *Forests & Finance*, retrieved May 2023.

2.2.2 Profits

Based on data from the preceding section on Rabobank's Brazilian forest-risk loans and investments, the net interest income and the gross result is calculated for a selection of years. The net interest margin is based on the Wholesale & rural business division of Rabobank, as is the gross result. The Wholesale & rural business division offer the most complete data for calculating these margins.

Data about financial relations with the Brazilian agricultural sector differ strongly between 2000 and 2012 versus 2013 to 2022. One reason is that Central Bank data are lacking from 2000 to 2012. Moreover, Rabobank started to service the rural sector from 2004 onwards and started an investment portfolio from 2000 onwards (see section 1.1). Therefore, the assumption is that the rural portfolio has grown exponentially (not linear) from zero in 2004 to the start of data availability in 2013.

In line with the growth of the activities of Rabobank in Brazil, the net interest income rises strongly from zero in 2000 to US$ 151 million in 2022. The gross result in this activity rises from zero in 2000 to US$ 74 million in 2022 (Table 10). Note that the gross result includes fees on underwritten securities in which Rabobank (Brazil) participates and/or organizes. Gross result also includes the operational expenses.

Table 10 Rabobank: Profits on Brazilian forest-risk loans (2000-2022)

€ million	2000	2005	2010	2015	2020	2021	2022
Wholesale & rural (€ million), global							
Net interest income	n/a	1,415	2,197	2,197	2,197	2,447	2,857
Total income, including fee income	n/a	2,226	3,579	3,436	2,772	3,524	3,766
Gross result (total income minus operational expenses)	n/a	950	1,165	1,165	1,165	1,759	1,845
Net interest income/wholesale & rural loans (margin %)	n/a	2.6%	2.2%	2.2%	2.1%	2.3%	2.4%
Gross result/total income (margin %)	n/a	42.7%	32.6%	33.9%	42.0%	49.9%	49.0%
Soy, beef, pulp & paper Brazil, based on Wholesale & rural data (US$ million)							
Outstanding loans Brazil Beef, Soy, Pulp & Paper	0	82	141	3,040	11,052	6,855	6,340
Net interest income	0	2	3	68	229	154	151
Fee income	0	0	0	2	1	3	1
Total income, including fee income	0	2	3	70	230	157	152
Gross result (total income minus operational expenses)	0	1	1	24	97	78	74

Source: Profundo; In 2000, Rabobank did not apply segment reporting as domestic retail loans dominated the portfolio.

When these outcomes for specific years are recalculated into profit for certain periods and a total for 2000-2022, the total net interest income linked to Brazilian soy, beef, and pulp & paper financing is US$ 1,125 million, and the gross result, after operating expenses, is an accumulated US$ 458 million in 2000-2022 (Table 11).

Table 11 Rabobank: Profits on Brazilian forest-risk loans (2000-2022)

US$ million	2000-2005	2006-2010	2011-2015	2016-2022	Total
Net interest income	5.3	13.0	174.4	932.3	1,125.0
Fee income	0.0	0.1	6.7	21.2	28.0
Total income, including fee income	5.4	13.1	181.0	953.5	1,153.0
Gross result (total income minus operational expenses)	2.3	5.3	59.9	390.0	457.5

Source: Profundo.

2.3 Total profits and loans linked to forest-risk in Brazil

The next step is to add up the Dutch and Brazilian profits. In total, Rabobank's Dutch loan activity (25% Brazilian soy-adjusted), and its financing of forest-risk activities in Brazil itself, have generated a net interest income of € 1,890 million in the period 2000-2022. The gross result, including fee income on underwriting activities and after operational expenses, Rabobank has earned € 717 million.

Table 12 Rabobank: Total profits on forest-risk loans related to Brazil (2000-2022)

€ million	2000-2005	2006-2010	2011-2015	2016-2022	Total
Net interest income on:					
Dutch soy-sourcing activities (x25%)	191.8	168.1	220.3	335.3	915.4
Brazilian forest-risk loans	4.8	9.7	135.2	825.0	974.7
Total net interest income	**196.6**	**177.7**	**355.5**	**1,160.3**	**1,890.1**
Gross result on:					
Dutch soy-sourcing activities (x25%)	58.2	63.1	77.5	121.1	319.9
Brazilian forest-risk loans	2.1	3.9	46.4	345.2	397.6
Total gross result	**60.3**	**67.0**	**123.9**	**466.2**	**717.4**
Average US$/€	1.10	1.35	1.29	1.13	

Source: Profundo.

To put these outcomes into perspective, Table 13 reveals that while the Brazilian forest-risk exposure in 2000 was below 1% for the global Rabobank activities (loans, net interest income, gross result), the exposure has grown around 2% in 2022. For instance, the sum of the loans to Dutch activities and the Brazilian activities linked to Brazilian forest-risk (€8.8 billion; see Table 13) was 2.0% of Rabobank's 2022 global loan portfolio of € 432 billion (Table 3).

Table 13 Rabobank's financing of Brazilian forest-risk sectors soy, beef, pulp & paper

€ million	2000	2005	2010	2015	2020	2021	2022
Loans, investments							
Dutch activities Brazilian forest-risk	1,307	1,464	2,093	2,752	3,001	2,945	2,845
Brazil activities	0	69	107	2,789	9,059	6,014	5,926
Total loans, investments	1,307	1,533	2,200	5,541	12,060	8,958	8,770
As % of total Rabobank global loan portfolio	0.7%	0.6%	0.5%	1.3%	2.9%	2.1%	2.0%
Net interest income							
Dutch activities Brazilian forest-risk	33	30	36	50	47	45	49
Brazilian activities forest-risk	0	2	2	62	188	135	141
Total net interest income Brazilian forest-risk	33	32	38	112	235	181	191
as % of global net interest income Rabobank	0.7%	0.5%	0.4%	1.2%	2.9%	2.2%	2.1%
Global net interest income	4,585	6,407	8,614	9,139	7,997	8,351	9,149
Gross result							
Dutch activities Brazilian forest-risk	10	10	15	16	18	15	21
Brazilian activities forest-risk	0	1	1	22	79	69	70
Total gross result Brazilian forest-risk	10	10	15	38	97	84	90
as % of global gross result Rabobank	0.4%	0.3%	0.3%	0.8%	2.3%	1.6%	1.8%
Global gross result	2,292	3,199	4,520	4,869	4,240	5,125	5,035
US$	0.96	1.19	1.32	1.09	1.22	1.14	1.07

Source: Profundo.

3

Rabobank's share in financing damage

In this chapter we present Rabobank's share in financing the selected sectors. To put a price on Rabobank's responsibility for damages caused by these sectors, it is crucial to know the bank's share of the total financing of the relevant activities.

3.1 Introduction

Rabobank's loans, for instance to Brazilian beef producer JBS, mean that Rabobank has partially financed activities that have created damage in Brazil. Rabobank is not responsible for (or cannot be linked to) all damage done by JBS, but only for its percentage share in the full financing received by the company. The same is true for its loans in the Netherlands. Rabobank is only one of the financers of Dutch farmers: other banks as well as own money/equity of Dutch farmers have their own share in the damage.

3.2 Netherlands: loans are only a part of the Brazilian soy-sourcing finances

Rabobank has a large market share in financing the Dutch food & agri sector. For instance, in 2015 the bank stated that it "*has had a stable market share in the Dutch food and agri sector of around 85% for many years and is indisputably the most important financier in this sector. Rabobank has acquired this position as a result of its agricultural roots and years of acquired sector knowledge.*"[8]

In 2017, the total assets of Dutch agricultural sector were € 91 billion, according to the national Dutch statistical office (CBS).[9] This means that with € 28.4 billion loans to Dutch Food & Agri, Rabobank financed a large part of the enterprise value (own equity plus debt) of the sector. A part of the sector is financed through own equity of farmers, and another part of financing is through payables and tax provisions.

Data from Wageningen Economic Research give insight in how Dutch farms in 'soy-intensive' sectors are financed. When focusing on own equity and long-term debt (Rabobank's exposure mainly consists of mortgage lending), the long-term financing accounts for 35-39% of the total financing.

Table 14 Financing structure Dutch farms: loans as % of enterprise value*

	2001	2005	2010	2015	2020
Dairy farms	21%	26%	30%	33%	26%
Pig farms	32%	35%	41%	45%	32%
Broiler farms	46%	38%	41%	37%	37%
Laying hen farms	42%	45%	44%	42%	44%
Average (unweighted)	35%	36%	39%	39%	35%

Source: Profundo based on Wageningen Economic Research (n.d.), "Agrimatie – BINternet, land- en tuinbouw", online: https://www.agrimatie.nl/binternet.aspx?ID=8&bedrijfstype, viewed April 2023; *) Long-term loan as % of enterprise value (= equity + long-term loan).

A low single-digit percentage of long-term loans is from family relatives (from parents to children, the new farming generation), but more than 90% is from banks, according to the Wageningen research. With Rabobank having 75% to 87% of the bank loan market in the last 23 years, the assumption is that the bank is financing 30% of equity + debt (= enterprise value) of the Dutch dairy and protein sector. Thus, Rabobank can be linked to 30% of the Dutch Brazilian soy sourcing for dairy and protein activities. As data is absent for most of the years, this '30%' is applied to the whole period 2000-2022 (Table 15).

Table 15 Rabobank's share of total financing of Dutch farmers

	2001	2005	2010	2015	2020
Average long-term loan as % of equity + long-term loan	35%	36%	39%	39%	35%
Banks' share of long-term loans	95%	95%	95%	95%	95%
Rabobank's share in financing of Dutch farmers	87%	83%	84%	85%	85%
Rabobank's share of financing	29%	28%	31%	32%	28%

Source: Profundo, based on Table 14.

3.3 Brazilian activities: Rabobank's part in the enterprise value

For Brazil, two financing data sets are available. The financing through the rural credits to local farmers mainly, and the financing of large companies.

3.3.1 Farmers credits

Chain Reaction Research calculated that from 2013 to 2020, total soy and beef financing in Brazil amounted to US$ 100 billion, of which US$ 74.2 billion came from Brazil's National Rural Credit System. The Rural Credit System contributed 91% in bank loans.[10] The financing by rural credits is an additional financing instrument for farmers to pay for their production. Rural credits do compete with other financing instruments, like equity and barter.

Barter, where commodity traders finance inputs like seeds or fertiliser to guarantee supply of the harvest later in the season, is still used by a large part of Brazilian farmers. For example, in the Cerrado region, around 35% of farmers use barter. Of all farmers in Brazil, 35% still use cash as main source of payment, and 32% rely on in-store credit and bank financing. Working capital funding and farm equipment are the top-2 reasons for obtaining financing.[11]

As further data on financing structures is lacking, the assumption is that the Brazilian rural credits have the same share of farmers' financing as commercial bank loans to Dutch farmers (see Table 15, first line). This is roughly in line with Rabobank's indication of 30%.[12]

3.3.2 Financing of large companies

Rabobank's financing in Brazil is dominated by the financing provided through Brazil's National Rural Credit System and to the pulp & paper company Suzano. Based on identified financial relations, 48% consisted of rural credits and 46% of financial services to Suzano. While Rabobank has been mentioned as an important financer of, for instance, JBS, many of these JBS loans are in fact to company units outside Brazil.[f] In 2000-2022, Rabobank's financing of local units of JBS, Minerva, and Marfrig amounted to US$ 130 million, which is only 1.3% of Rabobank's total financial flows to the investigated Brazilian forest-risk sectors in 2000-2022.

[f] Some stakeholders emphasize that if you give money to JBS, wherever in the world, you still enable forest destruction. If this would be included, Rabobank's relevant Brazilian forest-risk loans to for instance JBS would be much larger.

As Suzano, active in pulp & paper, has a different impact than the Brazilian units of JBS, Marfrig and Minerva regarding environmental damage, Rabobank's exposure to large companies is not taken into account in some of our calculations of environmental damage and social damage (except methane emissions). The relatively small amounts of Rabobank's exposure to other companies than Suzano will not materially affect the outcomes of environmental and social damage in some 'damage' categories.

4

Environmental, health and social impacts

The preceding chapters shed light on the size of the loans and underwriting services, on the profits from these loans, including adjustments, and the share Rabobank in the total financing of companies and sectors. In this chapter we estimate the emissions, the land use change and deforestation, and the health and social damage that may be linked to the contribution in financing by Rabobank.

4.1 Introduction

This section calculates and analyses the environmental, social, and health impacts of lending by Rabobank to sectors linked to the soy, beef, and the pulp & paper sectors in Brazil. These impacts occur in various biomes, in the Amazon and the Cerrado in particular.

Analyses of land-use and land-cover change mostly focus on the economic drivers and GHG emission effects of deforestation. However, it also must be considered that anthropogenic disturbances cause degradation of the remaining forests and threaten their future. The most important disturbances are so-called edge effects (ecological changes to habitat quality as deforestation leads to habitat fragmentation and artificial edges of remaining forest fragments), timber extraction, fire, and extreme droughts that have been intensified by human-induced climate change.[13] Additionally, the fires linked to deforestation lead to air pollution which creates health problems. On the deforested land, soybean production is based on pesticides use, which leads to (occupational) health problems and water pollution.

4.2 Climate damage reporting

Like many companies, Rabobank does not report on how much climate damage it has created through financing of the selected Brazilian forest-risk activities and the financing of Dutch activities dependent on embedded Brazilian soy.

The bank reports on CO_2e emissions, although this is not complete, and the categorisation is not consistent. In this confusing reporting process, Rabobank reported for 2020 and 2021 the Scope 1 & 2 emissions for its dairy and pig financing in the Netherlands. It also reported on Scope 1 & 2 emissions for soy financing in Brazil. The 12 sector/region combinations caused total emissions of 26.2 million tons CO_2e in 2021, of which 19.1% are relevant to the Brazil-linked activities. Rabobank's estimates its soy-related Scope 1 & 2 emissions for rural clients on 0.7 million tons CO_2e in 2021 (see Table 16).[14] For this classification, Scope 3 is lacking, as well as financed beef activities and pulp & paper.

Table 16 Rabobank: Scope 1 & 2 emissions of 12 sector/region combinations

Sector	Region	Business line	FY'20 scope 1&2 (Mt CO_2e)	FY'21 scope 1&2 (Mt CO_2e)	Outstanding 2020 (€ mln)	Outstanding 2021(€ mln)
Dairy	Netherlands	Retail, Dutch	4.1	3.6	11,300	10,900
Pig farming	Netherlands	Retail, Dutch	0.8	0.7	1,600	1,500
Soy	Brazil	Rural	0.6	0.7	1,900	2,100
Other			19.2	21.2	235,900	244,800
Total			**24.7**	**26.2**	**250,700**	**259,300**
Brazil-linked as % of total			**22.3%**	**19.1%**	**5.9%**	**5.6%**

Source: Profundo, based on Rabobank (2023), *Our Impact in 2022*.

Rabobank only publishes Scope 3 emissions for selected portfolios as stipulated by NZBA (Net-Zero Banking Alliance) (Table 17).

Table 17 Rabobank: Financed emissions from loans & investments (Scope 3)

Mt CO_2e	2020	2021	% in scope 2021	Total assets 2021 (€ mln)
Dutch Food & Agriculture	11.2	10.0	99-100%	
Wholesale clients	7.7	12.9	89%*	
Rural clients	18.6	19.6	89%*	
Other**	8.8	9.0	23-24%	
Total in scope for financed emissions	**46.3**	**51.5**	**87%**	**460,246**
Total assets				**639,231**

Source: Profundo, based on Rabobank (2023), *Our Impact in 2022*"; *) 89% for total of Wholesale & rural, **) Residential real estate, Trade, Industry & Services, Commercial real estate, DLL tractor and transport assets, sovereign bonds and Rabo Investments.

The incomplete data published by Rabobank do not provide information on emissions, and further analysis is needed. In addition, the data from Rabobank only cover a limited number of years, and only partially cover the 2000-2022 period.

4.2.1 Deforestation and emissions linked to embedded soy in the Netherlands

Based on the share of Brazilian soy in overall imports, we estimate that in recent years between 1.2 and 1.5 million tons of Brazilian soymeal have been used by the Dutch downstream sectors.[15]

Trase.earth reports deforestation attached to Brazilian soy for the period 2013-2020, based on the first country of import. For imports to the Netherlands, these values suggest an average annual deforestation footprint of 24,900 hectares attached to Brazilian soy arriving in Dutch ports. The development during these eight years shows a decline in the number of hectares per year linked to Dutch imports. As overall Brazilian deforestation rates were higher in the early 2000s, extrapolating this average annual deforestation area to the period 2000-2022 likely results in a conservative estimate for the deforestation footprint of Dutch imports of Brazilian soy of 572,400 hectares. Out of this total, an estimated 33% was used in the Netherlands (Table 18).

To evaluate the CO_2e emissions attached to the soy imports and the role of Rabobank's financing of the production of dairy, meat, and eggs that uses this soy, several data sources were combined.

According to statistical data, across the 23 years from 2000-2022, an estimated 35.9 million tons of Brazilian soybean equivalents were used in animal feed in the Netherlands. Building on Trase's supply chain mapping,[16] a life cycle assessment (LCA) study by Escobar et al. (2020) concludes that the imports of Brazilian soy to the Netherlands were on average connected to GHG emissions of around 0.64 tons CO_2e per ton of soybean equivalent in the period 2010-2015, considering CO_2, CH_4 and N_2O. These volumes include emissions during production, transport, and processing. Land use change accounts for around 40% of the footprint. We assume that a similar emission factor was relevant across the 2000-2022 period analysed in this study.[17]

When applying the 30%-share of the bank in the enterprise value of the Dutch dairy and protein sector, an estimated 57,100 hectares of deforestation were linked to Rabobank's financing activities. This area equals around four times the land surface of the Dutch island Texel. Moreover, Rabobank has been exposed to an estimated 6.9 million tons CO_2e emissions from Brazilian soy through its financing activities.

Table 18 Rabobank: Financed deforestation and emissions linked to Dutch use of Brazilian soy (2000-2022)

Period	Dutch use of Brazilian soy	Deforestation footprint	GHG emissions
2000-2022 (mln tons SBE)	35.9		
Average annual deforestation linked to Dutch soy imports (period 2013-2020) (ha, 000's)		24.9	
Extrapolating deforestation linked to Dutch soy imports (period 2000-2022) (ha, 000's)		572.4	
Correcting for Dutch domestic use of soy (33%)		190.4	
Average GHG emissions (ton CO_2e / ton SBE)			0.64
Total GHG emissions from Dutch use of Brazilian soy (mln ton CO_2e)			22.9
Share of Rabobank financing (30%)	**10.8 mln tons SBE**	**57.1 tsd ha**	**6.9 mln tons CO_2e**

Note: SBE=soybean equivalent.
Source: Profundo; Eurostat (2023), "EU trade since 1988 by HS2-HS4"; ISTA Mielke (various dates), *Oil World Annual Statistics*; Escobar, N., E.J. Tizado, E.K.H.J. zu Ermgassen, P. Löfgren, J. Borner and J. Godar (2020), "Spatially-explicit footprints of agricultural commodities: Mapping carbon emissions embodied in Brazil's soy exports", *Global Environmental Change*, 62: 102067; FAO (2019), *Technical Conversion Factors for Agricultural Commodities*.

4.2.2 Deforestation and emissions linked to forest-risk financing of Brazilian rural clients

With regard to rural credits, Rabobank indicates that its "*strategic focus and strict sustainability criteria give (its) portfolio a significantly better climate performance than the regional average…*". However, the Rabobank also admits that due to data constraints, the bank is currently not able to calculate the carbon intensity of its portfolio (for soy) in Brazil.[18] Also after requests from us, Rabobank was not able to provide further details but indicates that based on limited internal information, the bank seems to have a portfolio with above-average performance.

Our data used in the analysis in this section and paragraphs below, indeed indicate that Rabobank's rural credits linked to Amazon states as well as the agricultural frontier region Matopiba (Maranhão, Tocantins, Piauí, Bahia) in the Cerrado biome have decreased considerably since 2019, after a relatively high level before 2019. In Matopiba values dropped by half. **Therefore, the estimated deforestation and emissions outcomes in recent years are probably lower than those for the average bank active in rural credits in Brazil,** which is in line with Rabobank's

statements above. As more stringent deforestation policies at Rabobank (see Forests & Finance) were not in place for a large part of the 2000-2022 period and data are lacking, the assumption for the calculation of the full 2000-2022 period is that Rabobank's financing was equally exposed to deforestation as other rural credits in the same Brazilian state.

To estimate Rabobank's exposure to deforestation in Brazil, different sets of data were combined. Firstly, the Brazilian National Institute for Space Research (INPE) publishes detailed data on deforestation across the different Brazilian biomes on state-level.[g,19] Various direct and indirect drivers of deforestation can be identified. However, while infrastructure development, mining operations or charcoal production are contributing to forest loss and degradation, the share of these activities is comparatively small. The expansion of cattle ranches and agricultural lands remain the key drivers of deforestation in Brazilian biomes.[20] Research also highlights the role of soy as an indirect driver of deforestation by displacing existing pasture or other land uses.[21] Therefore, this research assigns the observed conversion of natural vegetation to farming and cattle ranching.

Brazilian Central Bank data on overall rural credit provision in Brazil as well as Rabobank's share in this total are available since 2013. Both sets of data are broken down by state. It needs to be considered though that credit is not the only source of financing. As no relevant breakdowns for Brazil could be identified, the average share of 37% of financing obtained from credit calculated for the Netherlands (Table 15) is used as a proxy to correct for other types of financing enabling the conversion of forested lands for agricultural purposes.

By multiplying Rabobank's share in Brazilian rural credit per year and state with 1) the correction factor of 37% for other types and sources of financing, and 2) the reported deforested hectares by biome, an estimate of the bank's exposure to the observed deforestation across biomes since 2013 is obtained, resulting in 207,000 hectares (Table 19). As the bank first serviced the rural sector in Brazil in 2004, the data needs to be extended to the period 2004-2012. To this end, the average annual value of previous years is decreased at an exponential rate to arrive at an assumed USD 1 million in the starting year 2004. Subsequently, the estimated share of the bank's financing in deforested hectares per biome during these years is extrapolated along the same decreasing scale, adding an additional 124,000 hectares.

In total, these calculations suggest that the rural financing provided by Rabobank in the period from 2004-2022 may have exposed the bank to an estimated deforestation of 330,000 hectares across the six Brazilian biomes (see Table 19). This area equals approximately 20 times the land surface of the Dutch island Texel. The largest share is accounted for by the Cerrado biome (53%), reflecting its position at the agricultural frontier in recent years. The Amazon biome has an estimated share of 28%, followed by other biomes with shares between 2%-10% (Table 19).

Table 19 Rabobank: Financed deforestation and emissions through rural credit in Brazil (2004-2022)

Data	**Amazon**	**Cerrado**	**Pantanal**	**Caatinga**	**Mata Atlantica**	**Pampa**	**Total**
Total deforestation 2013-2022 (1,000 ha)	8,222	9,083	606	2,565	1,206	1,113	**22,795**
Rabobank share in deforestation 2013-2022 (est., 1,000 ha)	57	108	8	20	9	4	**207**
Rabobank share in deforestation 2004-2012 (est., 1,000 ha)	34	65	5	12	5	2	**124**

[g] The six biomes are the Amazon rainforest, the Cerrado forested savannah, the Pantanal wetlands, the Caatinga semi-dry forest, the Mata Atlantica forest, and the Pampa grassland.

Data	Amazon	Cerrado	Pantanal	Caatinga	Mata Atlantica	Pampa	Total
Total Rabobank share in deforestation 2004-2022 (est., 1,000 ha)	**91**	**174**	**13**	**32**	**15**	**7**	**331**
Biome share in total (%)	28%	53%	4%	10%	4%	2%	
Emission factors (average tons CO_2e/yr/ha)	536	217	217	217	217	217	
Emissions from Rabobank's share in deforestation 2004-2022 (est., mln tons CO_2e)	**49**	**38**	**3**	**7**	**3**	**1**	**101**

Source: Profundo; Forests & Finance (2023); INPE (2023), "TerraBrasilis – PRODES desmatamento"; Brazilian Government (2021), *Technical Annex II to the Fourth Biennial Update Report (BUR): Results Achieved by Brazil From Reducing Greenhouse Gas Emissions from Deforestation in the Cerrado Biome for REDD+ Results-Based Payments*, p. 69; Brazilian Government (2021), *Technical Annex I to the Fourth Biennial Update Report (BUR): Results Achieved by Brazil from Reducing Emissions from Deforestation in the Amazon Biome for REDD+ results-based payments*, p. 54.

To estimate the related GHG emissions, average CO_2e-emissions per hectare and year as published by the Brazilian government for the Amazon (CO_2 in 1996-2015) and the Cerrado (CO_2, CH_4, N_2O in 2000-2020) are then applied to the identified deforestation footprint. The Cerrado average is used to calculate estimates for other biomes. These calculations suggest that Rabobank's rural financing activities in Brazil may be linked to a total of around 100 million tons CO_2e emissions in the period 2004-2022.

4.2.3 Deforestation and emissions linked to forest-risk financing of Suzano

According to Forests & Finance data, pulp & paper company Suzano is by far the largest corporate client of Rabobank in Brazil in the period 2003-2022, with a total forest-risk adjusted financial flow of US$ 4,489 million. The number 2 company financed by the bank is the agri-commodity trader COFCO, with US$ 151 million. Number 3 is Brazil's third largest beef producer, Minerva, with US$ 60 million. Suzano and the Brazil Agriculture Finance Program (US$ 4,651 million financial flow) are responsible for 94% of the total identified financial flows of US$ 9,719 million.

Suzano indicates that it is removing carbon, at a total of 22 million tons CO_2e accumulated in 2020-2022. Concerning 'natural capital', the company says it occupies 2.6 million hectares of land, of which one million hectares are dedicated to conservation. Circa 93,594 hectares are High Conservation Value Areas (HCVAs). In 'social' achievements, the company claims that 276,000 people benefited from social development programs, and 29,633 people were lifted from poverty since 2000. Pulp is its main product: it accounts for 83% of its net revenue, and 93% of the pulp was exported.[22] Suzano's proudness of its own achievements is based on the narrative that it is planting trees on degraded land. According to EPN, this degradation has mainly been caused by cattle ranching. However, this land will recover naturally quite rapidly once the cattle are removed. But when that land is converted to a eucalyptus plantation, damage is caused at an even more profound level, says EPN. Thirsty eucalyptus trees destabilise the region's water table, and deep ploughing destroys the remains of deep-rooted native plants which could otherwise re-emerge.[23] Therefore, although Suzano's tree plantations are often not placed directly on deforested land but on land degraded by cattle ranching, it does increase the damage to the natural environment.

Activists and researchers have dubbed Suzano's eucalyptus monocultures as 'biological deserts'. Also, the carbon storage credentials are criticised. Environmental Paper Network (EPN), a global collective of climate and forest protection researchers, concluded: "*Within two to three years after [eucalyptus] harvest almost all the 'stored' CO2 is re-released into the atmosphere.*"[24] This is because it is used for office or tissue paper and for energy supply/biofuel (so short lived products).

The conclusion is that Suzano operates in the context that in the Atlantic forests of Brazil, some of the world's most diverse ecosystems have been converted, directly or indirectly, to fast growing plantations. Brazil has millions of hectares of non-native plantations, made up mainly of eucalyptus. Although some plantations are certified with the Forest Stewardship Council (FSC) label, in others there have been repeated conflicts with Indigenous peoples about land rights. Forty per cent of Brazil's bleached pulp is exported to Europe.[25]

Due to the lack of data to calculating Suzano's on-balance land use change/deforestation and accompanying emissions, Suzano's impacts are left out of the calculations.

4.2.4 Methane emissions

The calculations above do not include the methane emissions from cattle. Although the meat industry (JBS, Marfrig, Minerva and other meat packers) is just a small part of the Brazilian portfolio of Rabobank, the methane emissions caused by this sector are so high, that they do add to the total CO_2-equivalent (Co2e) emissions, because methane is much stronger GHG than CO_2.

Table 5 indicated that in 2021 'Brazilian cattle' loans amounted to € 406 million in 2021. For the other years in the 2000-2022 period no data is available in Rabobank's reporting. Profundo data on Rabobank's largest clients, which cover nearly the whole portfolio in Brazil (including rural credits), suggests total financial flows to the beef sector of at least US$ 2,759 million in the investigated period (out of US$ 9,719 million). The largest part of this is related to rural credits for which no methane emission numbers per invested dollar exists. For two smaller financial flows in the list, JBS and Marfrig, these numbers have been calculated in various reports.

The GWP20 methodology is used as it better reflects the global warming impact until 2050.[26,h] Methane emissions contribute to 71-74% of JBS' and Marfrig's total emissions. If total emissions, with the majority being methane emissions, are divided by the enterprise value in the investigated year (2018), the 'tons of emissions per invested US$' results in 0.026 (26 kg) to 0.053 (53 kg). These two outcomes are applied as average (average = 0.040) for the non-rural credits/larger 'beef' companies financial flows (see Figure 2) for emission (in ton) per US$ in Table 22 (for meat processors).

Table 20 Methane and other emissions JBS and Marfrig 2018

	JBS	Marfrig	Average
CH_4 (mln ton)	4.8	1.9	
CH_4 emissions CO_2e GWP 20 (mln ton)	382.1	150.0	
Total GHG CO_2e GWP 20 (mln ton)	540.6	201.8	
CH_4 GWP 20 as % of total	70.7%	74.3%	
Enterprise value 2018 (US$ million)	20,706	3,804	
Emission (ton) per US$ (2018)	0.026	0.053	0.040

Source: Profundo, based on Planet Tracker (2023), *Hot Money*, and Bloomberg (2023).

h Planet Tracker (2023, January), Hot Money. About GWP it says: *"GWP (Global Warming Potential) is a measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide (CO_2). The larger the GWP, the more that a given gas warms the Earth compared to CO2 over that time period. The time period usually used for GWPs (particularly for comparing countries) is 100 years, however we have used 20 years for most of our analysis since this more closely matches the period to 2050 and thus the period over which companies and financial institutions need to achieve the required change."*

The emissions per US$ in rural credits linked to beef are calculated as follows: a cow, with 100 kg of methane emissions per year, is raised in 2.5 years for slaughter, roughly equivalent to the period of a rural credit (after request, Rabobank could not confirm that the length of a rural credit was 2.5 years on average, but also did not dismiss this assumption of three years in our estimates). This means that per US$ rural credit, CH_4 emissions equal 0.05 tons CO_2e (GWP20).

Table 21 Methane emission per invested rural credit

	Data
CH_4 per cow/year (kg)	100
Age (year)	2.5
CH_4 (ton) per 2.5 year	0.250
Price per cow (US$)	400
CH_4 (ton) per US$	0.00063
CH_4 emissions CO_2e GWP20, ton per US$	0.050

Source: Profundo, based on Meadows, A. (2022, October 10), "How scientists want to cut livestock's methane emissions", *Chemical & Engineering News;* , "What Is The BEST Age To Slaughter Beef Cattle? - Sand Creek Farm"; Selina Wamucii (2023), "Live Cattle price in Brazil - May 2023 prices (Updated Daily), online: https://selinawamucii.com, viewed in April 2023.

Thus, the financial flows from rural credits, lasting for three years, represent almost the same time to raise a cow. The US$ 2,602 million in rural credits (flows, not outstanding per year so no double-counting occurs) have financed CH_4 emissions of 129.5 million tons CO_2e (GWP20) (Table 22). Rabobank's 'financial flows' differ from 'outstanding loans' as financial flows can be outstanding for several years. If one financial flow is paid back after 3 years, the financing of emissions via this financial flow occurred for three years and led to three times the annual emissions provided in Table 20. In this way, the financial flow number can be used to calculate methane emissions pro rata financed by Rabobank (see Table 22).

In total, Rabobank will have emitted 148 million tons CO_2e through beef financing provided to ranches and large corporations.

Table 22 Rabobank: Methane emission damage in 2000-2023

	Beef / cattle ranching	Meat processors	Total - Low
Financial flows (US$ mln)	2,602	157	2,759
Outstanding (US$ mln) in various years		471	
Emission (ton) per US$ (2018)	0.050	0.040	
Total GHG CO_2e GWP20 (mln ton)	129.5	18.6	148.1

Source: Profundo; the use of financial flows means that double-counting does not exists. 'Financial flows' differs from 'outstanding loans' as 'outstanding' is reported every year, while 'flow' is only reported at the moment of transaction.

4.2.5 Total emissions 2000-2023

Rabobank's total financed emissions related to Brazil's forest-risk sectors (including methane of livestock keeping) is 255.7 million tons CO_2e (2000-2022). This is roughly two times the GHG emissions in the Netherlands in 2022, and 10% to 60% of Brazil's annual CO_2e emissions.

Table 23 Rabobank: total financed emissions Brazil in 2000-2022/3

	mln tons CO_2e	Rabobank as %
Emissions from deforestation		
Financed Dutch dairy and protein sectors	6.9	
Financed Brazilian forest-risk sectors	100.7	
Methane emissions		
Financed beef/cattle ranching	129.5	
Financed meat processors	18.6	
Total Brazil forest-risk linked to Rabobank	255.7	100%
Netherlands in total in 2022	128.4	**199%**
Brazil annually*	426 - 2,420	**11% - 60%**

Source: Profundo, CBS (Dutch national statistical bureau), OECD Data, UNFCC, Climate Observatory, Reuters; *) based on various scopes. The low end is a consumption-based scope, the high end production including land use change.

4.2.6 Rabobank's climate damage costs: deforestation (excluding methane)

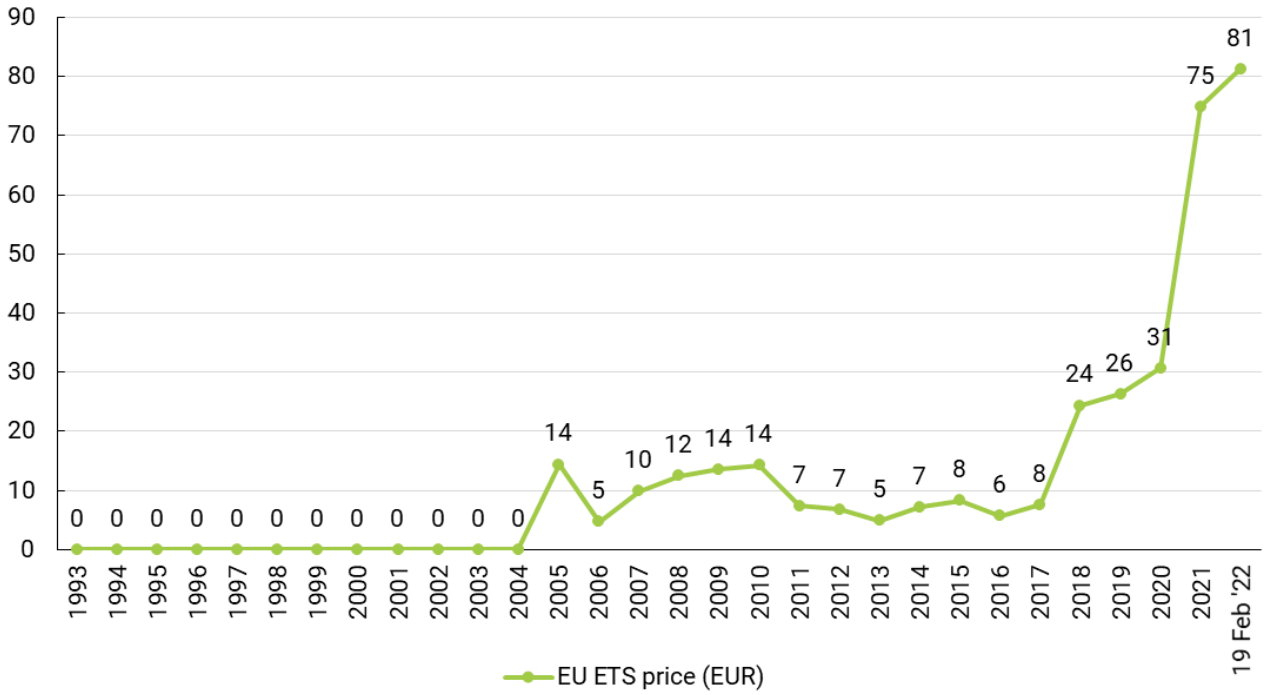
The development of methodologies to value climate damage are still in development and there is no internationally accepted standard yet. The International Monetary Fund (IMF) has adopted the approach that carbon dioxide pricing per ton is a good proxy to value the climate damage, also named the Social Costs of Carbon (SCC). The IMF states that, based on the development in literature, the SCC is a measure that is conditional on the level of CO_2 in the atmosphere. The higher that level, the more powerful is the greenhouse effect and therefore the higher are the expected physical damages. For simplicity reasons, a constant SCC (or carbon price) per ton was assumed in their analysis, as the real growth in costs every year (3%) would be nearly 'neutralised' by the need to use a discount rate[i] to calculate a present value of future costs.[27] This approach is followed in the current report.

The carbon dioxide price as a proxy for damage has also been used in other studies. For an analysis of five European big oil companies, the damage since the Rio Summit in 1992 was calculated. In that year, authorities agreed to be aware of environmental and climate damage by fossil fuel. In that specific study, 2020 was the end date.[28]

The Brazilian jurisdiction, which is the focus of the current report, does not apply a carbon dioxide cost system for Scope 1, 2 and 3. Many parts of the world are neglecting to price a major part of emissions. In the meantime, the EU ETS (Emission Trading System) price per ton CO_2e has shown an upward moving trend in the last 18 years (no price before 2004). This EU system is established for specific high-emission industries and still excludes Scope 3. It is a trading platform for emission rights and in this way establishes a proxy for climate damage per ton CO_2e. The current ETS price is € 86 per ton, roughly in line with what we have seen in recent years.

[i] A discount rate is used to calculate the Net Present Value (NPV) of a business or activity as part of a Discounted Cash Flow (DCF)analysis. The principle thought is that 1 Euro in year 2 is seen as less valuable than 1 Euro in year 1.

Figure 3 EU ETS end of year prices



Source: Transport & Environment (2022, 25 April), *European Big Oil – Big Liability in Carbon, Pollution and Health Care Costs*, based on Bloomberg, European Climate Exchange OTC 1st year CO_2 Emission EU ETS Px.

One could say that the EU price per ton CO_2e is relatively high due to the competition for emissions rights in a 'crowded' continent. However, an EU ETS price, or prices based on other policy recommendations as proxy for societal costs, continue to be a relatively conservative concept:

- Firstly, policymakers' estimates are often relatively low as a global-wide average price on CO_2e emissions is used with many jurisdictions still not applying CO_2e costs for scope 1, 2 and 3.
- Secondly, policymakers often underestimate the (economic) impacts by using a high discount rate assumption for future damages. When applying a high discount rate, a future value is calculated back to present into a low value. As a consequence, the future costs seem low in a Discounted Cash Flow calculation. This methodology is often used by companies to compare current investments and costs in year-0 with future profits from these investments in the years thereafter. However, is the loss of one litre water in year 10 less valuable than in year 0?
- Current policy recommendations range from US$ 51 to US$ 202 per ton.

Conservative societal cost models focus on short-term damage, assuming that climate change has no lasting effect on economic growth, despite growing evidence to the contrary. Extreme events like droughts, fires, heatwaves, and storms are likely to cause long-term economic harm because of their impact on health, savings, labour productivity, agriculture and social disruption. Expert groups of economists and climate scientists calculated values of US$ 171 respectively US$ 310 per ton. Recent calculations for economic damage have increased further due to the inclusion of higher damages in the Global South.[29]

These latest societal costs of carbon dioxide ($SCCO_2$) have a more forward-looking component, based on the projected cost to society of releasing an additional ton of CO_2, including climate damage costs and economic damages (economic feedback). One study shows that by 2100, global GDP could be 37% lower than it would be without the impacts of global warming, when taking the effects of climate change on economic growth into account (without accounting for lasting damages - excluded from most estimates - GDP would be around 6% lower). This means that in a 'wider' societal cost concept, the impacts on growth may increase the economic costs of climate change by a factor of six. When taking more robust climate science and updated models into account, one study suggests that the economic damage could in fact be over US$ 3,000 per ton of CO_2.[30]

When applying an EU ETS price of € 86 per ton CO_2e to Rabobank's emissions linked to the investigated forest-risk financing in 2000-2023 (107.6 million CO_2e, excluding methane), the climate damage costs would amount to € 9,254 million (Table 24).

To include a wider societal cost concept, and partly include economic feedback loops in the Global South and an impact until 2100, the current report's 'high' scenario applies an average of high-end estimates of € 1,160 per ton CO_2e: the US$ 3,000 per ton is averaged with the earlier mentioned US$ 171 and US$ 310 per ton. This leads to total climate damage costs of € 124,816 million.

Table 24 Rabobank: climate costs Brazilian-linked forest-risk activities 2000-2022

	Low	High
Financed Dutch dairy and protein sectors	6.9	6.9
Financed Brazilian forest-risk sectors	100.7	100.7
Total emissions (mln tons CO_2e)	107.6	107.6
CO_2e price/ton (€)	86	1,160
Total climate damage 2000-2022 (€ mln)	**9,254**	**124,816**

Source: Profundo.

This value number is a reflection of the past and does not consider the emissions that will occur in the future.

4.2.7 Climate damage costs: methane

Like in the section above, the € 86 and € 1,160 price per ton CO_2e is applied for low/high damage scenarios. The total damage is estimated between € 12,736 million and € 171,794 million.

Table 25 Rabobank: Methane emission damage in 2000-2023

	Beef / cattle ranching	Meat processors	Total - Low	Total - High
Total GHG CO_2e GWP 20 (mln ton)	129.5	18.6	148.1	148.1
CO_2e price/ton (€)			86	1,160
Total climate damage 2000-2022 (€ million)			**12,736**	**171,794**

Source: Profundo.

4.3 Biodiversity damage

4.3.1 Lost hectares for nature and impact on water supply

There are various methodologies to value biodiversity/nature. Also, there are stakeholders that are opposed to focus on a value approach as all valuation methodologies are partly, and often only, based on eco-system services (for mankind) and the value for tourism (idem).

A crucial factor in the loss of biodiversity is (indirect) Land Use Change (iLUC), which contributes to a 66% decline in biodiversity loss, measured through MSA (Mean Species Abundance). MSA is an indicator of biodiversity. It expresses the mean abundance of original species in a disturbed situation relative to their abundance in undisturbed ecosystems, as a measure of the degree to which an ecosystem is intact (GHG emissions caused almost 34% of biodiversity loss).[31] The area of deforestation or lost hectares, calculated in earlier sections, can be used as a proxy for biodiversity loss. The calculation above on deforestation concluded that Rabobank's financing in Brazilian (330,600 ha) and in Dutch activities (57,100 ha) was linked to a total deforestation of 387,700 hectares in crucial biomes.

Moreover, soy production and deforestation impacts water supply and rainfall patterns. On the one hand, soybean production consumes a lot of water, especially naturally occurring rain- or groundwater ('green water').[32] On the other hand, deforestation contributes to the increasing occurrence of droughts and erratic river behaviour, culminating in an 8.4% drop in yearly rainfall in the Cerrado over the last 30 years and more variable rainfall patterns, posing the possibility of productivity loss for crops planted.[33]

Therefore, Lapola et al. (2023) conclude from their research in the Amazon forest that the hectares lost through deforestation should be multiplied by a factor 1.12x to account for additional degradation.[34] As a consequence, the 387,700 hectares deforestation lead to 434,224 hectares when considering various forms of other disturbances (Table 26). The deforested area is equal to 24x the island of Texel and 2.6x the Province of Utrecht, and the biodiversity loss in hectares is 27x the island of Texel and 2.9x the Province of Utrecht when considering all disturbances.

Table 26 Rabobank: Deforestation, degradation, and biodiversity loss (2000-2022)

	# ha
Deforestation linked to Dutch activities	57,100
Deforestation linked to Brazilian activities	330,600
Total deforestation	387,700
Additional degradation	46,524
Total deforested and degraded land	**434,224**

Source: Profundo.

4.3.2 Biodiversity damage costs based on ecosystem services only

Based on various studies, CE Delft calculates a value of € 5,328 per hectare per year (assumption: 1US$=0.99€) for tropical forest.[35] These outcomes are based on the value of ecosystem services and correspond with data and methodology in studies collected in the ESVD (Ecosystem Services Valuation Database).[36] **It is important to note that the intrinsic value of nature is not included.**

As the damage in the period 2000-2022 has occurred in 23 years and the loss in hectares has built up from zero to the total accumulated number in 2022, an adjustment factor of 50% is applied. The total estimated damage linked to Rabobank's financing activities is then € 26,606 million. This number does not include damage done before 2000 and damage continuing after 2022. If no restoration of the lost hectares occurs, the value loss into eternity is € 142,746 million. This value is related to Rabobank's financing activities. A 2% discount rate is applied for this in a Discounted Cash Flow calculation. A higher rate is used in business cases, but market-based numbers are not applicable to nature/biodiversity. A 2% discount says that nature loss in one year time gets 2% less valuable or implies that the lost hectares might recover by 2% each year. This assumption may be too optimistic. A discount rate of 0% would be best to use; this would lead to very high outcomes.[j]

In the Low and High scenarios, the outcomes of F respectively H (see Table 27) have been applied.

Table 27 Rabobank: Biodiversity damage in Brazil (2000-2022)

Item	Area	Value
Biodiversity loss (ha) – A	434,224 ha	
Biodiversity value per hectare per year (€) - B		5,328
Number of years – C		23
Biodiversity damage during 23 years (€ mln) – AxBxC=D		53,212
Adjustment factor (building up from zero to 100%) – E		0.5
Biodiversity damage (€ mln) 23 years (€ mln), adjusted – DxE=F (Low scenario)		**26,606**
Biodiversity damage 2023 into eternity (DCF-based, 2% discount rate) – G		116,140
Total biodiversity damage* (€ mln) – F+G=H (High scenario)		**142,746**

Source: Profundo; *) ecosystem services-based, excluding intrinsic value nature.

[j] In fact, a 2% discount rate which leads to the € 116,140 million outcome is 21.8X larger than the € 5,328 million annual damage, which implies that if damage would be not discounted per year (so when 0% discount rate), the ecosystem would be restored in 21.8 years.

4.4 Health impacts

Health impacts might occur from various sources related to financing soy, beef, and pulp & paper activities in Brazil:

- The burning of forest leads to air pollution from small particles, affecting peoples' lives.
- The use of pesticides to grow the products might lead to occupational health problems and to reduction of (drinking) water quality.

4.4.1 Air pollution from deforestation – the damage

There are studies that calculate economic and health costs of air pollution from burning fossil fuels. Deforestation also contributes to air pollution as carbon is burnt through forest-fires. Additionally, trees that are lost cannot clean the air anymore.

According to the World Health Organization (WHO), in 2016, 6.1 million deaths were due to air pollution globally. Symptoms including shortness of breath, chronic cough, fatigue, headaches, and nosebleeds reflect a new public health crisis globally. This is also an increasing threat to Brazilian citizens, inside and outside the cities.[37] According to 2015 estimates, around 49,000 Brazilians die from air pollution every year, of which about half from outdoor pollution.[38] Thousands of premature deaths occur because of the fine particle emissions from deliberately set fires to clear land after deforestation.[39]

The smoke from fires related to deforestation is filled with tiny particles (sulphates, nitrates, ammonia, sodium chloride, soot, mineral particles, and water), 2.5 micrometres in diameter or smaller. This particulate matter (PM 2.5) can be carried by the wind and travel through the atmosphere for many kilometres. PM 2.5 can accumulate in the terminal parts of our respiratory system. From there, PM enters the bloodstream, causing health complications. The ones most affected by the pollution caused by fires in the Amazon are the elderly and children. Studies also show that in fire-rich areas in the Amazon, COVID-19 impact was worse.[40]

In August 2020, Human Rights Watch, in partnership with the Institute for Health Policy Studies (IEPS – Instituto de Estudos para Políticas de Saúde) and the Amazon Environmental Research Institute (IPAM – Instituto de Pesquisa Ambiental da Amazônia), released the technical note "Health Impacts of Deforestation-Related Fires in the Brazilian Amazon". This report analysed the impact of fires on the health of Amazonian populations in 2019. It showed that 2,195 people were hospitalised in 2019 in municipalities located in the Amazon biome due to respiratory diseases attributable to increased pollution caused by deforestation-related fires. It is estimated that the total public costs associated with hospitalizations due to deforestation-related fires made up BRL 5.64 million (US$ 1.4 million).[41] This number of 2,195 people (2019) was 1.6% of the average hospitalisations in the Brazilian biomes in 2016-2018. However, 67 interviews, of which 53 with health officials, emphasised that hospitalizations represent only a small portion of the health impacts associated with the fires due to the weak state of the Brazilian health infrastructure. Interviewees described how people suffering from respiratory illness are unable to access proper medical care given the limited health infrastructure in the Amazon region.[42]

In August 2019, nearly three million people residing in 90 municipalities of the Amazon region were exposed to harmful levels of PM 2.5 that exceeded the threshold recommended by the World Health Organization (WHO) to protect health. The number increased to 4.5 million people affected in 168 municipalities in September 2019.[43]

4.4.2 Air pollution from deforestation – the costs

A large study published in 2020 by Birnbaum et al. showed that some of the air pollution costs are underestimated, meaning that the health care benefits associated with reducing air pollution may be much larger than previously estimated. Incremental costs per patient have been estimated at US$ 74,957 to US$ 82,819 per person, including health care costs and work loss, per year (2016 data).[44]

In Table 28, these costs (in €) are multiplied by 103.1 million disability-adjusted life-years, a number taken from a study by Cohen et al. (2015). In 2015, PM 2.5 was the fifth-ranking mortality risk factor, causing 4.2 million deaths and 103.1 million disability-adjusted life-years.[45,46]

When we take 2018 as a reference year, Rabobank's contribution to CO_2e emissions in 2000-2023 from deforestation, which is a proxy for air pollution (methane is now excluded), is 0.26% versus 2018[47] emission. In a range, the by Rabobank's financed Brazilian emissions have led to € 17,330 million to € 19,379 million externalised health costs due to air pollution in 2000-2022.

Table 28 Rabobank: health costs due to air pollution 2000-2022

€ million	Factor	Low	High
Disability years 2015 (million)	A	103	103
Costs from study 2020, per year in €	B	64,066	71,640
Total costs	C = AxB	6,605,185	7,386,102
Global CO_2e emissions (bln tons) 2018	D	41.0	41.0
Rabobank's 2000-2022 contribution (mln tons)	E	107.6	107.6
% of Rabobank 2000-2022 relative to global 2018	F = E/D	0.26%	0.26%
Rabobank's health cost/damage	G = FxC	17,330	19,379

Source: Profundo, based on Birnbaum, H.G., Carley, C.D., Desai, U., Ou, S. and P.R. Zuckerman (2020, December), "Measuring the impact of air pollution on health care costs", Health Affairs, Vol. 39(12); Cohen, A.J., M. Brauer, R. Burnett et al. (2017, 10 April), "Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015", The Lancet, 389: 1907–1918.

4.4.3 Use of pesticides and occupational health diseases and water quality – the damage

Through financing the production of soybeans, Rabobank can be linked to a production system that is one of the largest users of pesticides, including highly hazardous pesticides (HHPs). Nearly one-third of HHPs in agriculture is used for soy production, and 34% of the total HHPs is used in Brazil (Table 29 and Table 30). Combining these data means that Brazil's most important crop, soybean, consumes loads of HHPs.

Table 29 Pesticides and HHPs in Brazil

US$ billion	Total	% HHPs	Value HHPs	% of sample total
USA	2.89	36.0%	1.04	21.7%
Brazil	3.33	49.0%	1.63	34.0%
India	0.57	59.0%	0.34	7.0%
Other countries	6.61		1.79	37.3%
Sample total	13.40		4.80	100%
Brazil as % of sample	24.9%		34.0%	

Source: Profundo, based on interview and various publications on pesticides and HHPs (Highly Hazardous Pesticides) by Public Eye; sample is PMD (market analysis company Phillips McDougall)-based (see Public Eye publications).

Table 30 Crops with HHPs in PMD sample

US$ billion	Pesticides	% of pesticides in sample	% HHPs per crop	HHPs value per crop	% of HHPs in sample
Soybean	5.02	21.8%	51.2%	2.57	26.0%
Cereals	4.55	19.8%	25.8%	1.17	11.9%
Rice	3.88	16.9%	43.5%	1.69	17.0%
Maize	3.51	15.2%	49.7%	1.74	17.6%
Cotton	1.27	5.5%	69.1%	0.88	8.8%
Total	18.23	79.2%	44.2%	8.05	81.3%
Other crops	4.77	20.8%	38.7%	1.85	18.7%
Global sample	23.00	100.0%	43.0%	9.90	100.0%

Source: Profundo, based on interview and various publications on pesticides and HHPs (Highly Hazardous Pesticides) by Public Eye; sample is PMD-based (see Public Eye publications).

In this context, a study by Pollack (2020) shows that 67% of a group of non-selective herbicides that was sold in Brazil were dedicated to the soybean crop. The study concludes that in 2014, the total average use per hectare soybean was 6.5 kg A.I (active ingredient)/ha; 69% were herbicides, 16% insecticides and 15% fungicides.[48] Another study states that 52% of all pesticide sales are for soybean production.[49] People living in Mato Grosso's rural cities were found to be exposed to 300 litres of pesticides per habitant each year.[50]

Glyphosate is an important HHP that is widely used in soybean production. In the US, numerous lawsuits were filed against the main glyphosate seller Bayer,[k] alleging that the herbicide caused cancer. Several jury verdicts have already awarded plaintiffs almost US$ 2.5 billion. Bayer has taken a provision of US$ 4.5 billion to set up a program to deal with further claims.[51] Also Paraquat is widely used in soybean production. One of the leading HHPs companies, Syngenta, is facing hundreds of Paraquat lawsuits in the USA as the weedkiller can be associated with the development of Parkinson's disease among farmers who used it.[52]

Atrazine is also a top-selling HHP that is very persistent in water and banned in the EU due to ground water contamination. In 2012, Syngenta settled a US lawsuit agreeing to pay US$ 105 million to compensate public water providers for the cost of removing atrazine from the drinking water to ensure residues are kept below the legal limit.[53] Atrazine is often used in corn and sugarcane production. The US EPA (Environmental Protection Agency) does not mention soybeans explicitly.[54] Very relevant for Brazil is that the use of pesticides and fertilisers during soy farming contaminates rivers, lakes, and estuaries, impacting wildlife and posing health risks to rural communities who consume the water.[55]

A study in the state of Goiás in Brazil discussed various investigations about the relation between water quality, the agricultural use of land and pesticides and recommended actions aimed at raising awareness among rural producers, with a focus on the compound carbofuran, banned by Anvisa since 2017.[56] Carbofuran is a carbamate pesticide, widely used around the world to control insects on a wide variety of field crops, including potatoes, corn and soybeans.[57]

The impact on health of using pesticides is material. Every two days, one person dies in Brazil from pesticide poisoning. Around 20% of these victims are children and adolescents between the ages of 0 and 19. Also, there are harmful effects on mammals, birds, and insects.[58] Another study also

[k] Bayer acquired the U.S. company Monsanto in 2018. Monsanto's herbicide Roundup is based on glyphosate as its active ingredient and is widely applied especially on Roundup-resistant genetically modified crops.

says that health problems in Brazil showed positive and significant correlations with the use of pesticides.[59]

4.4.4 Use of pesticides and occupational health diseases and water quality – the costs

In a report on Syngenta Group's exposure to costs related to the use of pesticides, the treatment of occupational diseases, and the treatment of drinking water amounted to USD 6 billion annually or € 5,263 million. As soybean uses 26% of global HHPs, and Brazil uses 34% of global HHPs, health care and water treatment costs related to Brazilian soybean production could be estimated at € 465 million in 2021. However, this might be an under-estimation as the use of pesticides for soybean in Brazil might be above the global average.

In the calculation for Rabobank's exposure, the share of Brazilian soybean production of pesticides damage costs needs to be corrected for rural share in the total financing of soybean farmers (37%) and Rabobank's share in financing in the rural credit program (2.1%). Then Rabobank's share in 2021 costs is € 3.6 million.

The next step is to calculate the number for the whole 2000-2022 period. The 2021 financing was 3.7%[60] of the whole period 2000-2022 financing by Rabobank, so the total is € 98.9 million for Rabobank. This is the total of health and water treatment costs which are not paid by Rabobank in the 2000-2022 period. Note that the research on health and water purification costs is focused on a number of causal links between some HHPs and some diseases. In coming years, many more could be found, raising the costs further.

Table 31 Health and water treatment costs from pesticides

	2021	2000-2022
Global number/costs of treatment of occupational diseases (US$ million)	1,400	
Global costs of treatment of drinking water (US$ million)	4,600	
Total (US$ million)	6,000	
Total (€ million)	5,263	
Soybean production's share as % of global use of HHPs	26%	
Brazilian as % of global HHPs	34%	
Health care + water treatment costs related to Brazilian soybean's HHPs use	465	
Rural program's share in financing farmers Brazil	37%	
Rabobank's share in rural program, including soy	2.1%	
Rabobank's costs (€ million)	3.6	
Rabobank: 2021 soy financing as % of total Rabobank's soy financing		3.7%
Multiplier from 2021 to total (x)		27.4
Total externalised cost Rabobank		**98.9**

Source: Profundo.

The current approach on valuing Rabobank's Brazilian pesticide damage has several shortcomings:

- Note that Rabobank might be financing much more activities which contribute to the use of HHPs in Brazil, like loans and underwriting services to companies producing pesticides.
- Paper & pulp also adds to the use of HHPs. Eucalyptus plantations sue a lot of HHPs and have led to many examples of poisoned land.[61] As there is a lack of specific studies assessing HHPs used in pulpwood/paper plantations and companies, so no estimates has been made in this report. HHPs used for paper and pulp is included in the 18.7% in the last column of Table 30.

4.4.5 Other diseases

In 2015, the government-led Institute of Applied Economic Research (IPEA) found that for every 1% of forest that was cut down per year, malaria cases increased by 23%. The study used data from 773 cities that a project monitoring deforestation in the Amazon had gathered from 2004 to 2012. Besides malaria, the incidence of leishmaniasis, a disease transmitted by a sandfly-borne parasite, also seemed to relate directly to levels of deforestation.[62]

These costs have not been taken into account, so the actual health costs will be higher.

4.5 Other social/socio-economic impacts

In 'other' social and socio-economic impacts, there are various studies that lead to contrary outcomes. On the one hand, the increasing amount of barren land without trees reduces the availability of natural resources that people can use for food and economic purposes. Water shortages also make it difficult to farm in many parts of the world. The problem is exacerbated by droughts, which are becoming more frequent due to climate change.[63] The use of water for soybean production leads to water conflicts due to the reduction of water availability, also due to less rainfall. Pressure on water resources in the Cerrado region has increased tensions between farmers and local population.[64] Factors that contribute to heightened conflict risks include water used for irrigation, reduced spring water levels and agrochemical pollution.[65] Overall there are many examples of violations against indigenous groups in relation to land grabbing by large agricultural companies leading to conflicts. There is loss of food security, loss of culture, and loss of homes.[66] [67]

On the other hand, there are reports emphasizing the negative effects of deforestation reduction on economic growth and real wages. [68] [69] However, these neglect external costs, reflected in the preceding paragraph, which likely hit the poorest the hardest.

Due to a wide range of different outcomes, the current study only concentrates on the value impacts of air pollution and pesticides, which have been better quantified. Other social/socio-economic impacts might lead to much higher to be calculated "social costs" but need further methodology development. **This means that an important part of the socio-economic impact of Rabobank's loans have not been taken into account. The actual costs regarding social damage will be much higher.**

4.6 Summary of total damage

In adding up all damages linked to Rabobank's Dutch and Brazilian financing activities during 2000-2022 in a Low and High scenarios,[l] the total estimate varies between € 66,025 million and € 458,834 million, including the calculation of a value loss for biodiversity. In both scenarios, the climate damage and biodiversity costs dominate. In the Low scenario, air pollution costs also contribute a high percentage.

In the Low scenario, the damages are 142% of Rabobank's 2022 group equity and reserves. In the High scenario, the damages are ten times higher than equity and reserves. It also must be considered that future costs, until Rabobank has reduced its impacts to net-zero, have not been calculated and would elevate the outcomes further.

[l] The 'Low' and 'High' outcomes are derived from the various external damage and cost categories in this report. By adding up all 'Low' outcomes respectively adding up all 'High' outcomes, the result is a range. Note that many elements like the intrinsic value of nature and various socio-economic damage (costs) could not be calculated and are thus not included in the range. The main differences between 'Low' and 'High' comes from the price ranges per volume unit in each category, and much less from ranges in units.

Table 32 Environmental and social damage by Rabobank in 2000-2022*

	Damage - Low	Damage - High
Climate damage		
Climate damage (CO_2e mln tons), deforestation	108	108
Costs per ton (€)	86	1,160
Climate damage (€ mln), deforestation	9,254	124,816
Climate damage (CO_2e mln tons), beef/cattle ranching	148	148
Costs per ton (€)	86	1,160
Climate damage (€ mln), beef/cattle ranching	12,736	171,794
Total climate damage 2000-2022 (€ mln)	21,990	296,610
Biodiversity damage, excluding intrinsic value of nature		
Biodiversity (hectares)	434,224	434,224
Biodiversity damage (€ mln)[m]	26,606	142,746
Health damage		
Air pollution (€ mln)	17,330	19,379
Pesticides (€ mln)	99	99
Other social/socio-economic impact (€ mln)	Na	Na
Total health and other social damage	17,429	19,478
Absolute and relative damage		
Total damage (€ mln), excluding intrinsic value nature	**66,025**	**458,834**
Group equity and reserves Rabobank 2022 (€ mln)	46,358	46,358
Damage as % of equity/reserves	142%	990%

Source: Profundo; *) Brazilian damage, through financing forest-risk activities in Brazil and indirectly through soy-sourcing sectors in the Netherlands.

[m] There are stakeholders that are opposed to focus on a value approach for biodiversity as all valuation methodologies are partly, and often only, based on ecosystem services (for mankind) and the value for tourism (idem).

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