TOXIC GOLD

HOW ILLEGAL GOLD MINING IN THE AMAZON FUELS ENVIRONMENTAL DESTRUCTION, INDIGENOUS RIGHTS VIOLATIONS, AND A SHADY GLOBAL TRADE

GREENPEACE

Toxic Gold

How Illegal Gold Mining in the Amazon Fuels Environmental Destruction, Indigenous Rights Violations, and a Shady Global Trade

Imprint

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Illegal mining site in the Yanomami Indigenous territory in the Amazon.

1. Executive Summary

Between 2018 and 2022, policies promoting gold mining exploitation led to a 265 % increase in illegal gold mining in Indigenous lands, undermining Indigenous rights, and causing severe environmental harm. Since 2023, the Lula government has implemented security operations and monitoring efforts, with the intent to reduce illegal mining in a number of Indigenous territories.

However, recent monitoring data of Greenpeace Brazil from 2023 to 2024 reveal a troubling trend: the mining activities have not reduced but merely shifted from one Indigenous territory to another. While illegal mining decreased from 2023 to 2024 in the Yanomami region (-7 %), the Munduruku region (-57 %), and the Kayapó region (-31 %), it has increased exponentially in the Sararé region (+93 %). Illegal gold mining in the Amazon remains a major driver of deforestation, mercury contamination, biodiversity loss, and social disruption, impacting mainly rural and urban populations, Quilombolas (descendants of Afro-Brazilians), and, above all, Indigenous communities.

The route along which the gold illegally mined in the Amazon enters the legal supply chain is complex and spans various stages. It can range from the falsification of documents and registration of gold mines, to the smuggling, laundering, and the pseudo-refinement of gold. At the end of the chain, the gold is exported worldwide, with Switzerland being one of the main international gold refinement and processing destinations. Significant discrepancies between Brazil's recorded gold exports and Switzerland's recorded gold imports suggest irregularities in the international gold trade. In 2022, Swiss imports exceeded Brazilian exports by 67 %, and in 2023 by 62 %, amounting to approximately 9.7 and 8.7 tonnes of gold, respectively. These gaps highlight the opacity of the international gold trade and the need for stricter oversight and transparency.

Highlights

- **Despite the Brazilian government's efforts to combat illegal mining, in the last two years, 4,219 hectares of rainforest have been destroyed by gold miners in the four Indigenous territories mentioned — an area equivalent to almost half the total area of Manhattan.**
- **Illegal gold mining affects everyone, as large areas of the Amazon rainforest are destroyed and poisoned with mercury to extract gold. This poses a serious threat to Indigenous peoples, wildlife, and the planet's climate.**
- **Significant discrepancies exist between Brazil's recorded gold exports and Switzerland's recorded gold imports, with imports exceeding exports by 67 % in 2022 and 62 % in 2023 (amounting to approximately 9.7 and 8.7 tonnes of gold respectively).**
- **The current gold rush is exacerbated by central banks – a few powerful players who hold substantial shares and, as a result, wield significant influence over the gold market. The trend is likely to continue, as many central banks declared their intent to stock up on gold reserves.**

2. The rise of illegal gold mining in the Amazon rainforest

Gold mining is eating its way through the Amazon rainforest. Humanity's obsession with gold is nothing new — it has shaped economies, fuelled migration, and sparked conflict for millennia. The first gold rush of the Modern Age in Brazil dates back to 1693, when gold was officially discovered in the country. Artisanal mining quickly developed and throughout the 18th century, gold production surpassed all of the production of the Spanish colonies put together.[1]

However, the hunger for the shining metal has never been sated. Even today, demand continues unabated, resulting in a record global production of around 5,031 tonnes in 2024. Around 3/4 of this gold is newly mined (3,661 tonnes) and 1/4 stems from recycling (1,370 tonnes). The total gold supply and demand continues to rise, with both mining and recycling showing sustained growth.[2] In the last 75 years alone, it is estimated that more than ⅔ of the gold currently available worldwide has been mined. If it were put together, it would form a cube of pure gold measuring approximately 22 m x 22 m.[3]

The Amazon rainforest is an unparalleled ecosystem that plays a crucial role in stabilising our planet's climate, acting as a vast carbon sink that absorbs greenhouse gases and regulates global weather patterns.[4] Most importantly, the Amazon – spanning across nine countries – is home to over three million species of flora and fauna[5] and around 4o million people,[6] including about three million Indigenous people from 410 different Indigenous groups, as well as Quilombolas (afrodescendants) and other traditional peoples.[7] The environmental, social, and health impacts of mining are a growing concern. Illegal gold mining, as well as other destructive practices, are pushing the Amazon closer to its tipping point.

Up to half of the Amazon could be at risk by 2050, with tree mortality increasing and reduced rainfall, possibly triggering a biome-wide collapse of the rainforest.[8] In addition, the mining process itself is associated with considerable environmental pollution and land degradation. Due to the low gold content in alluvial deposits, huge quantities have to be extracted using large amounts of energy. The use of dangerous chemicals such as mercury in the amalgamation process is common and contaminates the surrounding ecosystem as it seeps into the waterways. Mercury accumulates throughout the food chain in fish, fauna and flora, ultimately poisoning humans.[9] Initial studies reveal the extent to which Indigenous communities have been exposed to this toxic chemical, with contamination levels reaching well above the safe health limits.[10]

Artisanal and small-scale gold mining (ASGM) is currently considered to account for up to 20 % of newly mined gold, involving 15 – 20 million people worldwide.[11] In Brazil, ASGM is known as garimpo. By its very nature, garimpo is largely informal. This issue is particularly evident in Brazil, where illegal mining often takes place in remote protected areas and Indigenous territories, which

Aerial view of healthy Amazon rainforest

are difficult to access and with limited government oversight. Unlike traditional small-scale mining, modern garimpo often involves larger operations, a bigger workforce and heavy machinery, leading to significantly greater environmental impacts.[12] Studies show that a hydraulic excavator operating in the Amazon can do in 24 hours the same work that would take three men about forty days to complete.[13] The potential for destruction is thus unprecedented as these large machines keep operating irregularly on Indigenous lands.

The area destroyed by gold mining in the Amazon basin has increased considerably in the last decade. While mining invasions have occurred in the past, mining activity within Indigenous territories was restricted to a few well-defined areas. This, however, changed around 2016, when groups directly or indirectly linked to mining activities increased their political representation and influence in Brazil.[14] Policies favoring mining interests led to the rise of specialised and highly professional structures with significant financial resources, heavy machinery, and advanced logistical infrastructure. As a result, illegal mining activity in the Amazon has surged.[15]

With soaring gold prices, growing influence of criminal networks, as well as poor livelihood opportunities on the ground, garimpo has risen in earnest in the Amazon. Surpassing industrial gold mining since 2022,[16] this surge is carving increasingly large scars into the Amazon, in particular into the Indigenous territories of the Kayapó, Munduruku, Sararé, and Yanomami peoples. Although mining is prohibited on Indigenous lands, weak law enforcement and the lack of sustained solutions to support local populations allows illegal operations to flourish.

While illegal mining continues to spread and takes its toll on Indigenous people and on the environment, initiatives to open up Indigenous lands to mining and to other economic activities are gaining ground in decision-making spaces.

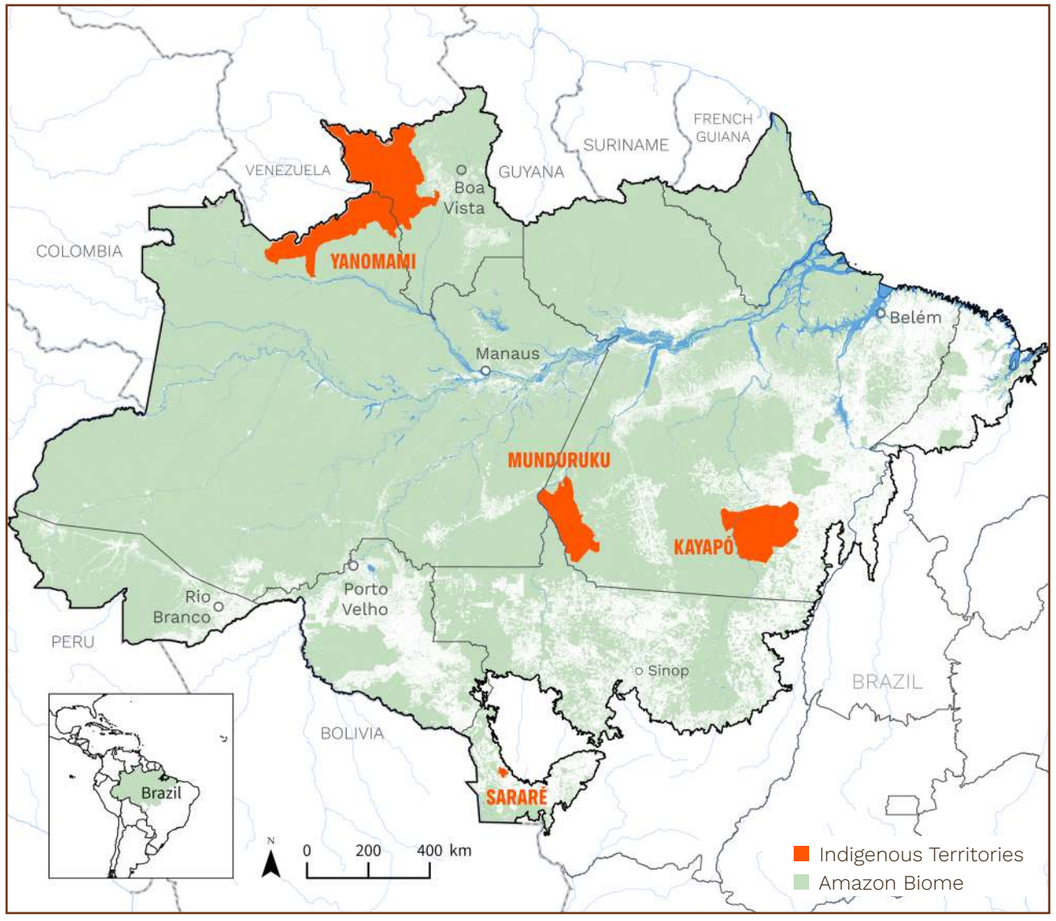
The most recent example comes from the Federal Supreme Court (STF), which, during the discussions of the conciliation agreement to deal with the unconstitutionality of a law that prevented the demarcation of Indigenous lands, took a concerning step by presenting a draft law that could deepen

Deforested area for illegal mining in the Yanomami Indigenous territory in the Amazon.

the trenches even further. The new measure under discussion proposes, among other things, the opening up of Indigenous lands to economic exploitation, without the consent of the Indigenous communities impacted. This would represent a setback and a violation of the fundamental rights and guarantees of Indigenous peoples – provided for in the Brazilian Federal Constitution – and would have significant environmental impacts.[17]

It is not the STF's role to propose laws, but rather to assess the constitutionality of the rules drawn up by the National Congress and the Executive Branch. This initiative by the STF puts at risk a court that has the important duty to defend the rights of minorities and fulfill its counter-majoritarian role. Brazil is now at a delicate crossroads when it comes to the fundamental rights of Indigenous peoples, while mining continues to poison their territories. In fact, this is an attempt to rewrite the rights of Indigenous peoples, which are already established in the Brazilian Constitution. A similar initiative is moving through the National Congress in the form of a legislative proposal to legalise various activities, including mining, on Indigenous lands, simultaneously pressuring the political sphere and judicial decisions to prioritise the interests of economic groups over Indigenous rights.

3. Monitoring results of illegal gold mining in Indigenous lands between 2019 – 2024



Indigenous territories most impacted by illegal gold mining in the Brazilian Amazon.
Source: FUNAI, IBGE, INPE, Natural Earth

Illegal gold mining scars in the Yanomami Indigenous territory in the Amazon.

Greenpeace Brazil is monitoring illegal gold mining within Indigenous lands using satellite images from the Planet Land and Sentinel-2 systems. Alerts from Papa Alpha, a Greenpeace-developed tool that uses the GLAD (Global Analysis and Discovery) alert systems, further supported the analysis. Another alert system, RADD (Radar for Deforestation Detection), was used to analyse areas with heavy cloud cover. In addition, Greenpeace carried out overflights of the areas studied to validate and refine collected data and to improve its monitoring technique.

The analysis reveals that, over the past two years (2023 and 2024) and despite legal prohibitions, illegal mining has destroyed 4,219 hectares of land, across four Indigenous territories in the Brazilian Amazon: the Kayapó (Pará – PA), Munduruku (PA), Yanomami (Amazonas – AM/Roraima – RR), and Sararé (see Table 1). The first three Indigenous territories alone account for more than 90 % of the mining found within Indigenous lands in the Brazilian Amazon.[18] The Sararé Indigenous land (Mato Grosso – MT) was included in Greenpeace Brazil's monitoring program after a rapid increase in mining activity was registered there in recent years.

The following tables show the detailed numbers of deforestation by illegal mining within each Indigenous territory over the years. The data for the individual Indigenous areas are presented differently, as they either refer to the year they were included in Greenpeace's monitoring work or to the available records in the existing database.

Indigenous territories	Destroyed area by illegal gold mining 2023 (in hectares)	Destroyed area by illegal gold mining 2024 (in hectares)
Yanomami	239	223
Munduruku	152	66
Kayapó	1,019	704
Sararé	619	1,197

Table 1: Overview of the deforested areas through gold mining in Indigenous territories, 2023 – 2024

Heavy machinery used for illegal mining in the Kayapó Indigenous territory in the Amazon.

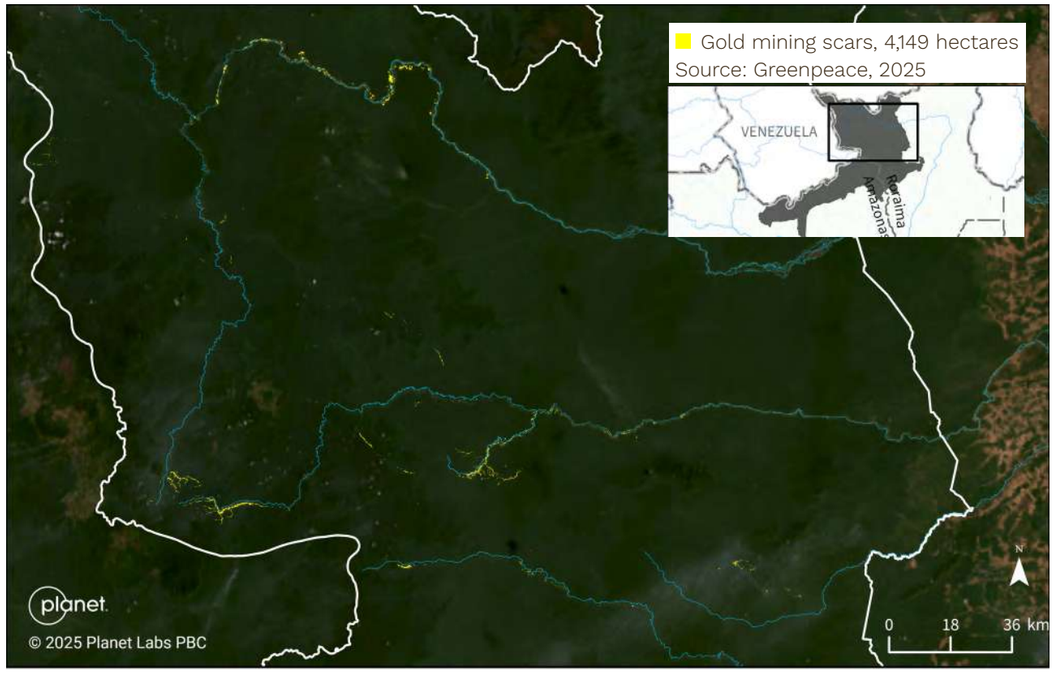
Year	New illegal mining areas (ha)
Accumulated until 2022	3,687
Newly opened mining areas 2023	239
Newly opened mining areas 2024	223

Table 2: New illegal mining areas in the Yanomami Indigenous territory (in hectares)

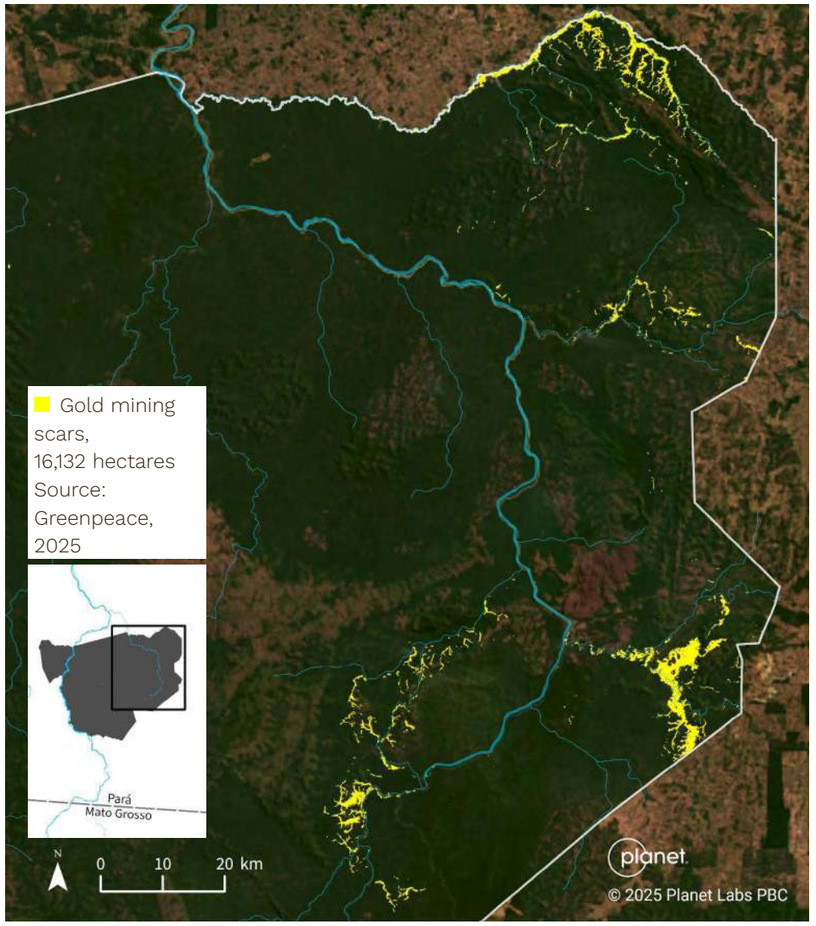
Yanomami Indigenous Land

Located between the states of Roraima and Amazonas, the Yanomami Indigenous land covers 9.6 million hectares, making it the largest Indigenous territory in Brazil. It is home to eight Indigenous peoples[19] with a population of more than 31,000.

In this territory, mining is carried out mainly near some of its main rivers, such as Mucajaí, Uraricoera, Catrimani e Apiaú. The region was the epicentre of a serious public health crisis that caught the world's attention in January 2023 when it was discovered that, between 2019 and 2022, 570 Yanomami children under the age of four had died from preventable causes.[20] At the time, President Lula declared a state of emergency and launched an initiative that has now lasted two years and has helped the region to recover.[21]



Illegal gold mining in the Yanomami Indigenous territory (9,664,975 hectares)



Illegal gold mining in the Kayapó Indigenous territory (3,284,004 hectares)

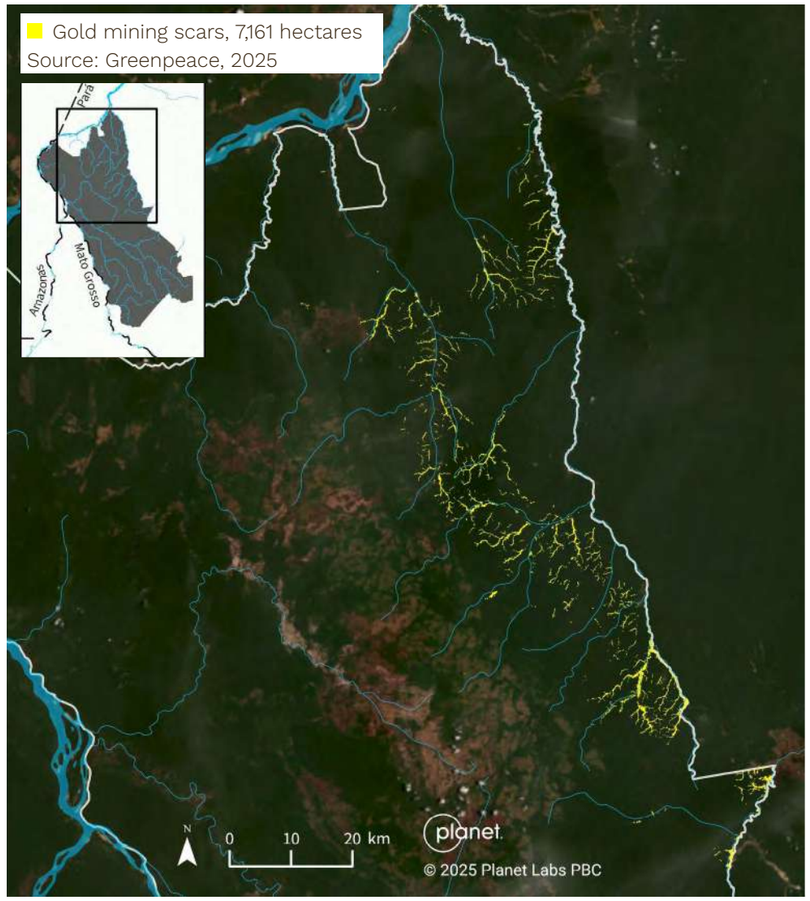
Kayapó Indigenous Land

Located in the state of Pará, where the 30th United Nations Conference on Climate Change (COP30) will be held in November 2025, the Kayapó Indigenous land covers an area of 3.2 million hectares. It is the home of two Indigenous peoples with a population of more than 6,000.[22]

In 2024, the Kayapó Indigenous land led the ranking of lands most affected by forest fires in Brazil,[23] with 3,246 hotspots recorded from the beginning of the year until the 24th of September. Satellite images showed that the hotspots were very close to or overlapping to recently opened illegal mining areas, showing that miners caused the fires inside the Indigenous land to open new areas for illegal gold mining.[24]

Year	New illegal mining areas (ha)
Accumulated until 2021	12,587
2022	1,822
2023	1,019
2024	704

Table 3: New illegal mining areas in the Kayapó Indigenous territory (in hectares)



Illegal gold mining in the Munduruku Indigenous territory (2,381,795 hectares)

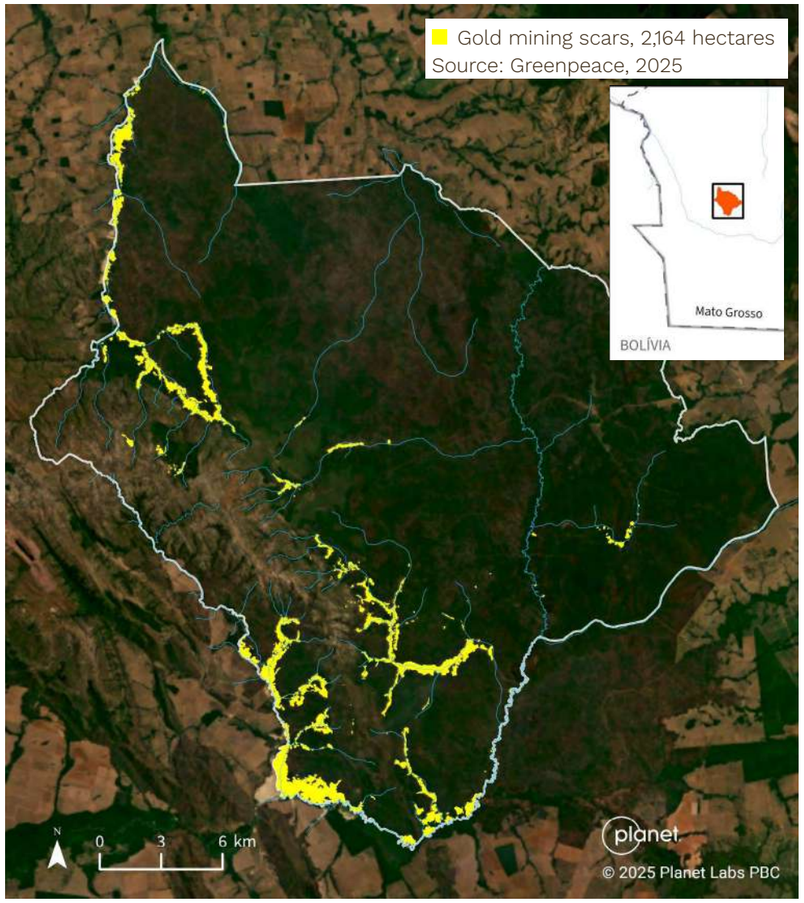
Munduruku Indigenous Land

Located in Pará, the Munduruku Indigenous territory covers an area of 2.3 million hectares and is in the basin of the Tapajós River. It is home to three Indigenous peoples, the Apiaká, the Isolated Peoples of the Alto Tapajós and the Munduruku, with a total population of more than 9,200 people.[25]

Several studies show the harm caused by mercury and the contamination of many Munduruku people, including women and children.[26] Over the years, these researches confirmed the negative impacts[27] that illegal mining, the use of mercury and the invasion of gold miners caused in the interior of the Indigenous lands in the Amazon.

Year	New illegal mining areas (ha)
Accumulated until 2018	1,407*
2019	1,559
2020	2,271
2021	1,275
2022	431
2023	152
2024	66

Table 4: New illegal mining areas in the Munduruku Indigenous territory (in hectares)



Illegal gold mining in the Sararé Indigenous territory (67,419 hectares)

Sararé Indigenous Land

The Sararé Indigenous land is located in the state of Mato Grosso and covers an area of 67,719 ha and is the territory of the Nambikwara people with a population of 201.[28] The land was recently added to Greenpeace's monitoring system due to the rapid growth of mining within the territory.[29]

The year 2024 marked a new record of deforested area in this territory. Indigenous leaders indicate that regional criminal factions linked to the Comando Vermelho (CV) – one of Brazil's oldest and most influential criminal organisations, which emerged in the 1970s in Rio de Janeiro – are operating in open mines from north to south along the western border of the territory, spreading violence and death threats. The speed at which mining is advancing there[30] is one of the most significant concerns for those who follow the socio-environmental agenda in Brazil today.

Year	New illegal mining areas (ha)
Accumulated until 2018	78*
2019	0.75
2020	10
2021	168
2022	92
2023	619
2024	1,197

Table 5: New illegal mining areas in the Sararé Indigenous territory (in hectares)

Measures taken by the authorities

Despite the numbers presented by this survey, it is important to note that, in recent years, the trend of opening new mining areas within the Indigenous lands has been reduced after a few years in which mining activity within these territories grew uncontrollably.

Lula's government has been conducting thousands of security operations in Indigenous lands, coordinated by several federal agencies whose work is to guarantee the protection of Indigenous peoples against invasions and environmental impacts, including the advance of illegal mining.[31] These operations dismantled important support bases for mining and destroyed the equipment used by the criminals, making it significantly harder to maintain clandestine activities and forcing many invaders to leave the area.[32]

The operations carried out in the Yanomami and Munduruku Indigenous lands played a fundamental role in reducing the numbers of illegal mines, as did the Lula government's willingness to address the problem.[33] This differs drastically from the previous administration, which was sympathetic to mining and openly supported the activity, even though it had signs of illegality and severe socio-environmental consequences. The result was that, between 2018 and 2022, for example, the area mined within Indigenous lands increased by 265 %, with the addition of 16 thousand hectares, according to Mapbiomas.[34] The institution also found that, in 2022, 62 % of the illegal mining activity within Indigenous lands in Brazil was recent, with less than five years of existence.

The monitoring carried out to measure the opening of new mining areas in the Yanomami, Kayapó, Munduruku, and Sararé Indigenous territories in the last two years shows that, despite the efforts made to stop the opening of new areas for illegal activity, miners continue to find ways to circumvent inspections and maintain illegal gold mining. The Sararé Indigenous land was the most affected by mining in recent years, with 1,816 hectares destroyed by the activity in 2023 and 2024. Since 2020, this territory has been the target of a violent offensive by miners, who have significantly damaged the rivers and forests in the surrounding area, in addition to causing immense socio-environmental impacts on the traditional peoples and Indigenous communities in that region.

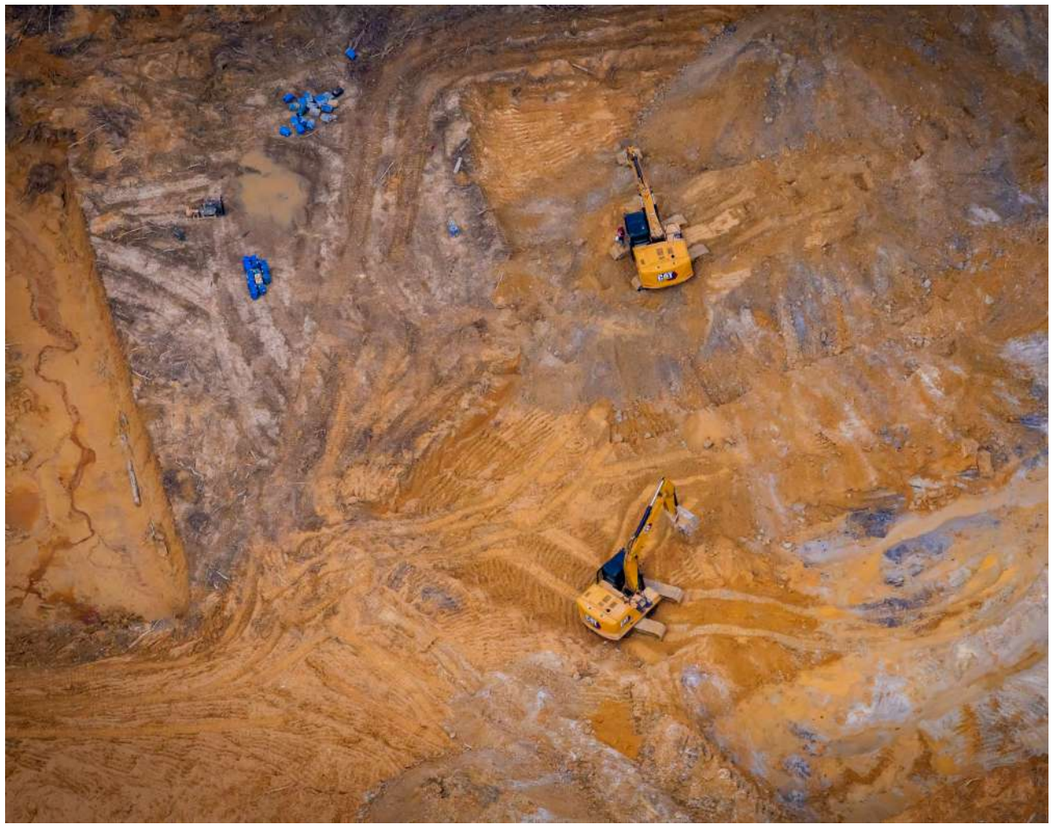
Demands – what Brazilian authorities can do to free the Amazon from gold mining

It is essential to remember that gold mining in the Amazon is very dynamic and changes rapidly. To ensure a long-term protection of Indigenous lands and to prevent a resurgence of mining, Brazilian authorities must implement sustained and strategic measures. The recent discovery of underground mines in the Amazon[35] and their subsequent destruction by security forces shows that it is necessary to maintain a continuous and persistent monitoring and surveillance effort, so that the miners do not return to their original territories when security operations end and the police return to their bases.[36]

First efforts made under the presidency of Lula to tackle illegal gold mining in the Amazon show the significant impacts that immediate action can have on the environment, (food) security and the lives of Indigenous populations.[37] In the two years of federal action in the Yanomami territory, the federal government has reported a sharp fall in consolidated mines by more than 90 %, as well as a cutback in new mines by more than 90 %. Simultaneously, this area's environmental quality is believed to have improved, with turbidity levels in surrounding rivers seemingly diminished.[38] While these are promising signs, more far-reaching long-term action is needed to address illegal gold mining in the Amazon basin. Extractive practices can no longer be allowed to operate in silence.

As the data of Greenpeace Brazil illustrate, while the number of mining-related alerts has dropped since the Bolsonaro government, it has started to climb back up over the past months, with mining activities also expanding into new territories as gold prices soar.

Below: Hydraulic excavators entering Yanomami Indigenous Land via an illegal road – a development that could multiply the destructive impact of gold mining by up to 15 times.



Brazilian authorities urgently need to:

- **Establish a program with strategic and integrated actions to combat illegal mining within and around Indigenous lands.**
- **Continue with the de-intrusion policies in Indigenous territories, aiming for a permanent state presence in areas impacted by illegal mining.**
- **Prohibit the use of mercury in gold mining and adopt a protocol for the care and assistance of contaminated individuals.**
- **Promote an audit of active Mining Concession Permits (PLG).**
- **Reuse the confiscated gold to fund the recovery of areas impacted by illegal mining.**

4. Toxic gold: impacts on Indigenous people, local communities, and biodiversity

Illegal mining causes deforestation and biodiversity loss,[39] making it difficult to combat the climate crisis and protect the Amazon. Brazil is reported to have the second highest loss of tree cover to mining in the world.[40] Although deforestation has gone down between August 2023 and July 2024 by as much as 30 % compared to recent years, forest resilience continues to be fragilised by continued mining activity.[41] In 2024, the Amazon suffered the highest rates of fires ever recorded, with hotspots in the Kayapó Indigenous territory.[42] As one of the most burned regions at that time, these events highlight the diverse damage that mining activity causes to the interior of the Amazon biome.

Illegal gold mining also poses severe risks due to mercury contamination.[43] Mercury is used in gold extraction, and its impact extends far beyond the mining sites. As a highly toxic substance, it accumulates in the environment, contaminating rivers and accumulating through the food chain in fish, wildlife, and ultimately humans. In the human body, mercury primarily affects the central nervous system, but its damage is not limited to that. Studies have also linked exposure to harm the cardiovascular, renal, and endocrine systems. Symptoms of mercury poisoning include loss of sense of touch, heat sensitivity, and pain in the hands and feet. Additional symptoms include a metallic taste in the mouth, constant ringing in the ears, dizziness, headaches, irritability, and insomnia. Severe cases may involve tremors, memory loss, cognitive impairments, and learning difficulties.[44] The scale of contamination is alarming. In 2024, the Oswaldo Cruz Foundation (Fiocruz) published a study revealing that 84 % of the population in nine Yanomami villages had been exposed to mercury.[45] Previous research from Fiocruz likewise revealed that 6 out of 10 Munduruku Indigenous individuals exhibited mercury levels exceeding the safety concentration limit set by the World Health Organization's (WHO).[46] Similarly, a 2023 study conducted by multiple institutions found that in markets across 17 cities in the Amazon, one in five fish contained mercury concentrations above WHO safety limits.[47] The research was supported by technicians from Fiocruz, WWF Brazil, Instituto Socioambiental (ISA), the Institute for Indigenous Research and Training (Iepé), the Federal University of Pará (UFPA), and Greenpeace Brazil.

Beyond people, mercury contamination has far-reaching effects on Amazonian wildlife. Aquatic species such as fish and amphibians, are counted among the most affected. Studies indicate that mercury may affect the physico-chemical properties of habitats and breeding grounds. In poison dart frogs, a link has been observed between mercury levels in water and tadpole development.[48] In fish, the contamination was found to bioaccumulate and biomagnify in higher concentrations in their tissues.[49] Tropical birds, from kingfishers to hummingbirds, are also showing signs of mercury contamination. Tropical birds, from kingfishers to hummingbirds, are also showing signs of mercury contamination. Birds whose habitats are close to gold mining operations and who eat fish and insects exhibit the highest levels of contamination – sometimes up to six times higher than at control sites.[50] It has been reported that mammals are also increasingly in focus, with animals living close to mines, ranging from ocelots to titi monkeys, affected.[51]

20th Anniversary of Free Land Camp: Largest Indigenous Mobilization in Brazil.

The spillover effects of illegal gold mining represent a serious and growing threat. Apart from mercury, illegal mining has a profound impact on social structures and endangers the health and livelihood of many Indigenous peoples. Although Brazil's 1988 constitution explicitly prohibits mining within Indigenous territories, this law is frequently ignored. As a result mining activities significantly reduce the availability of hunting and fishing grounds, which are essential for the subsistence of these communities.[52] Furthermore, the mining context also includes practices such as enticing Indigenous peoples with offers of alcohol, money, and boats in exchange for the permission to mine. These actions contribute to the social disruption of Indigenous peoples and traditional communities, as they lead to situations such as forced labour, sexual exploitation (sometimes even of children and adolescents), and the intensification of internal conflicts.[53] Gold miners may also bring infectious diseases with them to villages and traditional communities, posing a considerable risk to isolated peoples, increasing the rates of illness and death.[54]

A Manicoré-marmoset in a forest near the Manicoré River in the Amazon.

Runoff from an iron and gold mine in Brazil.

5. The toxic trail from the Amazon into the world

As the rainforest is being invaded and depleted, gold demand keeps rising globally. Limited livelihood opportunities on the ground coupled with ever increasing gold prices serve to fuel an unprecedented global gold rush.[55] Never before has gold mining been this lucrative. Used as a hedge and reserve asset amidst rising market volatility and geopolitical tensions, gold is at its highest annual performance since the turn of the millennium, as central banks and investors keep driving up demand.[56] In 2024 alone, the price of gold has grown by 44 %.[57]

Gold is a commodity that is very difficult to trace. Because of its wide circulation and relative ease of manipulation, it facilitates the obfuscation of origin. It is a high-value, low-volume, imperishable commodity which makes it an easy choice for smuggling and illicit trade.[58] Through various routes, gold illegally mined in the rainforest becomes part of the supply chain and flows undeterred through markets in Brazil and abroad. But how does the gold travel from the Amazon to its purchaser? How does it blend into the supply chain? How does it find its way into international trade flows?

It is in the downstream part of the supply chain, after the gold is mined, transported, traded, refined and processed, where more attention is needed to disrupt practices. The secrecy shrouding the gold trade is only one more indicator of the impunity in which those involved operate. The access points are multiple, the means and opportunities to trade this toxic gold plenty.

Stage 1: Leaving the mines

The gold that prospectors extract from the heart of the Amazon is rudimentarily produced and mostly takes the form of ingots or gold nuggets. The gold is used as an own mode of payment and is traded as a commodity in exchange for goods and services, in particular in the villages surrounding the Amazon.

At the same time, the smuggling of gold is a common practice. In some cases, gold prospectors cross the border to sell their gold directly in neighbouring countries. By exploiting porous border controls and quick access to neighbouring Amazonian border towns, gold is often carried on the body or in hand luggage. In other cases, gold prospectors sell their gold directly to legal mines. The illegal gold gets then registered under the legal mining concessions as the product of a(n) (unexplored) legal mine and is mixed with the »clean« gold. The owners of legal mines themselves sometimes may even encourage the exploration of gold in prohibited areas.[59]

Numerous gold prospectors also sell their gold in the city of Boa Vista, in the Brazilian state of Roraima, where it is bought by small jewellery stores on the Rua do Ouro (»road of gold«). The small jewellery shops or private individuals operating on the site usually do not have official authorisation from the Central Bank to purchase and sell gold. Gold is issued there without the need to present an invoice or any other form of verification. These middlemen, in turn, then generally travel to Manaus (AM) or Itaituba (PA) to sell the gold either to other gold brokers, to jewellery stores or gold buying stations, or directly to Distribuidora de Títulos e Valores Mobiliários (DTVMs).[60]

Stage 2: Supplying the traders

In Brazil, only DTVMs are legally authorised to market newly mined minerals. They are the first official trading point at which »rough gold« typically enters the legal market, and are therefore the instance where taxes on small-scale gold mining are collected. While they should act as the first checkpoint to verify the legal origin of the mined gold, they have long acted as one of the first laundering points for illegal gold. Up until recently, the sale of gold was based on the principle of good faith. A hand-written note in which the seller declares where the gold was allegedly extracted

from was considered sufficient proof of origin.[61] Any gold could thus easily be declared as coming from a legalised mine, with the use of the so-called »Permissão de Lavra Garimpeira« (PLG), a permit issued by the National Mining Agency (ANM) to prospectors or prospector cooperatives to explore specific areas for minerals. Unlike a mining concession for large companies, the PLG is aimed at small-scale activities, usually carried out manually or semi-mechanised, limited to 50 hectares (for individuals) or 10,000 hectares (for cooperatives).

Another common ploy is to use PLGs to gain undue advantage, whether through the use of heavy machinery, which is far removed from the initial formulation, or by falsely declaring gold to come from areas where in fact no exploration has occurred. According to a report drawn up by the Alliance in Defense of Territories,[62] bringing together representatives of the Kayapó, Munduruku and Yanomami peoples, many permits in circulation are idle, i. e. the permit holder has not started operating within 90 days, as required by law.[63] Since ANM fails to act in all cases to ensure that the deadline is met, there are multiple PLGs issued, which are not actually used by their respective holders. This has the indirect effect of creating property assets in favor of the beneficiaries of mining titles and/or mining applications.

The ANM's lack of supervision of these permits and the absence of an electronic control system ends up allowing a large number of illegal PLGs, both environmental and labour-related, feeding illegal gold mining with documents. This facilitates the emergence of »ghost mines« (those that supply gold to buyers but don't actually mine in the approved areas), which serve to »heat up« the gold extracted illegally on Indigenous lands and other conservation units. According to the Federal University of Minas Gerais, at least 15 tonnes of gold entered the market this way between 2019 and 2023.[64] Under the presidency of Lula, first efforts to aid enforcement have been put in motion since 2023, through electronic invoicing and the cancellation of the »good faith« principle among others.[65]

Once the illegal gold has entered the formal supply chain, the »legal« gold is flown to São Paulo or Rio de Janeiro, where it is freely traded, sold to banks and high-end jewellers, trading companies and abroad.[66]

Unsurprisingly, once gold moves up to this stage of the supply chain, it is exceedingly difficult to trace its origins and distinguish between legal and illegal gold.

Stage 3: Exporting

In 2024, 61,567 tonnes of gold worth more than $3.9 billion USD were exported from Brazil around the world. Gold exports were recorded from the states of Alagoas, Amapá, Amazonas, Bahia, Distrito Federal, Goiás, Maranhão, Mato Grosso, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo and Tocantins. About one quarter of the gold (23 %) is coming from the Amazon basin (or Amazônia Legal), in particular from Mato Grosso.[67] While there are mines that have been legalised in the Amazon basin, there remains a risk that the gold supplies include illegally mined gold. The states of Pará, Mato Grosso, and Amazonas are considered to be particularly high-risk, as it is believed that gold production there is largely based on illegal garimpo. Similarly, São Paulo is considered a high-risk state, as it does not produce gold but instead allegedly serves as a hub for laundering illegal gold for export.[68] An analysis found that 94 % of the European Union's gold imports from Brazil in 2023 were tinged with high risk of illegality.[69] While gold exports from Brazil have overall decreased over recent years, gold from the Amazon has seen a smaller decline and thus gained in importance, making up 18 % of total gold exports in 2022, 21 % in 2023 and 23 % in 2024.[70]

Greenpeace Brazil activists and Indigenous leaders hold a peaceful action demanding "Stop Mining in the Amazon", 2023

Destination country	Trade value (USD)	Net weight (t)
Canada	$1.838.546.881	29.4
Switzerland	$948.234.974	16
UK	$579.388.660	7.5
UAE	$211.441.948	3
USA	$185.659.448	2.8
Germany	$155.350.990	2.2
India	$29.515.833	0.4

Table 6: Overview of the top Brazilian gold export destinations in 2024 [71]

The top three export destinations of Brazilian gold in 2024 were Canada, Switzerland and the United Kingdom. All three constitute leading international hubs for gold refinement, processing and trade, and are at the centre of international supply chains. When it comes to the European market, Switzerland presents an interesting case as more than half of the gold imported to the EU comes via Switzerland. Between 2019 to 2023, the EU imported roughly 1,551 tonnes of gold from extra-EU countries and 55 % came via Switzerland, 10 % via the UK, 7 % via the UAE and 3 % were imported directly from Brazil.[72] Similarly, between 2019 to 2023, Germany imported 720 tonnes of gold. 56 % came via Switzerland and less than 1 % directly from Brazil.[73]

According to official export data, several countries have dropped in relevance in recent years as key export destinations for Brazilian gold, including India, the United Arab Emirates (UAE), USA, Italy and Belgium. A sole exception represents Switzerland, to which gold net weights have slightly increased since 2022. When comparing export and import data, however, some irregularities are immediately apparent. Large discrepancies can be seen between the net weight exported to countries and the net weight imported. In the case of Switzerland, this is the most striking, as recorded gold imports from Brazil exceed recorded gold exports from Brazil by 67 % in 2022 and by 62 % in 2023, a difference of approximately 9,7 tonnes and 8,7 tonnes respectively (see Table 7). Another glaring example sets the UAE, where recorded gold imports are over 48 % higher in 2022 and over 138 % higher in 2023. Taking into account the significant discrepancy in recorded trade data, UAE appears to remain a key export destination for Brazilian gold.

Such discrepancies in gold production statistics have been identified for some time now with regard to Brazil, be it in the recorded net weight exported compared to the net weight produced or, as in this case, when recorded imports exceed recorded exports. An explanation for such asymmetries can be trade misinvoicing, smuggling and/or illicit gold trading. Gold may not be registered with the relevant authorities in the exporting country in order to avoid taxes, but may enter the country of import legally, showing thus up in the trade statistics of the importing country. It can also mean that gold coming from a country that is regarded as high-risk is declared as coming from a different country, in order to avoid additional scrutiny. Other explanations that can be put forward to explain these discrepancies are time lags between cargo leaving and arriving, free zones not appearing in trade data or unintended mistakes by customs.[74] Although in the case of Switzerland and the UAE, the differences between declared exports and imports are too large to suggest any of the latter. Ample evidence points to the existence of smuggling in both countries' supply chains.[75]

Year	Destination country	Net weight exported (from Brazil)	Net weight imported (from Brazil)	Gap weight (export/ import)
2022	Canada	33.8	31	2.8
2023	Canada	30.7	26.9	3.8
2022	Switzerland	14.5	24.2	9.7
2023	Switzerland	14.2	22.9	8.7
2022	UK	14.3	13.3	1
2023	UK	7.2	7.4	0.2
2022	UAE	8.3	12.3	4
2023	UAE	3.9	9.3	5.4
2022	Germany	1064 kg	1064 kg	0
2023	Germany	1289 kg	1287 kg	2 kg

Table 7: Discrepancies in international gold exports from Brazil and gold imports of selected countries (2022-2023) [76]

The world's hunger for gold is destroying the vital Amazon rainforest – just to stockpile gold bars like these that sit untouched in bank vaults.

6. Neutrality with benefits: Switzerland's role as a global gold hub

Swiss gold enjoys a high level of trust and recognition worldwide. Switzerland plays a leading role in the gold trade and is an important hub for gold refinement and processing.[77] But how did a country without its own gold deposits become an international gold heavy weight? Switzerland's gold trade has a controversial past. During World War II, Swiss banks bought more than 3/4 of German Nazi-gold, much of it looted, which effectively helped to sustain the German war economy.[78] Post-war, Swiss banks continued trading with sanctioned regimes, providing them with vital foreign currency. Citing neutrality, Switzerland has maintained these ties despite global criticism.[79]

Refineries – the gatekeepers in the supply chain

Over the years, Switzerland has built up a comprehensive technical and industrial know-how in the field of gold refining. Four of the world's seven largest gold refineries are located in Switzerland.[80] In the past, the refineries were closely tied to the financial sector as they were owned by the country's largest banks, which handled the buying and selling of gold.[81] Gold refineries serve an important purpose: they transform raw gold into tradable and high-quality products. Even if the imported gold is already of high quality, it is further refined and then marketed under the »Swiss gold« label, regardless of its original source. Much of the gold is transformed rather than refined in Switzerland. This means that it is processed or reshaped, rather than fully refined, before being re-exported. Additionally, Switzerland holds a leading position in the main sectors where gold comes to use: jewellery, investment and watches.[82]

But where does the gold come from?

In 2024, Switzerland imported 2,008 tonnes of gold. Notably, 155.8 tonnes came from the UAE, with over 99 % classified as ‚gold for further refining and processing,' commonly referred to as ‚recycled gold'.[83] Like Switzerland, the UAE has no domestic gold deposits but has emerged as a key player in the global gold trade. Over the past 40 years, it has climbed from outside the top 100 gold-importing countries to being among the top five.[84] Dubai is a central hub for gold trade with the majority of UAE gold refineries being located there. The Gold Souk market plays a crucial role, but discrepant regulations in the UAE's gold sector hinder proper oversight over the sourcing of gold.[85] From the UAE, the gold is then exported as so-called ‚recycled gold' to various countries including Switzerland, which comes second among the top 5 export destinations for UAE gold (see Table 8). There it is further transformed and ultimately rebranded as ‚Swiss gold.'

Destination country	Trade value (USD)	Net weight (t)	Share of total exports (%)
Turkey	$13.970.246.273	230.9	26 %
Switzerland	$9.576.237.686	158.3	18 %
Hong Kong	$8.263.514.944	136.6	16 %
India	$7.267.058.751	120	14 %
Saudi Arabia	$2.880.911.768	47.6	5 %

Table 8: Overview of the top 5 UAE gold export destinations in 2023 [86]

While ‚recycled gold' is often perceived as ethical and sustainable, major issues persist. For the lack of a clear definition, freshly mined gold can easily be reprocessed and falsely labelled as recycled, concealing its true origins. As a result, consumers are misled into believing that recycled gold is inherently eco-friendly.[87] Additionally, lax Swiss legislation and insufficient oversight allow importers to obscure the gold's true origin, even though it may, in reality, originate from elsewhere.[88]

But gold does not only reach Switzerland as recycled gold. Switzerland is the second largest direct importer of Brazilian gold (Table 6). There are reports of how mining gold from the Amazon reaches Switzerland via letterbox companies or simply in hand luggage on airplanes.[89] In 2022, Swiss refineries signed a joint declaration stating that they will not accept any illegal gold from the Amazon.[90] Be that as it may, in 2024, 4.5 tonnes of gold from the Brazilian Amazon region were nevertheless exported to Switzerland (representing 23 % of the total amount exported)[91] where illicit origins cannot be excluded with certainty.[92] This is why not only civil society organisations are calling for more transparency and due diligence obligations,[93] but also several special rapporteurs and the UN Working Group on Business and Human Rights have criticised Switzerland for its lax handling of gold processing and trading.[94] After all, from Switzerland, gold is exported across the world. The top five destinations in 2024 were China, India, UK, USA and the UAE.[95]

The pretense of transparency: the gold industry's half-hearted efforts

Due to growing awareness of traceable supply chains and questionable trading practices, various industry players have announced measures to improve accountability. One example of such efforts is the announcement made in September 2023 by the World Gold Council (WGC), an association of leading gold mining companies, to disclose the identities and locations of its partner refineries in the future.[96] In order to combat gold laundering effectively, however, it is the refineries, which would have to disclose all their trading figures and partners, from mining companies to end processors, to enhance transparency.

The London Bullion Market Association (LBMA) is another key player in the global gold market. Founded in 1987, the LBMA positions itself as the global authority for precious metals, overseeing the ‚Good Delivery List' for gold and silver, which requires refineries to meet specific quality standards. At the same time, however, refineries are not obligated to disclose the exact origin of their gold. This lack of transparency makes it difficult to trace any illicit gold. Additionally, three of the five ‚Good Delivery Referees' responsible for monitoring this list are based in Switzerland, highlighting the close ties between the Swiss gold sector and international standard-setting.[97] Given the complexity and challenges associated with gold procurement, strict supervision and responsible practices are essential.

What should Switzerland do?

- **The Swiss government must ensure that trade information for its gold imports is collected and made public for the entire supply chain (i.e. including not just the countries of re-export, but also the countries of extraction and any other countries through which the gold transits), and publish the names of supplier and recipient companies;**
- **The current revision of the Precious Metals Control Act (Edelmetallkontrollgesetz) must not only take into account the OECD guidelines for promoting responsible supply chains and mining conditions, but also implement these requirements in a regulation with strict conditions and high penalties;**
- **As a central point in the supply chain, Swiss refineries and smelters must take responsibility and provide complete transparency regarding the sourcing and processing of gold.**

7. The last destination: into the vaults of central banks

The main uses of gold are in jewellery and watch-making, central banks' reserves, investment and technology (see Table 9). In fact, nearly half of the demand for gold is for jewellery and watchmaking.[98] In 2024, this represented roughly 2,004 tonnes. In comparison, central banks' demand accounts for less than 23 % (or 1,045 tonnes in 2024) of total gold demand.[99] Nevertheless, the influence of central banks is arguably significant. The central banking sector is dominated by a few powerful players, who hold substantial shares and, as a result, wield significant influence over the gold market.[100] By comparison, the jewellery and watchmaking market is highly fragmented, with a large number of participants.[101]

Central banks have historically accumulated large gold reserves to cover the money in circulation. If put together, central banks now hold more than 35,000 metric tonnes of gold, which is the equivalent of one fifth of all the gold ever mined.[102] The US, Germany and Italy hold the largest central bank gold reserves in the world beside the International Monetary Fund (IMF) (see Table 10). Nowadays, gold serves as one of the most crucial reserve assets worldwide and central banks use gold for long-term storage of value, as a natural hedge against inflation and it helps to diversify central bank portfolios. The majority of this gold is in the form of bullion bars, typically weighing 12.44 kg or 1 kg, while smaller quantities are held as official gold coins.[104] The Swiss National Bank manages the eighth largest central bank gold reserve, with the Bank for International Settlements, also located in Switzerland, acting as a key international gold broker for central banks, also holding gold reserves.[105]

Central banks reduced gold reserves in the 1980s and 1990s, but returned to buying after 2009. Transition countries have been particularly intense buyers, as gold was seen as a symbol of strength and sovereignty.[106] The 2024 Central Banks Gold Reserves survey, which collected data from a record 70 of the world's central banks, confirms the trend, with nearly 30 % of central banks planning to add to their own gold reserves within the next year.[107] The Chinese central bank is among the leading central banks that is buying up gold.[108] But the gold rush is felt everywhere. In the European Union, several central banks have already introduced their plans to stock up gold reserves, in particular in Poland, Hungary, the Czech Republic and in Ireland.[109]

Sector	2020	2021	2022	2023	2024
Jewellery	1324	2231	2195	2191	2004
Investment	1795	992	1113	946	1180
Central Banks	*255*	*450*	*1080*	*1050*	*1045*
Technology	309	337	315	305	326
Total	3683	4010	4703	4492	4555

Table 9: Gold consumption by sector (in tonnes) [103]

Rank	Country	Tonnes
1	United States	8.133,5
2	Germany	3.351,5
3	International Monetary Fund	2.814,0
4	Italy	2.451,8
5	France	2.437,0
6	Russian Federation	2.335,9
7	China, P. R.	2.269,3
8	Switzerland	1.039,9
9	India	876,2
10	Japan	846,0

Table 10: Top 10 ranking of central bank reserves [110]

At the same time, several European countries, including Germany, France and Spain, have announced that they will neither increase nor sell their gold reserves.[111] While the WGC proudly endorses these record-breaking central bank purchases and soaring gold demand, they remain silent about the devastating costs behind these numbers.[112] As investors celebrate rising gold prices, the Amazon rainforest is being pillaged to unearth more of this so-called »safe-haven« asset. Illegal mining, deforestation and mercury pollution fuel the gold industry, but these harsh realities are absent from the WGCs polished reports. Nature destruction and threats against local communities continue unabated, in the name of wealth accumulation and "market stability".

In response to some of these concerns, the EU has introduced a special Conflict Minerals Regulation for union importers of tin, tungsten, tantalum and gold (3TG) which came into force on January 1, 2021. The new law imposes strict due diligence obligations on importers of 3TG from conflict-affected and high-risk areas – who must source from responsible and conflict-free sources only. Its primary goal is to prevent the trade of these raw materials from financing armed groups or security forces. To achieve this, EU importers must thoroughly assess their supply chains, while the regulation also aims to enhance transparency and security in the trading practices of importers and refineries. Although the regulation mainly focuses on preventing conflict financing, its measures for responsible sourcing and increased transparency could also have positive environmental effects, such as rainforest protection, the reduction of deforestation, and the minimisation of mercury pollution. Implementation yet is not given and reviews of the regulation's effectiveness highlight the need for a stronger integration of environmental aspects in future regulatory revisions.[113] Environmental risks are not explicitly covered so far by the regulation and although possible links between armed conflict and the environmental impact of mining are acknowledged, no additions on environmental due diligence are foreseen. Risks related to illicit trade in gold also remain insufficiently addressed in the current regulation, with transit hubs passing under the radar as a potential gateway for illicit gold.[114] Restrictions and due diligence obligations mainly apply to a specific list of countries, in which Brazil, the UAE and Switzerland are not included.

International demand for gold exposes the complicity of importing countries in the greater destruction of the Amazon rainforest. To this date, it is apparent that existing frameworks and international standards on gold supply chains are insufficient to address all the risks associated with illegal gold mining, gold laundering and the illicit trade in gold. The implementation of internationally standardised chain of custody processes to improve the traceability of gold throughout the supply chain is essential to bring about real change. These standards must incorporate all stages of gold extraction, trade, refining and processing. Similarly, risk assessments need to include all potential harmful impacts that these practices might engender, including environmental degradation and illicit trade.

The gold supply chain is a shared responsibility:

Governments must take action:

- **Oblige companies and financial institutions along the gold supply chain to disclose the names of their suppliers, indicating the place of extraction and the place of (substantial) processing;**
- **Not import gold from and flag gold supply chains passing through conflict-affected and high-risk areas;**
- **Set up independent auditing bodies to monitor compliance with responsible production and supply chain practices.**

The European Union must:

- **Add environmental risks to the revision of due diligence obligations under the Conflict Minerals Regulation;**
- **Put Switzerland on the CAHRA-list (Conflict-Affected and High-Risk Areas) to oblige companies that trade in Swiss gold to fulfil stricter due diligence obligations.**

Could this be Amazonian gold? It's hard to say. Swiss refineries import raw gold, refine it, and then market it as 'Swiss gold'—no matter where it really comes from.

Forest near Tapajós River in the Amazon

8. Respect the Amazon – Outlook and demands

While gold is collecting dust in central bank vaults, in private reserves and investments, the Amazon is steadily approaching its tipping point, while Indigenous people and local communities are being poisoned. If we don't assess the impact of the rush for gold on the Amazon and Indigenous communities and learn to respect this precious ecosystem, illegal mining will continue to spread through the rainforest, contaminating the environment, destroying the land and its people.

The coming COP30 global climate talks will be hosted in Belém, in the heart of the Amazon. They will provide a huge opportunity to interlink climate and nature protection measures and policies and take urgent action to protect the Amazon and other ecosystems with a structure and function close to their natural state (high integrity ecosystems) worldwide. Dedicated financial mechanisms that mobilise sufficient resources, support a socio-ecological transformation and which recognise the rights and roles and strengthen the position of Indigenous peoples and local communities will be crucial to implementing any real change on the ground.

Concerted efforts will need to go further than the toxic business of gold mining and rethink the connection to the Amazon as a whole. They need to look beyond the rainforest and include the perspectives of urban populations[115] who have been historically marginalised and silenced – those who are often still exploited for cheap labour that ultimately contributes to poisoning their homeland and surrounding ecosystem. Gold mining is just an example but other extractive practices, such as illegal logging, are just as harmful and destructive. To illustrate the need for holistic and integrative approaches it is worth noting that of the twenty largest favelas in Brazil, half of them are located in the Amazon:[116] they house those who have been driven out of the forest by violence or by the successive extreme weather events that have recurred since the beginning of the century.

Sloth in Brazil

True respect for the Amazon involves breaking with the model of plundering natural resources, implemented since the early days of colonisation. It is in the Amazonian cities that social inequalities – feeding back into the destructive logic of an economy incapable of coexisting with the forest – materialise. To protect the Amazon, countries need to go beyond the logic of command and control and associate bold policies that enable an economy capable of living with the forest, respecting human rights and overcoming the social inequalities that condemn thousands of Amazonians to poverty.

In the run up to COP 30 in November, we demand global leaders to respect the Amazon and:

- **Act on their promises to halt deforestation**
- **Regulate and stop funding Amazon destroyers**
- **Fund solutions for Indigenous People and local communities to protect and restore the Amazon**

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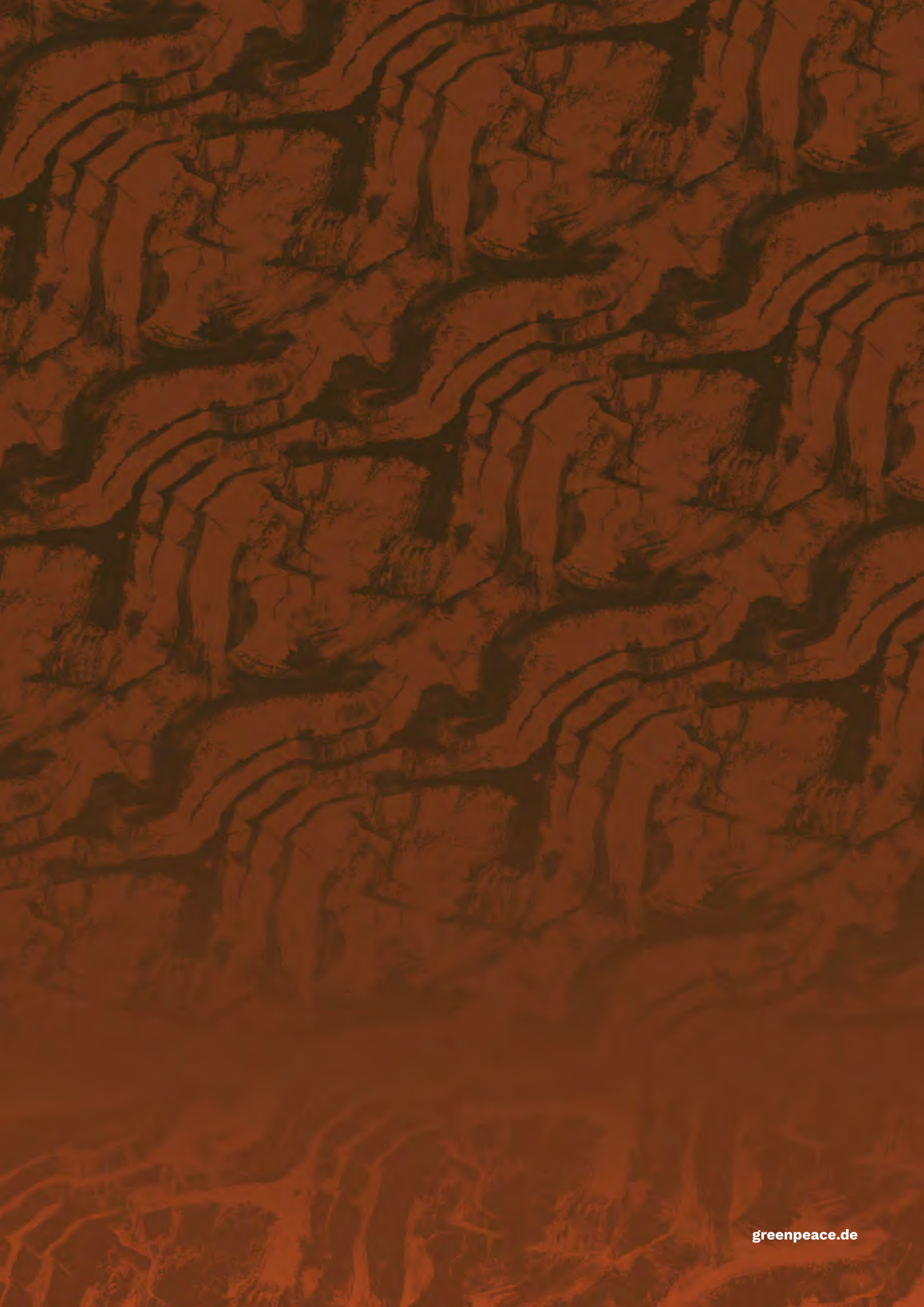

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