IGARAPÉ INSTITUTE
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# **STRATEGIES TO COMBAT ENVIRONMENTAL CRIMES** AND ASSOCIATED MONEY LAUNDERING

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# Introduction

*Melina Risso, Vivian Calderoni and Vitória Lorente*

We are living through an unprecedented climate crisis that threatens the planet's biodiversity and future generations. According to the European Union's Copernicus Climate Change Service (C3S), global temperatures have already risen beyond 1.4 °C above pre-industrial levels, contributing to more frequent extreme weather events such as severe droughts, catastrophic floods, and heat waves. C3S also reported that 21 of the 22 months preceding May 2025 exceeded the 1.5 °C average, the threshold established under the Paris Agreement.[1]

This crisis is driven by deforestation. Tropical forests, such as the Amazon, play a critical role in absorbing $CO_2$, but their degradation can lead to net carbon emissions. Parts of the Amazon now release more carbon than they absorb, based on recent atmospheric measurements.[2]

The Amazon, the largest tropical forest on the planet, is at risk of reaching a point of no return due to accelerated deforestation. Scientists indicate that this tipping point may occur once forest cover loss reaches 20% to 25%. A study published in the journal *Nature* found that 15 percent of the Amazon has already been deforested and another 17% shows degradation caused by human activities such as selective logging, fires, and understory extraction. In addition, about 38% of the forest may be weakened as a result of the prolonged droughts that marked the past decade.[3]

Accelerated deforestation in the Amazon is primarily driven by illegal activities within extraction-based sectors. In 2020 alone, about 76% of all deforestation in the Amazon occurred on Brazilian territory. Between 2023 and 2024, more than 90% of this deforestation in the Brazilian Amazon was carried out illegally, without the required authorization.[4] The main driver of deforestation in the region is the expansion of agriculture and ranching, which accounted for 84% of forest loss in the first two decades of the century. Infrastructure works such as roads and waterways, along with illegal activities such as unlawful timber extraction, drug cultivation, and illegal mining, also contribute significantly.[5]

Organized crime is increasingly embedded in the lucrative markets for products of environmental or rural origin, such as timber extraction, mining, and agriculture and ranching, benefiting from forest destruction and predatory forms of economic exploitation. Environmental crimes are estimated to generate at least USD 110 billion to USD 281 billion per year[6] through practices such as document fraud, corruption of public officials, money laundering, smuggling, among others. These crimes are driven by economic interests in which illegally obtained natural resources are concealed before entering the formal market, a process known as "environmental asset laundering." To conceal the illegal origin of these resources, complex criminal practices

1 Reuters (2025). May was world's second hottest on record, EU scientists say

2 Euronews Green (2024). Amazon tipping point: Up to 47% of forest threatened by climate change and deforestation

3 São Paulo Research Foundation - FAPESP (2024). Amazon rainforest could reach tipping point by 2050

4 Institute of Amazonian Studies - IEA (2025). Maioria do desmatamento na Amazônia ocorreu sem autorização, aponta estudo; Amazon Institute of People and the Environment - Imazon (2024). Mais de 90% do desmatamento da Amazônia é para abertura de pastagem

5 *Infoamazonia* (2023). Deforestación en la Amazonía: pasado, presente y futuro

6 Rhipto, Interpol and *GI* (2018). World Atlas of Illicit Flows

are used to give products extracted in violation of the law an appearance of legality. This is one of the ways in which money laundering occurs, including when natural resources illegally obtained are transformed into seemingly lawful assets as they enter the legal economy.

This context underscores the urgent need to improve techniques for preventing, detecting, and investigating the laundering of environmental assets by public and private authorities. It also highlights the need to address the illegal activities that permeate supply chains at various stages that drive illegal deforestation, through innovations developed from multiple forms of knowledge across different fields.

The anti–money laundering system was originally structured with a focus on repressing drug trafficking. Over the decades, the system has become more complex, gradually incorporating other predicate offenses to money laundering. However, regarding crimes with environmental impact, institutional progress is still required to strengthen mechanisms such as risk alerts, the strategic use of data, and interoperability among information systems. Understanding the dynamics of environmental crime is essential in this process because it exhibits characteristics distinct from those of other offenses. Each natural resource extracted or produced illegally exploits vulnerabilities specific to its supply chain, capitalizing on regulatory gaps and institutional weaknesses. Since the central objective of these schemes is to insert goods obtained illegally into the formal market, an in-depth understanding of the routes and strategies employed is indispensable for improving the capabilities of the anti–money laundering system.

Some initiatives have already been implemented and have produced promising results. These experiences, some of which are presented in this collection, provide relevant inputs for the design of public policies and can serve as a reference and source of inspiration for other institutions, both national and international. In this context, the Igarapé Institute, with the participation of the Financial Action Task Force of Latin America (GAFILAT), called on several organizations with different areas of expertise and missions to come together in a space for listening, exchange, and collective work, with the objective of advancing efforts to address money laundering linked to environmental crimes.

The Third Regional Meeting, “Strategies for Addressing the Laundering of Environmental Assets and Associated Financial Flows,” held on November 28 and 29, 2024, in São Paulo, Brazil, brought together experts from different fields and countries to discuss the challenges and solutions for combating the laundering of assets and financial flows derived from environmental offenses. With an emphasis on innovative techniques and methodologies successfully applied by various institutions, the event aimed to promote the exchange of experiences and to inspire the adoption of sound practices by both national counterparts and institutions from other countries. Also, GAFILAT participated.

The meeting featured presentations and discussions on tools and methodologies capable of identifying, tracing, and addressing the laundering of environmental assets and associated financial flows, highlighting the importance of coordination among public institutions, the private sector, and civil society at the regional level to confront these criminal economies. This collection emerges from the depth and diversity of the debates held throughout the meeting. By bringing together articles by leading specialists, the volume seeks to expand the reach of the shared reflections and strengthen the institutional responses to the crimes that threaten our ecosystems and undermine sustainable development.

We believe that innovative solutions can emerge when different forms of knowledge meet and enter into dialogue — even, and especially, when they do not begin from a common starting point. This is because the very complexity of environmental crimes requires expanding the understanding of traditional boundaries between the legal and the illegal, the formal and the informal, the local and the transnational. It is precisely in the transnational character of the criminal networks that sustain these illicit economies that the need for coordinated regional solutions becomes evident.

In the opening chapter of this volume, the minister Liliana Alcaraz, President *Pro Tempore* of GAFILAT in 2024, discusses studies and resolutions developed in a coordinated manner among countries of GAFILAT regarding environmental crimes, which have been identified as a present threat in the region. Among the aspects highlighted by the then *pro tempore* president was the GAFILAT Asset Recovery Network (RRAG), presented as an international cooperation tool through which GAFILAT countries can share information on environmental crimes

Chapters 2, 3, and 4 examine tools to combat environmental crimes with a focus on detecting risks associated with the laundering of environmental assets, which are transformed into seemingly lawful amounts that move freely through the economy. In this context, the Algoritmo para la Legalidad de Madera de la Amazonía (ALMA), developed by Proética (the Peruvian chapter of Transparency International), the Environmental Investigation Agency (EIA), and the Center for International Environmental Law (CIEL) in Peru, and presented by Rolando Navarro and Frank Rivero in Chapter 2, analyzes the risks of illegality in timber extraction in the Peruvian Amazon. The tool is particularly important for buyers seeking to reduce the risk of acquiring products of illegal origin and for protecting Environmental Defenders, by helping to reduce impunity for forest crimes reported by these activists.

José Guilherme Roquette, a forestry engineer and analyst at the Office of the Prosecutor of the State of Mato Grosso, presents in Chapter 3 the Materia project, which can detect the illegal use of virtual credits for timber laundering, using both preventive and repressive approaches. The Gold Transparency Portal, presented in Chapter 4 by Ariene Cerqueira, a public policy analyst at WWF Brazil, identifies elements of noncompliance in mining processes, indicating risks of laundering gold extracted illegally in Brazil by cross-checking data from different official sources and integrating them with high-resolution satellite imagery.

Chapter 5 presents the reflections of federal prosecutor Ana Carolina Haliuc Bragança, based on the techniques discussed in the preceding chapters. She highlights the critical importance of public, private, and civil society actors in building data-driven solutions that guide behavior aimed at protecting an ecologically balanced environment, as guaranteed by the Federal Constitution. These solutions may involve strengthening prevention and oversight carried out by public authorities, or creating economic incentives that reward or sanction good or poor practices within a market-oriented framework.

The discussions prompted by the Third Regional Meeting, in a second stage, highlighted the importance of an intelligent oversight system capable of anticipating environmental crime risks and enabling timely actions that reduce the environmental damage caused by these offenses. Such anticipation of risks requires the strategic use of different categories of data, especially by integrating geospatial information that can direct oversight efforts to areas with a higher probability of such harms.

In this context, Chapters 6 and 7 present the Delphos system, developed by the Federal Police of Brazil, and the Crotalus system, developed by the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama). Felippe Pires Ferreira, a criminal expert with the Federal Police of Brazil, and Nara Pantoja, Daniel Moraes de Freitas, and Rodrigo Antonio de Souza, environmental analysts at Ibama, show that these systems use an intelligent approach to guide and anticipate the actions of law enforcement and environmental oversight agencies: Delphos for operations against illegal mining, and Crotalus for addressing illegal deforestation. This is made possible by combining information and data of different types, together with the use of artificial intelligence and machine learning for predictive actions that strengthen the analytical capacity and response of authorities.

Customs controls and transport inspections were another topic that received significant attention at the Third Regional Meeting. Such controls are highly strategic for disrupting the circulation of environmental assets transported and traded through fraudulent documentation. Strengthening oversight at the transport and commercialization stages is a priority of the United Nations Office on Drugs and Crime (UNODC) through its Container Control Program, as presented by Alexander Walsh, coordinator of UNODC's Environmental Crime Prevention Unit, in Chapter 8. The program involves analyzing various elements to inform risk assessment, including cargo weight, transport routes, certificates of origin, environmental licenses, and atypical values. Cargo inspections conducted by customs officers also receive technical support from UNODC for wood species identification through an application and artificial intelligence.

In Chapter 9, Natália Garay, head of customs enforcement in San Antonio, Chile, shares the Chilean customs authority's experience in detecting illegal environmental assets originating in the Amazon region, such as Amazonian gold exported to the global market through Chile. She also describes the strategies recently adopted to combat this practice, including regulatory reforms and strengthened enforcement and interinstitutional cooperation.

In Chapter 10, Bruno Giancarlo Antoniazzi, tax auditor at the Secretariat of Economy of the State of Goiás, presents the Selective Intelligent Enforcement system, which has proven remarkably effective in detecting the transport of goods that involve tax evasion in the state of Goiás. The system increased the share of enforcement actions from 1% to 30% and can be applied to halt the commercialization of illicitly sourced environmental assets transported on highways.

The Third Regional Meeting also opened space for debates on the potential leadership role of financial institutions, which can act proactively in environmental protection beyond the formal compliance with legislation. Once again, the importance of interinstitutional collaboration and the use of data analysis technologies for anomaly detection stands out. In Chapter 11, expert consultants Daniel Rico and Paula González-González examine the role of the financial system in preventing environmental crime through the cases of the Melka Group in Peru and the Colombian gold market case. They discuss how the banking sector can be more proactive in identifying and monitoring suspicious transactions linked to resources derived from illicit activities that harm the environment.

Finally, the last chapters of this volume reflect on the risks posed by the economic sectors most vulnerable to money laundering and the infiltration of organized crime, which can exploit existing economic structures to advance environmental crimes. In Chapter 12, Emerson Kapaz, CEO of the Legal Fuel Institute, presents a critical analysis of organized crime infiltration into the fuel sector and the importance of developing effective control mechanisms, including incentives and sanctions, to mitigate the risk of money laundering in this sector.

In Chapter 13, Flávia Maria Valente Carneiro, general coordinator for supervision and regulation at the Financial Activities Control Council (COAF), reflects on the challenges of combating the exploitation of lawful economic activities by criminal networks. Drawing on a holistic, integrated view of the various economic sectors and their regulatory institutions, she outlines key directions for strengthening the Brazilian system's institutional capacity to prevent money laundering, the terrorist financing, and the proliferation of weapons of mass destruction (PML/TF/PF).

Active participation in the Third Regional Meeting by representatives of various organizations with relevant roles in combating environmental asset laundering and associated financial flows demonstrated the value of coordinated action among public institutions, the private sector, and civil society. More than an isolated event, this meeting represents a step in a longer trajectory, a stage within an ongoing process of institutional strengthening and regional integration. The network consolidated during the Third Regional Meeting is both a starting point for this process and a commitment to think and act in an integrated manner in the face of the challenges posed by environmental crimes and their impacts.

We hope this book will serve as a working tool, a source of inspiration, and a reference for professionals, public officials, scholars, and civil society organizations dedicated to protecting the environment and to advancing solutions for lawful and sustainable economies.

# 1. Identification of threats posed by environmental crimes in GAFILAT countries and regional experiences for their mitigation

**Liliana Alcaraz**
*Pro Tempore President 2024 of the Financial Action Task Force of Latin America (GAFILAT)*

Environmental crimes have become an increasingly significant threat linked to money laundering in Latin America. The Financial Action Task Force of Latin America (GAFILAT), comprising 18 countries from the region, plays a key role in tackling money laundering (ML), terrorist financing (TF), proliferation financing (PF),[7] and other threats to the integrity of the international financial system. Its core objective is to identify national-level vulnerabilities to protect the global economic system from misuse.

In recent years, GAFILAT has been producing regional threat assessment reports, the most recent update of which was completed in 2024. These reports are updated periodically to identify current threats, enabling countries to take the corresponding preventive actions and implement policies, mechanisms, and tools to address them in a timely and effective manner. Their preparation draws on a range of information sources, including typology reports from Financial Intelligence Units, analyses of convictions, information from national risk assessments, and other specialized studies.

In the second update of the Regional Threats Reports, environmental crimes were identified as an emerging threat. Although these crimes had already been included in national risk assessments, they were generally considered to be of minor relevance and showed low levels of detection and sanctioning. According to the information analyzed for that report, a sustained increase was observed in activities such as illegal wildlife trafficking and illegal logging. Illegal mining became the main threat, particularly in the Andean region, which includes Bolivia, Colombia, Chile, Ecuador, and Peru. In addition, seven countries in the region identified the criminal exploitation of natural resources as a determining factor in money laundering.

Given this scenario, in 2021 a document entitled "Strengthening the Effective Approach to Illegal Mining as an Emerging Money Laundering Threat in the Region" (Fortalecimiento del abordaje efectivo de la minería ilegal como amenaza emergente de lavado de activos en la región)[8] was produced under Brazil's *pro tempore* presidency of GAFILAT. The document aims to provide guidance on good practices and relevant operational aspects for the prevention, detection, and investigation of money laundering stemming from illegal mining. The report analyzes the impact of this activity in the region and characterizes its presence across different countries, as well as its potential areas of influence.

One of the main conclusions of the study indicates that illegal mining facilitates the concealment, transfer, and investment of illicit proceeds due to the structure of the market, which in many cases operates predominantly in cash, making transactions difficult to trace. Likewise, anonymity in the ownership and commercialization of gold hinders the identification of the origin of funds, thereby facilitating the activities of organized crime.

Among the best practices adopted by GAFILAT countries to address this threat are effective interinstitutional cooperation mechanisms, strengthening environmental and financial legislation, and increased interaction between environmental authorities and other competent agencies. Several countries have also signed international agreements on environmental crimes and expanded the use of both formal and informal international cooperation to facilitate mutual legal assistance. Manuals, typologies, and operational protocols have also been developed to guide authorities responsible for combating illegal mining.

7 "Proliferation financing" refers to the provision of financial support to programs aimed at the development, acquisition, or dissemination of weapons of mass destruction, such as nuclear, chemical, or biological weapons.

8 GAFILAT (2021). Fortalecimiento del abordaje efectivo de la minería ilegal como amenaza emergente de lavado de activos en la región

Key recommendations to improve the response to this type of crime include the need to build specialized capacity among competent authorities, adopt additional measures to strengthen legal frameworks, enhance customs controls, and reinforce international cooperation. In addition, the use of tools for information exchange among GAFILAT countries has become established as an essential strategic resource.

The third update of the Regional Threats Report (2022) consolidated environmental crimes as an ongoing threat, placing them eighth in the ranking of threats in Latin America. This classification was maintained in the Fourth Update, which, as mentioned, was approved in 2024. For this latest review, various sources of information were considered, including national risk assessments and reports from the Fourth Round of Mutual Evaluations of GAFILAT countries.

Mutual evaluation reports from countries such as Colombia, Peru, Chile, Ecuador, and Brazil show that illegal mining has been repeatedly identified as a threat to the region's financial integrity. In Colombia and Peru, despite the existence of convictions for this type of crime, significant gaps persist in the recovery of illicit assets. Brazil, in turn, has prioritized the identification and suppression of illegal mining as a central pillar of its national anti-money laundering strategy.

Additionally, GAFILAT relies on the Asset Recovery Network (RRAG - Red de recuperación de activos, in Spanish) as an efective tool for international cooperation among its member countries. The RRAG has 23 members and 52 contact points representing police forces, prosecutors' offices, Financial Intelligence Units, and other law enforcement authorities. This tool enables the swift exchange of information, facilitates the detection of illicit goods, and enhances the effectiveness of international cooperation. It has also contributed significantly to raising awareness of the importance of identifying and recovering illicit assets, while enabling the generation of statistics to assess the effectiveness of the policies adopted.

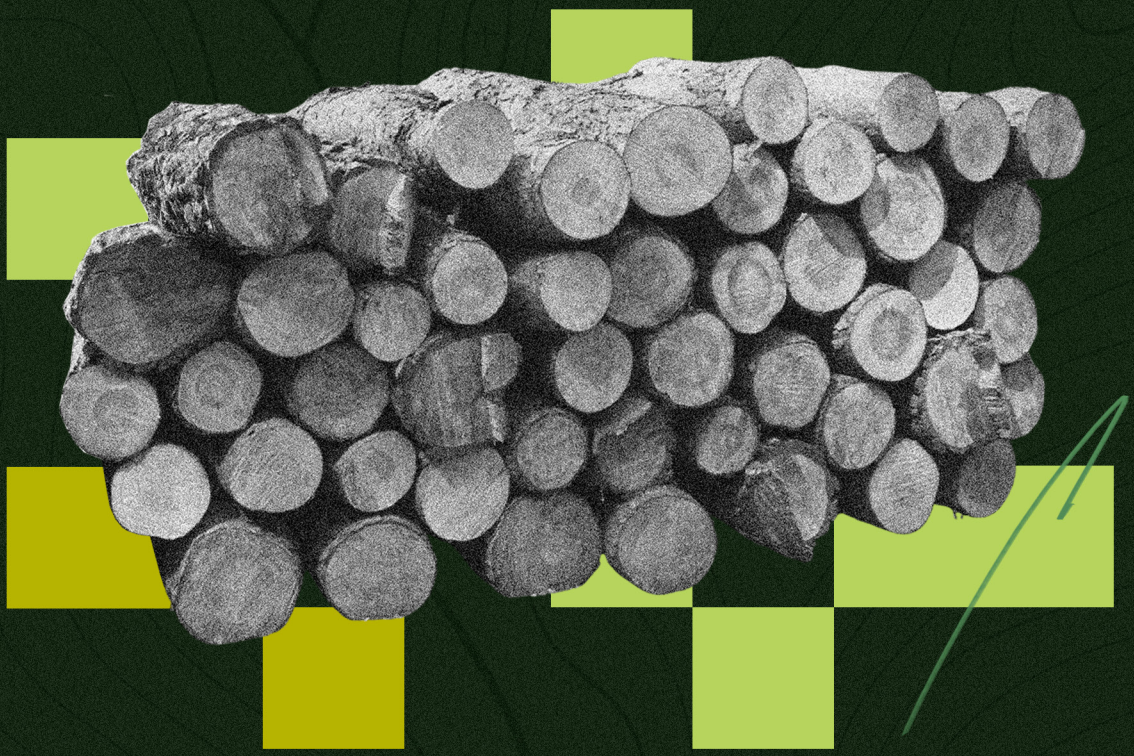
In this context, it is evident that environmental crimes represent a growing challenge for Latin America and require a joint and coordinated response among countries in the region and their international partners. Efforts to combat illegal mining and other environmental crimes should not be limited to the regional level, but rather integrated into global strategies aimed at mitigating their impacts and preventing these activities from continuing to be used as channels for money laundering. International cooperation, the strengthening of legal frameworks, and the development of specialized authorities are indispensable elements for a more effective response to this threat.

*"The RRAG is a tool that enables the swift exchange of information, facilitates the detection of illicit goods, and enhances the effectiveness of international cooperation."*

# 2. Building an Algorithm — ALMA — to Analyze the Legality of Timber in the Amazon

**Rolando Navarro**
*Independent Researcher on Environmental Crime*

**Frank Rivero**
*Forestry Management Consultant at the Environmental Investigation Agency (EIA)*



The problem of illegal logging in the Amazon and its associated trade represents a serious challenge, exacerbated by structural weaknesses in the monitoring, control, and enforcement mechanisms of the competent authorities. In response to this issue, three civil society organizations — Proética (the Peruvian branch of Transparency International), the Environmental Investigation Agency (EIA), and the Center for International Environmental Law (CIEL) — collaboratively developed the Amazon Timber Legality Algorithm (Algoritmo para la Legalidad de Madera de la Amazonia - ALMA).[3]

This tool is designed to identify the risk of illegality in specific timber shipments originating from the Peruvian Amazon. It aims to combat illegal timber trade by providing inputs that support responsible, well-informed decision-making in due diligence processes.

The tool's development involved using computational methods to process and analyze thousands of records from field inspections conducted by Peru's Forest and Wildlife Resources Oversight Agency (Organismo de Supervisión de los Recursos Forestales y la Fauna Silvestre - OSINFOR), responsible for verifying the legal origin of timber in the forest. In Peru, as in most Amazon Basin countries, authorization for forest management (selective logging for commercial purposes) requires preparing a detailed census of the area, including the identification and georeferencing of each tree to be harvested.

Recent data indicate that between 2001 and 2023, more than three million hectares of forest were lost in Peru, with much of this deforestation linked to environmental crimes. Over 50% of these offenses are related to illegal logging, the illicit trade of timber products, and illegal mining. According to data from OSINFOR, more than three million cubic meters of illegally harvested timber have been identified in Peru's forests since 2009. However, these figures reflect only officially recorded cases, suggesting the real impact may be significantly greater.

One of main challenges Peru faces is the use of fraudulent forest management plans to disguise illegal timber trade. Over 70% of the detected illegal timber was registered as originating from the Loreto region. This does not necessarily mean that all the timber was harvested in Loreto — rather, it suggests that legally authorized forest management plans from Loreto were used to launder timber extracted from other areas, such as Ucayali.

To detect this type of fraud, digital platforms have been developed, such as OSINFOR's Management Information System (SIGO), which enables verification of timber legality using field inspection data. In addition, Proética, in partnership with EIA, created the Timber Legality Observatory.[4] This digital platform consolidates information from field inspections, including cases of fraudulent management plans or plans that included non-existent trees, the volume of timber traded using such documents, and the actors involved in approving these plans.

Forest governance in Peru faces serious challenges, particularly due to institutional fragility and the failure of forestry authorities themselves to comply with existing regulations. According to OSINFOR, although regional forestry agencies are legally required to submit forest management plans within 15 days of approval to allow timely oversight, only 55% of these documents were submitted within the required timeframe, undermining the effectiveness of enforcement efforts.

Data on the scale of illegality in Peru's timber trade is another area of concern. While OSINFOR reported that in 2021 only 20.7% of timber sold in the country originated illegally, a recent Sectoral Risk Assessment of Money Laundering and Terrorism Financing in the Timber Sector, conducted by the Financial Intelligence Unit (UIF), estimated that a whopping 57.6% of the timber traded in Peru that same year came from illegal sources.

9 Algoritmo para la Legalidad de Madera de la Amazonia (ALMA)

10 Timber legality observatory

The ALMA tool was developed precisely to help address these challenges by assessing the risk of illegality based on information from Forest Transport Permit, the mandatory official documents that support the transport and trade of timber by accompanying all shipments throughout the supply chain.

The platform's development took place in several stages, including analyzing the Peruvian forestry sector in depth, systematizing available data, and selecting the most appropriate predictive model. In total, 14 predictive models were tested to identify the risk of illegality, with the Random Forest Classifier yielding the highest accuracy in detecting such risks.

The dataset used to train the algorithm contained over 39,000 observations (rows) across 41 variables (columns). The information was drawn from official open sources provided by OSINFOR and supplemented through formal requests under public information access laws.

It is worth noting that on the Sigo open data platform, OSINFOR classifies forest management plans based on field inspection results conducted by its specialists. Management plans are placed on the red list when they present high, relevant, or moderate risks due to indications of irregularities in timber commercialization, and on the green list when no evidence of risk is found.

To develop ALMA's dataset, the project team opted for a more refined classification methodology that includes identifying the legal status of each tree species recorded in every inspected forest management plan. Analysis of the dataset using this new classification revealed significant findings: approximately 25% of the observations originally listed on Sigo's green list (which made up 51% of the total) included unauthorized or illegal timber volumes. Conversely, 8% of the observations on the red list (which accounted for 49% of the total) included timber batches that were authorized or legally harvested. These results underscore the need for OSINFOR to improve the criteria currently used to classify forest management plans on the Sigo platform.

On the ALMA platform, anyone can enter information from a Forest Transport Permit into an online form and immediately receive an estimate of the risk of illegality associated with the timber linked to that permit. As such, the tool is particularly useful for buyers seeking to reduce the risk of acquiring timber from illegal sources, supporting stronger due diligence processes and enabling responsible, evidence-based decision-making.

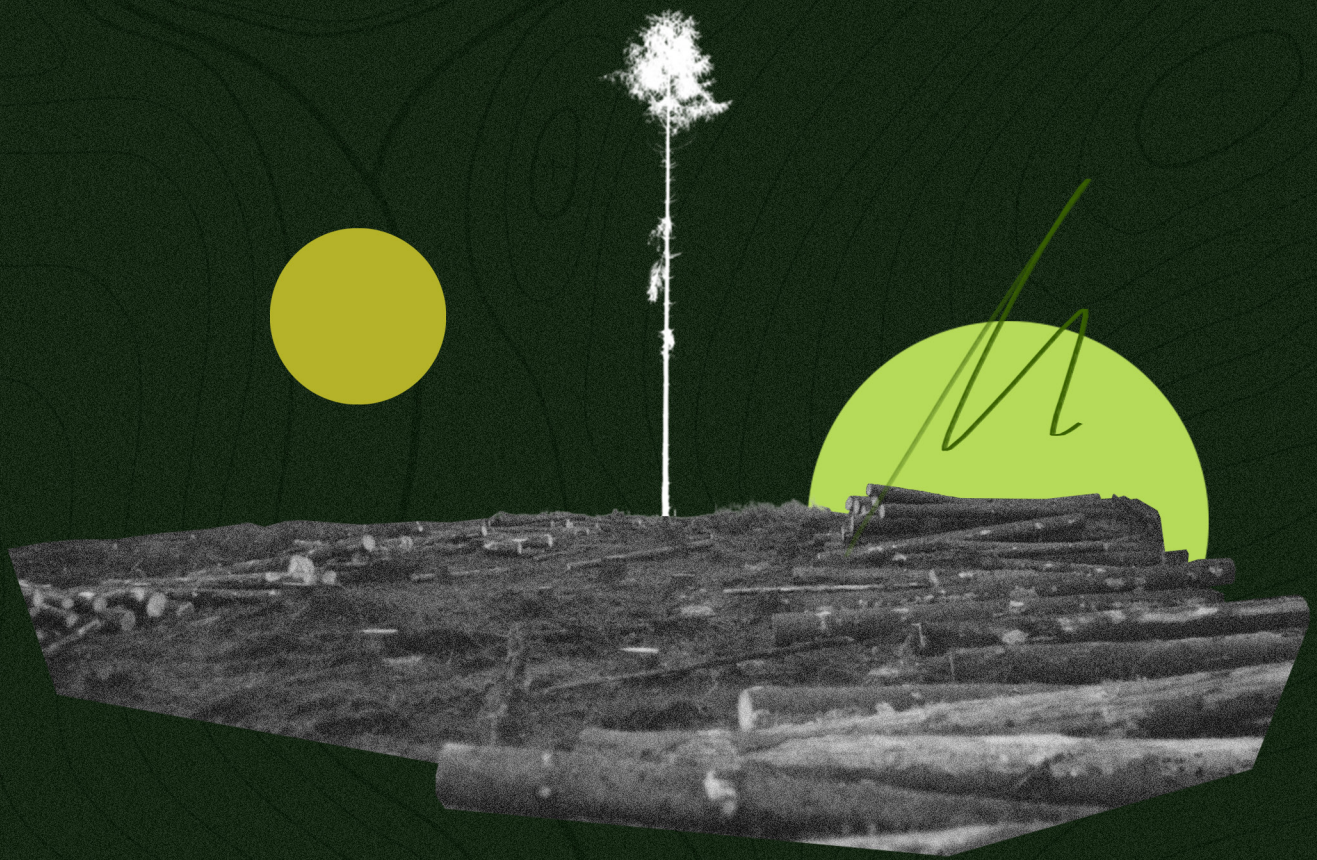
Additionally, ALMA contributes to the protection of Environmental Defenders, whose lives are increasingly under threat due to the expansion and impunity of illegal activities in the Amazon.

The lack of transparency and data manipulation in the forestry and mining sectors underscores the urgent need for independent tools to enhance public oversight of the exploitation and trade of natural resources. In this regard, ALMA represents a significant step forward in promoting the legal timber trade by increasing transparency and enabling civil society to participate in environmental monitoring and in the protection of forest resources, while confronting impunity and reducing the impacts of illegal exploitation in the Amazon.

*"The tool is particularly useful for buyers seeking to reduce the risk of acquiring timber from illegal sources, supporting stronger due diligence processes and enabling responsible, evidence-based decision-making."*

# 3. Project *MATERIA*: Monitoring and Controlling the Illegal Use of Virtual Timber Credits in the State of Mato Grosso

**José Guilherme Roquette**
*Forest Engineer Analyst at the Public Prosecutor's Office of the State of Mato Grosso*



Illegal deforestation in the Amazon is a chronic problem, primarily driven by timber extraction, land grabbing, and the expansion of livestock farming. Combating the illegal timber market can be regarded as a strategic measure to curb forest degradation, since this activity often precedes and finances illegal deforestation due to its high profitability and its role as the initial stage in the complete removal of native vegetation. Research indicates that the area degraded by logging in the Amazon is comparable in size to the area affected by clear-cut deforestation.

Despite enforcement efforts, annual deforestation rates have remained at high levels in recent years. One of the main challenges environmental agencies and law enforcement face is the use of virtual timber credits to facilitate the illegal trade of forest products. This occurs because products of illicit origin, such as native timber logs, can be easily introduced into the formal market by inserting fictitious credits into official systems that regulate their trade.

These fraudulent credits generally originate from overestimated timber volumes in the forest inventories of technical projects approved by environmental agencies for legal logging in authorized areas. They are also sometimes generated from leftover material produced during the extraction and processing of logs at sawmills. This weakness in control systems, together with the ease with which fictitious credits can be traded, has contributed to the persistence of illegal logging in the Amazon, as it often conceals the illicit origin of harvested wood.

Environmental agencies address this issue through actions such as the identification of logging areas for on-site inspections — a high-risk task for public officials that is often ineffective in the long term, as offenders frequently return to the area once inspection teams have left. Another enforcement strategy involves inspections at sawmill yards, where authorities compare the volume of stored timber with the remaining credits recorded in official systems. However, this process is highly time-consuming, as it requires a detailed inventory assessment at each facility, making it unfeasible to inspect multiple sawmills quickly.

In this context, the present article outlines the methodology applied by the MATERIA project, developed to enhance enforcement and control mechanisms within the timber supply chain, with a focus on reducing the trade of fraudulent credits and, consequently, curbing illegal forest exploitation.

The MATERIA project was developed by the Public Prosecutor's Office of the State of Mato Grosso to detect and prevent the misuse of timber credits within the state. Its methodologies aim to strengthen monitoring and accountability mechanisms throughout the supply chain by reducing the availability of virtual credits and thus increasing the operational costs of illegal timber.

*"One of the main challenges environmental agencies and law enforcement face is the use of virtual timber credits to facilitate the illegal trade of forest products."*

The methods developed are based on analysing timber credit transactions within the state's official forest product control systems (Sisflora), correlating this data with information obtained through remote sensing and field inspections. The analysis uses near-real-time deforestation alerts generated by satellite sensors to monitor authorized logging areas while tracking the trade of virtual timber credits in the official control systems.

Two main approaches have been adopted to combat illegal logging:

1. **Preventive:** When the sale of virtual timber credits is identified without evidence of logging activity in the authorized area, an on-site inspection is conducted to confirm the absence of operations and to request the return of the remaining credit balance in the enterprise's account. This reduces the availability of fictitious credits in the market, which could otherwise be used to simulate the legality of unauthorized timber extraction.
2. **Punitive:** In addition to, or in place of, preventive measures, inspections are carried out at sawmills that have received suspicious virtual credits, to locate timber logs of illegal origin and hold the companies administratively, criminally, and civilly accountable.

In addition, all efforts have been shared with Public Prosecutors' Offices across Brazil and with environmental enforcement agencies at the state (SEMA-MT) and federal (Ibama) levels, to disseminate the methodology and promote its use in monitoring timber exploitation throughout the Amazon.

Implementing Project MATERIA has already led to the identification of numerous fraudulent practices within the timber supply chain. During one inspection, an overestimation of timber credits was identified in forest management plans, with a remaining balance of 14,510.8810 $m^3$ of native timber logs recorded in the system even after logging activities in the area had ended. In another case, credits were traded before any forest harvesting operations had begun. Complementary techniques, such as using LiDAR (Light Detection and Ranging) pulses to estimate vegetation height and compare it with forest inventory data, have also proven promising for detecting fraud.

Another approach involved selecting sawmills that had received suspicious timber credits, followed by inspections of their inventories. During traceability tests, proof of origin was required for logs without proper identification, leading to formal notifications to sawmill operators and the imposition of fines. These actions reinforce the importance of continuous monitoring and the implementation of preventive policies to prevent the legalization of illegally harvested timber.

The MATERIA Project has demonstrated the feasibility of effective tools for identifying and preventing the misuse of fictitious timber credits, enabling more targeted and efficient enforcement efforts. The correlation between remote sensing data indicating the presence of logging activity and the flow of timber credits within official control systems enabled the detection of various fraudulent schemes. Furthermore, disseminating the methodology among environmental and enforcement agencies is essential for its broader application and systematic implementation.

Given the challenges of illegal logging, environmental authorities must adopt innovative technologies and proactive inspection strategies. Continuing and refining the methodology applied through the MATERIA Project can significantly contribute to preserving the Amazon rainforest and strengthening public environmental control policies.

# 4. Diagnosis and Compliance in Gold Production in Brazil: The Experience of the Gold Transparency Portal

**Ariene Cerqueira**
*Public Policy Analyst at WWF - Brasil*

Approximately 94% of Brazil's mining areas, totaling over 100,000 hectares, are located in the Amazon region, with 86% dedicated to gold extraction. It is estimated that more than half of this area operates illegally, often within Indigenous territories and protected areas, without any form of environmental licensing. This scenario reflects the most intense period in the history of gold exploitation in the Amazon, driven by high metal demand and the search for financial security amid post-pandemic instability and international conflicts.

Currently, eleven Indigenous territories are directly affected by gold mining, with the most significant impact on lands belonging to the Kayapó, Munduruku, and Yanomami peoples. Additionally, 40% of illegal mining operations are located within protected areas, such as the Tapajós Environmental Protection Area (Área de Proteção Ambiental - APA) in the state of Pará.

The expansion of illegal mining causes severe environmental damage, including deforestation and river pollution. It is linked to human rights violations, such as mercury contamination, violence, sexual exploitation, and forced labor. It also poses a serious threat to local communities' health and the region's biodiversity.

It is important to note that even when gold extraction appears to comply with the law, structural weaknesses in the gold supply chain often enable practices that violate Brazilian law, creating opportunities for fraud and other illegal activities. Operational and logistical challenges faced by oversight and enforcement agencies further contribute to the persistence of this situation.

Gold extraction in Brazil is primarily carried out through Artisanal Mining Permits (Permissões de Lavra Garimpeira - PLG) and Mining Concessions. PLGs are granted by the National Mining Agency (ANM) and require environmental licensing, among other documents. However, this process faces several challenges, including slow administrative procedures, weak technical evaluations, and corruption, especially when licenses are issued by municipal governments — as is commonly the case in the state of Pará.

In response to this situation, WWF-Brazil, in collaboration with the University of São Paulo and the Igarapé Institute, created the Gold Transparency Portal (Portal da Transparência do Ouro - PTO),[11] a tool designed to consolidate relevant public data to assess the level of compliance of gold mining activities with Brazilian legislation. The goal is to centralize scattered information and promote greater transparency across the country's gold extraction and trade chain. The initiative is the result of a long-term research and cooperation process involving several public agencies, including the Federal Prosecution Office (MPF), the ANM, and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).

The platform was developed based on a detailed understanding of the gold supply chain, from financing and inputs used to the extraction phase itself. Although officially launched in June 2023, its development and refinement have been underway since at least 2020.

11 Portal da Transparência do Ouro

The platform's main innovation lies in its ability to cross-reference data from multiple sources, integrating this information with high-resolution satellite imagery and a 12-month history. This significantly enhances both analysis and monitoring. Since the data used is drawn from official public databases, the platform guarantees open access, allowing users to monitor operational compliance with credibility. It is primarily geared toward the public sector, helping to optimize human and financial resources in the fight against illegality in the gold supply chain.

This intersection of information makes it possible to assess the legality of operations by verifying whether extraction occurs in authorized areas and whether it is properly registered with both the ANM and the relevant environmental authorities. The system also evaluates environmental licensing, the submission of Annual Mining Reports (Relatórios Anuais de Lavra - RAL), and the payment of the Financial Compensation for the Exploitation of Mineral Resources (Compensação Financeira pela Exploração de Recursos Minerais - CFEM). Data from the Brazilian Institute of Environment and Renewable Natural Resources (Ibama) are also incorporated, enabling a more comprehensive analysis.

According to data from the ANM Portal (June 2024), out of 41,465 cases under review, only 1,943 had valid titles, and just 185 were formally in compliance with legal requirements. Nevertheless, 2,431 Annual Mining Reports were submitted, but only 527 cases made CFEM payments — the tax collected on gold production. This scenario highlights the importance of the tool, not only for increasing transparency in the sector and supporting the development and implementation of public policies, but also for strengthening the work of justice system institutions in addressing illegalities and irregularities.

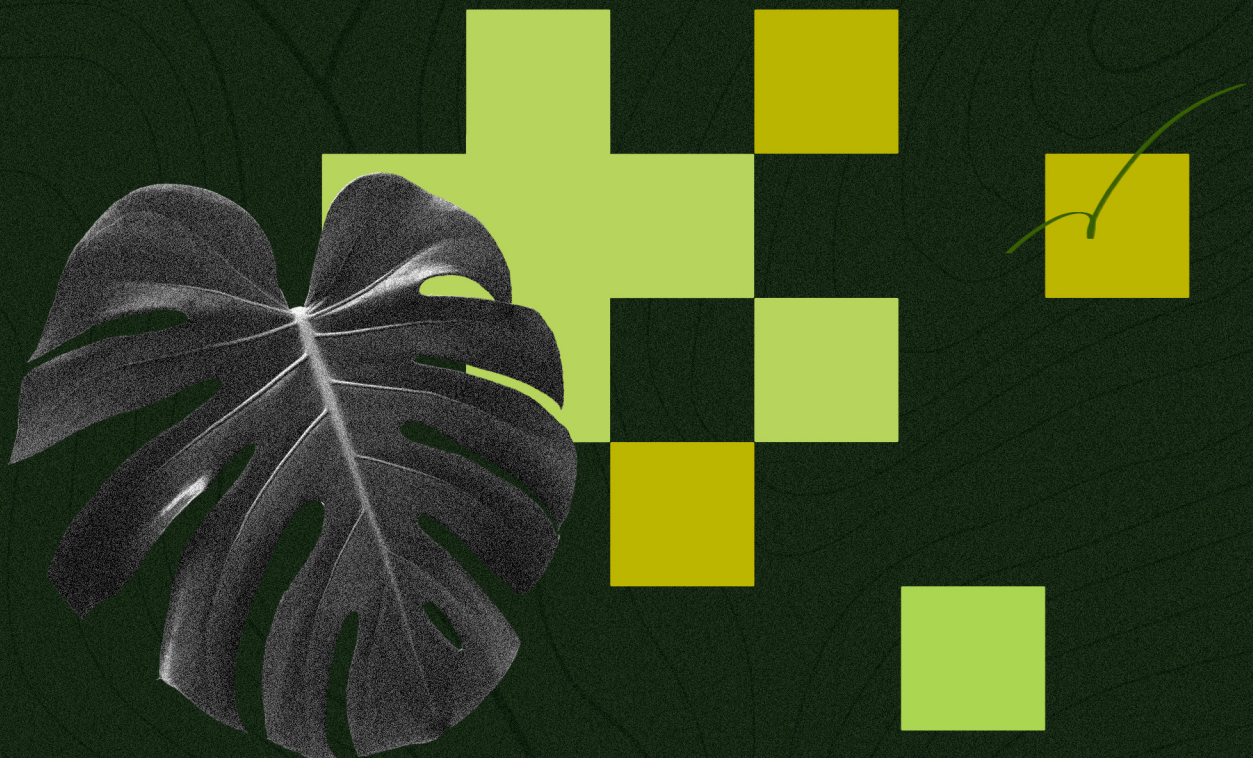
Based on the PTO's analyses, a series of recommendations has been developed, including strengthening ANM's institutional capacity to enable more effective oversight, improving control mechanisms over gold production, and adopting measures to prevent fraud and money laundering in the sector. The need for stricter environmental licensing procedures and greater transparency in administrative processes was also emphasized.

The platform plans to expand its capabilities by automating analysis using artificial intelligence, integrating data on gold commercialization, and developing customized modules for oversight agencies. These advancements aim to strengthen the fight against environmental and economic crimes throughout the gold supply chain in Brazil.

*"The platform's main innovation lies in its ability to cross-reference data from multiple sources, integrating this information with high-resolution satellite imagery and a 12-month history."*

# 5. Lessons for the Protection of the Amazon: Collective Action, Technology, and Knowledge

**Ana Carolina Haliuc Bragança**
*Federal Prosecutor, Federal Prosecution Service (MPF - Brazil)*



The vastness of the Amazon is matched only by the magnitude of the challenge of protecting it. On the one hand, there is no doubt about the importance of forests globally, particularly in preserving climate stability and sociobiodiversity. On the other hand, the institutional capacities required for their conservation often appear to exceed those available to the national governments that share their territory. The Amazon is a monumental region marked by a limited state presence across all dimensions, both in law enforcement and in the promotion of social welfare, while the incidence of environmental crimes and related offenses continues to rise, including corruption, violence against traditional and Indigenous populations, fraud, and asset laundering.

The exchange of experiences between states and civil society on innovative tools and mechanisms to combat this ecosystem of environmental crime in the Amazon[12] represents a crucial step toward more effective biome protection. This momentum was evident during the Third Regional Meeting, hosted by the Igarapé Institute under the theme "Strategies for Confronting Environmental Asset Laundering and Associated Financial Flows."

At the event, I had the opportunity to moderate the panel "Double Laundering: Environmental Crimes and Related Offenses as a Regional Threat in Latin America, and Techniques for Detecting Environmental Asset Laundering Risks," where several tools were presented by different actors, all aimed at strengthening efforts to combat criminal chains linked to illegal logging and gold mining in the Amazon.

In the area of forest protection, the Environmental Investigation Agency (EIA), active in Peru, shared its Amazon Timber Legality Algorithm (Alma) with the group, while the Public Prosecutor's Office of the State of Mato Grosso, in Brazil, presented the MATERIA Project. WWF-Brazil, in turn, presented the experience of the Gold Transparency Portal, designed to tackle illegal mining. GAFILAT emphasized the prevalence of environmental crimes as a consolidated threat across Latin America, highlighting the institutional cooperation mechanisms it promotes throughout the region.

Details on these initiatives are included in specific articles throughout this volume. As the panel moderator, I would like to draw attention to what these tools, when analyzed collectively and structurally, point to: concrete pathways for strengthening strategies to confront the ecosystem of environmental crimes in the Amazon.

First, I emphasize the diversity of actors involved in developing these tools. Alma was the result of a joint effort by three civil society organizations active in Peru: Proética, the Environmental Investigation Agency, and the International Center for Environmental Law. WWF-Brazil developed the Gold Transparency Platform in collaboration with the University of São Paulo and the Igarapé Institute. The MATERIA Project was launched by the Public Prosecutor's Office of the State of Mato Grosso, while GAFILAT, through its cooperation mechanisms, constitutes a collective effort by state actors.

The coordination among governments and civil society, and among states themselves, with academic institutions involved in both cases, reinforces the understanding that protecting the Amazon is not the exclusive responsibility of public authorities but a shared duty of the entire collective. It is a collective effort that yields significant gains in the efficiency of preserving the biome.

12 Waisbich, Laura Trajber *et al.* (2022). The ecosystem of environmental crime in the Amazon: an analysis of illicit rainforest economies in Brazil. Rio de Janeiro: Instituto Igarapé. p.3.

This perspective aligns with the concept of the right to an ecologically balanced environment as a third-generation right grounded in solidarity. Rights of this nature are characterized by the fact that their realization depends not only on state action but also on the conduct of private actors. It is no coincidence that the Brazilian Constitution, when establishing the right to an ecologically balanced environment, assigns both the government and society at large the duty to defend and preserve it for the benefit of present and future generations.[13] Thus, when civil society collaborates in the development of tools to protect the Amazon, it embraces this spirit of solidarity and contributes to the realization of the right to an ecologically balanced environment — or, in the terminology of the Inter-American Human Rights System, the right to a healthy environment, applicable to all countries of the Amazon Basin.[14]

Within this same context, it is essential to note that the intended users of the tools presented are diverse: in some cases, governments; in others, economic actors, civil society, academia, or some combination thereof. Alma and, in particular, the Gold Transparency Platform enable economic actors, buyers of environmental assets such as timber and gold, to assess the risks of illegality in their supply chains.

The technological solutions proposed offer a practical rebuttal to arguments historically advanced by market agents who claimed not to be responsible for monitoring environmental violations or, even when acknowledging some degree of responsibility, argued that they lacked the tools to do so, believing that such mechanisms fell exclusively within the remit of the state's police powers. While such arguments are not legally tenable, given the collective nature of environmental protection duties, they no longer hold up operationally since risk assessment tools are now readily available.

Moreover, tools such as Alma and the Gold Transparency Platform raise the standards of due diligence required of economic actors by providing accessible, robust analyses of illegality risks. This generates significant legal effects, as these tools heighten the scrutiny the state expects of companies purchasing timber and gold, given the existence of effective mechanisms for identifying risk, all without prejudice to the ongoing and necessary refinement of techniques for detecting illegality.

Beyond the legal and operational strengthening of environmental protection duties imposed on both governments and private actors, I would like to highlight a second shared dimension across all the tools presented at the Regional Meeting: the vital role of technology and innovation in protecting the Amazon. In the projects discussed, governments and civil society worked with the production and analysis of diverse datasets, most notably in the MATERIA Project and the Gold Transparency Platform, through automated analysis of satellite imagery.

As a rule, environmental crimes occur within specific geographic areas and typically involve unauthorized forms of natural resource exploitation activities that, under appropriate legal frameworks, could otherwise be conducted lawfully. This means that, on the one hand, satellite images serve as a valuable tool for identifying what is — or is not — happening on the ground; and, on the other hand, official data on legally authorized production provide a rich source for assessing, for instance, the productive capacity of specific regions.

This innovative combination of data processing and imaging technologies serves the needs of both public and private actors. For public authorities, it helps guide preventive and enforcement efforts, optimizing the allocation of public resources by focusing on enterprises

13 Constitution of the Federative Republic of Brazil (1988). Art. 225, *caput*.

14 Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador – 1988). Article 11.

and activities most likely to involve illegality. For private actors, it supports more informed decision-making regarding the purchase of environmental inputs, in line with the heightened duty of due diligence.

Still, it is crucial to recognize that developing innovative techniques for assessing illegality risks is only feasible when grounded in the availability of relevant data for analysis. This underscores the essential role of environmental data transparency, in all its various forms, in fostering innovation, whether driven by private or public actors.

In its Advisory Opinion No. 23/2017, the Inter-American Court of Human Rights affirmed the State's obligation to ensure the broadest possible access to environmental information, as part of its duty to respect and guarantee the rights to life and personal integrity in the context of environmental harm.[15] Considering that the preservation of the Amazon is a fundamental condition for global climate stability, and thus essential to maintaining dignified climatic conditions for all populations, all environmental data on both legal and illegal exploitation must be made publicly accessible. This includes infraction notices, inspection reports, production reports, environmental tax records, and forest and mineral inventories, among others.

In addition, technology plays an essential role in strengthening interstate cooperation in combating environmental offenses. As GAFILAT has demonstrated, it enables the development of rapid response networks for requests related to international legal cooperation and mutual legal assistance. Technology and innovation also enhance the efficient dissemination of accumulated knowledge on combating environmental crimes through virtual seminars and training sessions, as well as the distribution of manuals, operational protocols, and other relevant materials for cooperating states.

A final point that deserves emphasis across all the projects presented is the shared understanding that effectively combating money laundering linked to environmental crimes requires a deep grasp of how these crimes operate in practice.

As previously noted, environmental offenses typically involve the unauthorized exploitation of natural resources — activities that, if conducted under the appropriate legal framework, could otherwise be lawful. In this context, criminal actors seek not only to conceal the illicit origin of financial proceeds but also to disguise the unlawful origin of environmental assets. For example, illegally harvested timber is made to appear legal, or gold extracted illegally is presented as having a legitimate provenance.

*"Considering that the preservation of the Amazon is a fundamental condition for global climate stability, and thus essential to maintaining dignified climatic conditions for all populations, all environmental data on both legal and illegal exploitation must be made publicly accessible."*

15 Inter-American Court of Human Rights (2017). Advisory Opinion OC-23/17: Environment and Human Rights. p. 85all environmental data on both legal and illegal exploitation must be.

For government officials engaged in anti-money laundering efforts, this scenario imposes the burden of distinguishing licit environmental assets from those stemming from criminal practices. This separation cannot be achieved efficiently without a thorough understanding of the legal frameworks that confer legitimacy on natural resource exploitation activities.

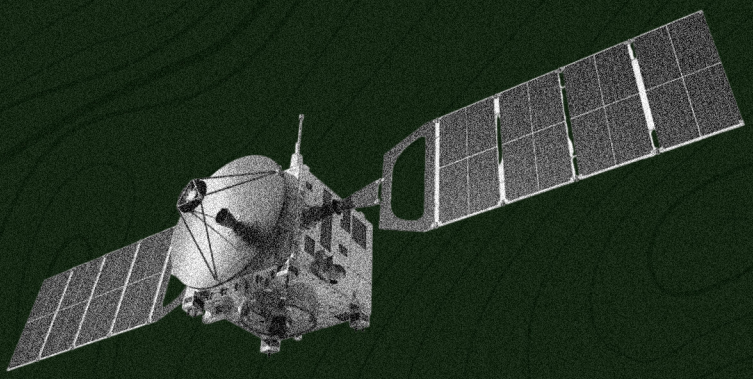
All of the projects presented — the Gold Transparency Platform, Alma, and the MATERIA Project — are grounded in this understanding. They invest in mechanisms to detect risks of illegality tied to the fraudulent concealment of the illicit origin of environmental assets. Moreover, they promote the production and sharing of knowledge among GAFILAT member countries, helping overcome the difficulties individual states may face in assessing the legality of environmental assets originating in other jurisdictions and circulating within their territories.

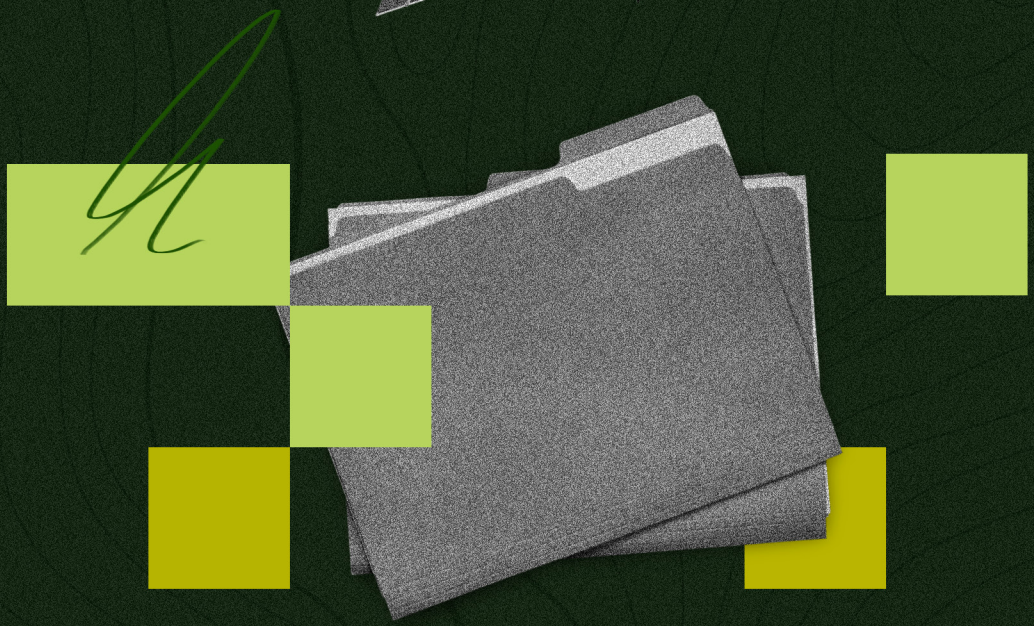
In conclusion, despite the challenges outlined at the beginning of this text, states and civil society are not standing still. They are acting together, across multiple fronts, to confront environmental crime and related offenses in the Amazon in innovative, technology-driven ways, always grounded in a deep understanding of how traditional criminal typologies operate in this region.

This is a broad alliance focused on building institutional capacity for the governance and protection of the biome. It must be continually strengthened by incorporating new actors, especially from the private sector, developing and sharing new tools, and improving those already in place. It is up to those already committed, whether public entities or civil society organizations, to broaden and strengthen this alliance, fulfilling the collective duty to protect the environment through concrete and effective action.

# 6. Project DELPHOS: A Perspective on Integration, Proactivity, and Investigative Operations

**Felippe Pires Ferreira**
*Forensic Expert, Brazilian Federal Police*





The DELPHOS Project was conceived to consolidate the Federal Police's internal and external databases, enhancing the agency's capacity for criminal investigations and forensic examinations. Developed internally by the Forensic Department within the Federal Police's Technical-Scientific Directorate in 2020, the project aims to systematize and store information, ensuring that data currently being produced is not discarded but instead reused in future investigations and forensic analyses.

The project is based on three core principles. The first involves building and structuring knowledge bases that store, process, and utilize all data generated from forensic examinations and investigations in future cases. This is the essence of the project: transforming institutional records into strategic assets for new operations. The second pillar is data integration, which promotes cross-referencing of internally produced information across various sectors of the Federal Police with data from other agencies, primarily through cooperation agreements.

This approach strengthens integrated analysis, increases the value of the data generated, and prevents the isolated use of information, thereby expanding the potential for generating meaningful insights for investigations and police work. The third principle is the pursuit of greater proactivity in data analysis, enabling the tool to anticipate user needs through automated alerts, reducing the time spent on manual searches, and optimizing the work of the professionals involved.

The project's initial phase focused on cataloging gold samples seized by the Federal Police, with the potential to expand to other minerals. Since then, the DELPHOS Project has been evolving continuously, incorporating new functionalities and broadening its knowledge base. In 2021, the Gold Profile Database (BANPA) was created — a repository of gold samples collected from various regions across Brazil. The goal of Banpa is to enable comparison of suspicious samples with those registered in the database, generating a probabilistic index indicating the material's likely origins. This supports investigations on environmental and financial crimes associated with illegal gold mining.

Also in 2021, the Federal Police joined the Brazil MAIS Program, an initiative by the Brazilian government. This marked a milestone for the institution, as satellite data made available through the program enabled a more preventive policing approach in areas suspected of environmental violations. Previously, detecting such crimes could take years, compromising the collection of evidence and the identification of those responsible. With real-time access to satellite imagery, it is now possible to monitor activities such as the construction of clandestine airstrips and the progression of deforestation, enabling public authorities to respond faster and more effectively.

In 2022, the project made progress in developing tools to detect crimes related to illegal mining. A dedicated module was created to integrate databases from various environmental agencies, enabling the cross-referencing of information and identifying individuals and companies presenting inconsistencies or anomalies in their disclosures. To maintain system efficiency and produce more accurate alerts, DELPHOS automates data collection and analysis processes, ensuring that information remains constantly up to date for forensic experts and investigators.

One of the project's distinguishing features is its ability to work with both structured and unstructured data. In the case of cross-referencing information on mining activities, DELPHOS uses data from the National Mining Agency (ANM), the Federal Revenue Service, the Central Bank, the National Foundation for Indigenous Peoples (Funai), the National Institute for Colonization and Agrarian Reform (Incra), the Federal Police, and other agencies, combining this information with satellite imagery. This approach enables the identification of patterns and anomalies, particularly in mining areas. The methodology has proven effective, for example, in detecting inconsistencies between the volumes of gold reported and the actual

conditions of the extraction sites. In some cases, miners declared high production levels, but satellite images showed little to no human-induced changes at the site, suggesting possible fraud in the declarations. Another example involves comparing productivity among mining dredges: when one dredge performs significantly above the regional average, it may indicate irregularities in the reported extraction activities.

The DELPHOS Project makes various tools available to users, with an ongoing focus on identifying anomalies and inconsistencies in environmental database records. One such tool uses visual resources, such as heat maps, to display alerts in areas under state protection. This functionality enables the detection of deforestation and the construction of clandestine airstrips within Conservation Units, Indigenous Territories, Quilombola[16] Areas, or Settlements. In addition to simplifying data interpretation, this functionality enables managers to allocate resources more precisely to combat environmental crime, enhancing the effectiveness of law enforcement operations conducted by public agencies.

A strategic source of information for detecting anomalies is the dataset related to the Financial Compensation for Mineral Exploration (CFEM). These data enable comparative statistical analyses across entities within the same region to determine whether reported productivity levels follow consistent patterns or exhibit significant variations that may suggest fraud.

Another critical aspect of the project is the data that goes beyond environmental indicators. By applying data cross-referencing methods that link mining processes with information on individuals and legal entities, it becomes possible to identify connections between miners and political actors that are otherwise obscured by campaign donations or family ties. A methodology was developed to support this effort by assigning an irregularity risk index to each operator or legal entity, providing law enforcement with a strategic tool to prioritize investigations and allocate resources more efficiently in the fight against such offenses.

Mineral extraction in the Amazon remains a recurring issue, driven by the high profitability of illegal mining that inflicts severe environmental and economic damage across the region. Although legal mechanisms such as the Artisanal Mining Permits (PLGs) aim to regulate the responsible exploitation of mineral resources, gold extraction levels exceeding authorized limits have been reported in some areas, suggesting possible irregularities and violations of existing legislation.

A prominent case involving the DELPHOS Project occurred in the Tapajós region, where large-scale illegal gold extraction was uncovered. The investigation was based on the analysis of structured data from official regulatory and oversight bodies, cross-referencing information on mineral production, CFEM declarations, and commercial transaction records. In addition, data on rural properties and interinstitutional cooperation agreements were included, enabling a detailed assessment of the operations and the individuals involved.

In the case under investigation, an experimental mining operation authorized to extract only a small, fixed amount of gold became one of the country's largest producers. Data analyzed by the DELPHOS Project revealed that the PLG in question reported the sale of 787 kilograms of gold in 2020 — already a significant amount for an experimental operation. In 2021, that volume jumped to 3,167 kilograms, far exceeding the 50 kilograms of ore per year allowed by its usage permit.
Another alarming figure was the gold content per ton of ore: 63 grams, compared with the global average of under 10 grams per ton. This indicator

16 Quilombola area is a territory legaly recognized by the Brazilian government as lands traditionally occupied by Afro-Brazilian communities descended from formerly enslaved people who established autonomous settlements (quilombos) as a form of resistance.

reinforces the hypothesis that part of the declared gold originated in other regions, contributing to the laundering of illegally extracted ore.

Cross-referencing data revealed inconsistencies in the information reported to CFEM, providing strong indications of fraud. The DELPHOS tool also enabled the identification of recurring patterns of irregular extraction, including changes observed in satellite imagery and the movement of large volumes of material outside the authorized boundaries of the permitted area.

Another key aspect of the investigation was mapping the commercial relationships tied to the sale of the gold. One of the main buyers identified was a clinical analysis laboratory that acquired 345 kilograms of gold despite lacking the operational infrastructure to handle such a volume. Official records indicated that the company had no registered employees, owned no vehicles, and that its legal representative possessed only three registered assets. Moreover, there was no record of any Central Bank authorization allowing the laboratory to purchase gold from PLG sources.

This case highlights the importance of innovative solutions in forensic and investigative work. By integrating structured data, it was possible to conduct a focused and thorough analysis of the case, directly supporting police operations. In this context, the development of a knowledge base, data integration, and the ability to generate automated alerts — the foundational pillars of the DELPHOS Project — have proven critical in combating and preventing environmental crimes.

The project represents a significant step in modernizing the Federal Police's operational capabilities, particularly by integrating satellite imagery and data analysis technologies with investigative methodologies. This combination has accelerated the identification of inconsistencies and enabled security forces to act proactively, thereby increasing efficiency and effectiveness in combating environmental offenses. The speed of decision-making and enforcement responses makes a decisive difference in preventing environmental damage and mitigating its devastating effects. In a country as vast as Brazil, tools like DELPHOS are not just desirable — they are essential for confronting the challenges of modern crime.

The evolution of the DELPHOS Project demonstrates the positive impact of technology on criminal investigations and forensic work. By automating data collection and analysis, the Federal Police has been able to operate more efficiently, proactively, and strategically, reducing environmental damage and strengthening enforcement against crimes targeting public assets.

The project continues to expand, with new modules under development to enhance its integrative capacity and deepen data analysis. Upcoming phases include monitoring other minerals, incorporating new data sources, and building algorithms to detect anomalies. There is a broad consensus that intelligent data management is essential for addressing crime and preserving the environment. This underscores the project's importance to the Federal Police and highlights how technology can transform public security and protect Brazil's natural resources.

*"The project DELPHOS represents a significant step in modernizing the Federal Police's operational capabilities, particularly by integrating satellite imagery and data analysis technologies with investigative methodologies."*

# 7. CROTALUS System: An Initiative to Combat Deforestation

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**Daniel Moraes de Freitas**
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**Rodrigo Antonio de Souza**
*Environmental Analyst and Head of the Environmental Information Analysis and Production Service, Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA)*

The preservation of the Amazon Rainforest is one of the greatest environmental challenges faced not only by Brazil but by the entire world. Covering approximately 5.5 million square kilometers, the Brazilian Amazon represents about 60% of South America's total tropical rainforest. It is home to more than three million species, and its biodiversity and water resources are of immeasurable value. Combating deforestation in this region is essential to preserving this unique natural heritage.

In response to growing deforestation, the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama) developed the CROTALUS System, an automated mechanism for receiving, prioritizing, and sharing deforestation alerts. The system was created to increase the effectiveness of enforcement actions in response to the growing number of alerts issued annually by the Real-Time Deforestation Detection System (DETER), operated by the National Institute for Space Research (INPE). Between 1990 and 2020, the Amazon lost approximately 410,000 square kilometers of forest cover, highlighting the urgency of adopting more efficient monitoring and intervention mechanisms.

CROTALUS uses a multi-criteria analysis approach to prioritize deforestation alerts. Three key variables were defined to guide enforcement actions: accessibility (the ease of reaching the deforested area, considering roads, rivers, and geographic conditions), growth potential (the likelihood that deforestation will rapidly expand if not addressed), and flagrancy potential (the probability of intercepting offenders in action). These variables were developed in collaboration with Ibama's enforcement and monitoring experts, ensuring a statistically robust model adapted to operational realities.

Data processing is fully automated and conducted by Ibama's National Center for Environmental Monitoring and Information (Cenima) through algorithms executed daily on virtual machines. The results are made available via the Geospatial Environmental Information Analysis and Monitoring Platform (Pamgia), allowing enforcement agents to quickly and efficiently access the data. In addition, the data feed into a field application, which provides inspectors with detailed information on each alert, including maps with tools for recording observations and uploading images captured in real time.

Another distinctive feature of the system is its ability to predict high-risk deforestation areas using artificial intelligence and machine learning techniques. Based on socioeconomic data, historical enforcement records, and recent deforestation events, CROTALUS estimates areas at high risk of deforestation over 15 days. Analyses indicate that nine out of ten new alerts occur in regions previously flagged by the model as extremely high-risk, underscoring its effectiveness as a predictive tool for deforestation prevention.

*"CROTALUS System uses a multi-criteria analysis approach to prioritize deforestation alerts. Three key variables were defined to guide enforcement actions: accessibility, growth potential, and flagrancy potential."*

Since its implementation, CROTALUS has demonstrated a significant impact on Ibama's environmental enforcement strategies by leveraging innovative tools to support deforestation control efforts. The system was institutionalized through an internal administrative resolution issued by Ibama, thereby formalizing its role in enforcement planning. The initiative was also a finalist for the 27th Public Service Innovation Award in the Environmental category, a recognition of the work of public servants who develop and enhance technological solutions to protect the Amazon. In addition, the system was invited to be presented in a technical session at the International Forestry Congress of the International Union of Forest Research Organizations (IUFRO), one of the most prestigious events in the global forestry sector.

The results achieved by CROTALUS highlight its strategic role in optimizing environmental enforcement resources. By integrating diverse data sources and enabling more effective management of deforestation control actions, the system contributes to evidence-based decision-making and enhances operational efficiency. The predictability of actions, more rational allocation of financial and human resources, and reduced response times are just some of the benefits this technology has brought about.

The name CROTALUS was not chosen at random. It refers to the scientific genus of the rattlesnake, a species known for its precision and speed when striking. Like the rattlesnake, the system was designed to deliver swift, accurate, and effective interventions against deforestation, a true precision strike against illegal environmental degradation. The initiative has already gone beyond the Amazon region, with expansion underway into the Cerrado biome, demonstrating its potential to support environmental protection in diverse regions of the country. CROTALUS represents a major advancement in Brazil's environmental management, standing out as an essential tool in the fight against illegal deforestation.

# 8. Risk Analysis and Illegal Timber Identification: UNODC Approaches in Brazil

**Alexander Walsh**
*Coordinator of the Environmental Crime Prevention Unit at the United Nations Office on Drugs and Crime (UNODC-Brazil)*

Illegal logging represents a significant global challenge, with severe impacts on biodiversity and the economy. It demands coordinated efforts for prevention and for confronting organized crime. The United Nations Office on Drugs and Crime (UNODC) plays a vital role in building the capacity of authorities to conduct risk analysis and identify timber sourced from illegal logging, with a special focus on the Amazon region. This work is carried out through projects such as Strengthening the Criminal Justice Response to Forest Crimes (Crimflo) and Forest Crime and Illicit Timber Trade (Leap).

The United Nations Convention against Transnational Organized Crime (UNTOC), together with various resolutions of the UN General Assembly and the Economic and Social Council, highlights the importance of Member States, in cooperation with UNODC, taking action to address environmental crimes and related offenses such as corruption and money laundering.

This brief article provides an overview of the UNODC initiatives in Brazil, covering enforcement strategies and technologies used to identify timber species, and emphasizing the importance of international cooperation to reduce deforestation and illegal timber trafficking.

As highlighted in several UNODC publications in recent years, such as the World Drug Report 2023 and the Global Analysis on Crimes that Affect the Environment, transnational organized crime has been expanding its operations to include environmental offenses, including the illegal timber trade. In recent years, there has been growing recognition of the relevance of these crimes within the global financial system, as noted by organizations such as the Financial Action Task Force of Latin America (GAFILAT) and through UNODC's own research.

In Brazil, the UNODC has been actively engaged in strengthening institutional capacity to address environmental crimes by providing technical training and promoting collaboration across different levels of government. The organization conducts its work in the country through research and technical assistance, focusing on institutional strengthening to combat environmental and financial crimes.

Its strategy includes implementing training programs for state-level authorities, based on the technical expertise of federal institutions in Brazil. These programs train professionals to address issues such as identifying illegal timber and curbing unregulated fishing, using traceability systems. The UNODC also offers courses on data georeferencing and satellite image analysis, tools that are essential for monitoring illicit activities in remote areas.

A technical assistance program focused on detecting illegal gold mining in the Amazon also stands out. The program includes support for developing gold traceability systems, as well as training courses in Criminal and Financial Investigation Analysis (Ciaf), conducted in partnership with the Federal Police, aimed at improving investigations into economic crimes linked to these illicit activities. These initiatives seek to integrate technology and institutional expertise, enhancing the State's capacity to combat criminal networks and ensure compliance with legal frameworks.

As a core component of timber monitoring, risk analysis is essential for identifying irregularities in timber trade operations. In partnership with the World Customs Organization (WCO), the UNODC has implemented the Container Control Program. The initiative uses document review tools to analyze trade patterns and detect anomalies, alerting ports around the world to suspicious shipments and potential cases of document fraud.

One of the program's outcomes is the Leap project, which provides technical assistance to reduce forest crime in tropical forests, particularly in Latin America and Southeast Asia. Elements found in timber transport documentation, such as weight discrepancies, inconsistent addresses of the parties involved, unusual values, and vague product descriptions, are considered risk indicators.

Customs documentation, including the bill of lading, certificates of origin, and environmental permits, is carefully analyzed to detect fraud and inconsistencies. Identifying unusual patterns in transport routes is also a critical factor in preventing the illegal timber trade.

In addition, the UNODC promotes the training of enforcement officers through tools such as anatomical reference guides, digital analysis applications, magnifying lenses, and imaging devices like ArborTron. The latter employs artificial intelligence to accurately identify timber species, thereby supporting field personnel.

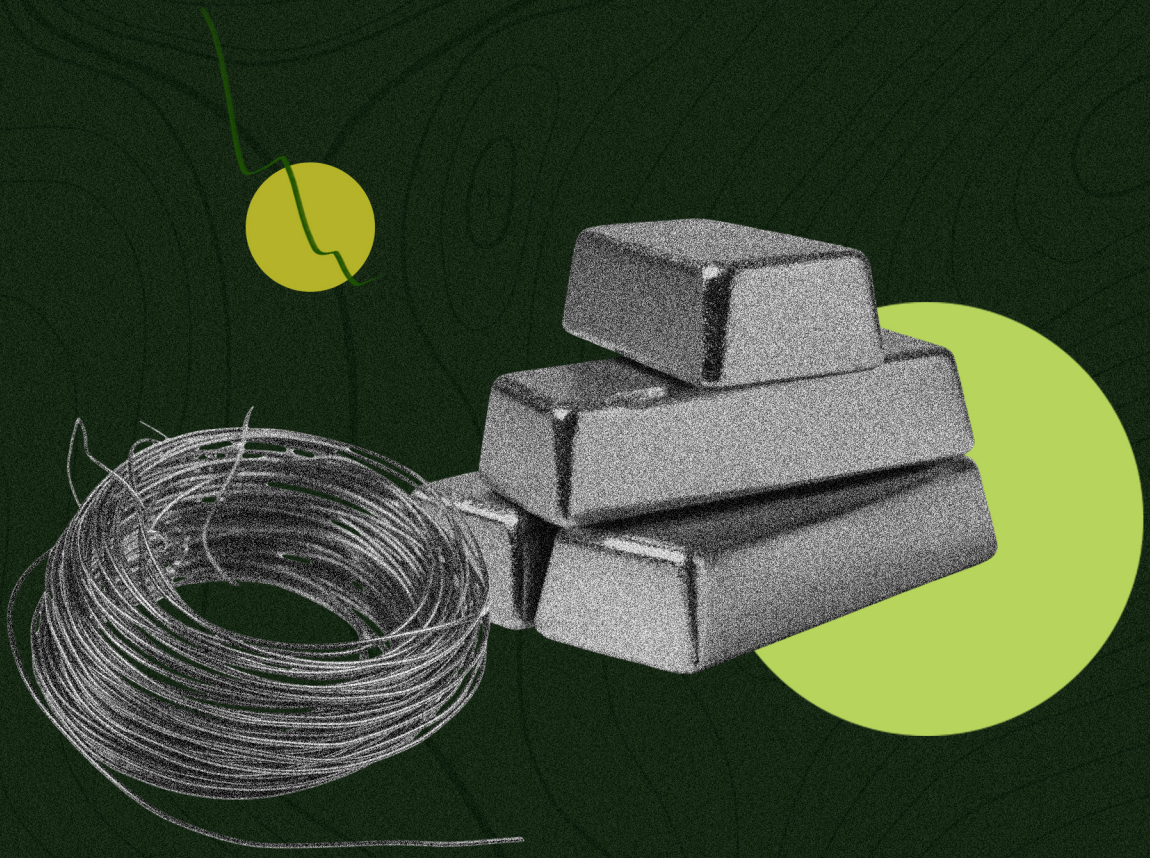
UNODC initiatives strengthen institutional capacity to combat environmental crimes by promoting the adoption of advanced monitoring and investigative techniques. Nevertheless, challenges persist, such as the complexity of illegal supply chains, the need for stronger interagency coordination, and the broader application of emerging technologies to identify illegal timber.

Recognizing that combating illegal timber trafficking requires a multifaceted approach, the UNODC maintains close dialogue with Member States and provides its expertise in integrating risk analysis, technology, and international cooperation. The organization continues to advance initiatives that have already shown significant progress in building institutional capacity and developing tools for identifying illegal timber.

*"Customs documentation, including the bill of lading, certificates of origin, and environmental permits, is carefully analyzed to detect fraud and inconsistencies. Identifying unusual patterns in transport routes is also a critical factor in preventing the illegal timber trade."*

# 9. Smuggling of Natural Resources and Customs Challenges in Chile

**Natalia Garay**
*Head of Customs Enforcement in San Antonio, Chile*



The smuggling of natural resources and mining byproducts presents a significant challenge for customs authorities, particularly in countries rich in minerals and forests. In Chile, timber, gold, and copper exports of illicit origin have demanded greater coordination among different enforcement agencies. This article examines emblematic smuggling cases, the difficulties in proving the illegality of goods, and the strategies adopted by Chilean Customs to address these practices.

The illegal trade of natural resources has become a growing concern for customs authorities in Chile. Although illegal mining is not widespread in the country, evidence indicates that resources such as gold are being extracted or smuggled from neighboring countries and illicitly exported. In copper's case, theft is often followed by export, frequently after the material has been transformed into other products such as ingots, shredded cables, scrap, or cathodes. The lack of proper documental traceability makes it difficult for maritime border enforcement to detect and prevent their shipment. Furthermore, timber theft and its subsequent commercialization, often linked to money laundering schemes, create significant obstacles to effective enforcement.

Chile is not a major producer of primary gold, but it does export the metal as a byproduct of copper mining. However, investigations have revealed that some of the gold exported from the country had a purity inconsistent with its national production capacity. In a landmark 2018 case, authorities uncovered a criminal network exporting gold bars with a 99.99% purity level, far higher than that typically achieved through domestic production. The investigation showed that the gold had been smuggled in from neighboring countries and passed through a document laundering scheme before being exported. The Customs Service identified potentially illicit gold through a risk analysis of declared values, invoices, and supporting documentation. The illicit origin of the gold was confirmed through investigative actions ordered by the Public Prosecutor's Office in coordination with police forces.

A second case, in 2021, demonstrated the continuation of this *modus operandi*, involving the use of shell companies to facilitate the export of gold of illicit origin. A legislative reform that reclassified "willfully false declarations", previously only a customs offense, as a predicate offense for money laundering (similar to smuggling) made it easier to seize assets and hold those involved accountable.

Another essential legal reform took place in 2023, with the redefinition of the legal concept of smuggling. Under the new definition, any goods whose export is prohibited due to their illicit origin — goods obtained or generated through a crime, whether in Chile or abroad — are now considered contraband. As a result, goods derived from illegal gold mining in neighboring countries, along with stolen copper cables and Chilean timber, are now classified as prohibited merchandise.

Chile is among the world's leading copper exporters, and the metal's high demand has fueled theft of copper cables and cathodes. Criminal networks use clandestine refineries to alter the material's form, making it more difficult to trace. In a recent case, 13 trucks loaded with copper cathodes were stolen, and the material was later exported as copper scrap. Current regulations require energy and telecommunications companies to disclose the origin of the material, but challenges in identifying provenance continue to hinder Customs' ability to seize these shipments.

While Chile does not have tropical forests like the Amazon, the theft of native timber in the country's south has become an increasing concern, especially in areas affected by territorial conflicts. This wood is often exported through Chilean ports using seemingly legitimate documentation. To address this issue, Customs, the Internal Revenue Service, the police, and the Public Prosecutor's Office have been working together to prove the illicit origin of the goods. A recent partnership with the National Forestry Corporation (Conaf), which provides access to a database of certified producers, has proven to be a valuable strategy to mitigate this type of crime.

The illicit export of copper and timber in Chile is being tackled through institutional coordination under the Organized Crime Policy, which has been in effect since 2022. The Chilean Customs Service has implemented several strategies to combat the smuggling of natural resources, including the monitoring and analysis of suspicious exports, the physical and chemical inspections of goods, cooperation with national and international institutions, and legal reforms that expand the authority to detain goods of illicit origin.

Despite progress, challenges remain, such as the difficulty of proving shipments' illicit origin, the need for more effective coordination with neighboring countries, and the modernization of joint inspection protocols.

Natural resource smuggling in Chile involves sophisticated criminal networks that are well-versed in legal and operational export requirements. These networks enable them to carry out their activities through document laundering, which is an indicator of asset laundering. Recent legal reforms and increased interagency collaboration have helped strengthen efforts to combat these practices. Nevertheless, improving control mechanisms and expanding international cooperation remain essential for a more effective response.

*"The Chilean Customs Service has implemented several strategies to combat the smuggling of natural resources, including the monitoring and analysis of suspicious exports, the physical and chemical inspections of goods, cooperation with national and international institutions, and legal reforms that expand the authority to detain goods of illicit origin."*

# 10. **Smart Traffic Control** and the Fight Against Tax Evasion in the State of Goiás

**Bruno Giancarlo Antoniazzi**
*Tax Auditor of the Secretariat of Economy of the State of Goiás*

This article outlines the evolution of tax control in the State of Goiás, focusing on the implementation of the Selective Smart Inspection (Fiscalização Inteligente Seletiva – FIS) system, which has revolutionized the fight against tax evasion and holds significant potential to support efforts in addressing environmental crimes. Adopting technologies such as Optical Character Recognition (OCR) for license plate reading, combined with practices like cross-referencing tax data and fostering interagency cooperation, has enabled more efficient and targeted inspections. These improvements have significantly increased the effectiveness of inspection actions by the Secretariat of Economy of the State of Goiás.

Historically, tax inspections in Brazil were conducted through fixed checkpoints, typically located along state borders. However, this method had several limitations, including route deviations to bypass inspection points, long queues of trucks waiting for clearance, and difficulties verifying the authenticity of tax documents.

In response to these challenges, the State of Goiás adopted a new approach based on the FIS system. This shift replaced the passive inspection model concentrated at fixed points with an active and mobile inspection model. Under this new format, Mobile Inspection Units operate across strategic regions. When the system triggers an alert, the team intercepts the target vehicle directly on the highway.

The Selective Smart Inspection system was designed to optimize highway inspections by applying smart selection criteria to identify suspicious vehicles, thereby significantly reducing random and ineffective stops. To achieve this, several advanced technologies were implemented, including:

- **Optical Character Recognition (OCR):** Cameras strategically installed on state and federal highways capture passing trucks and match vehicle license plates with their corresponding electronic tax documents.
- **Integrated Database:** Stores all vehicle passage records, allowing route tracking and identifying inconsistencies in tax documentation.
- **Mobile Application for Auditors:** Developed in-house by the Secretariat of Economy of Goiás, this application enables real-time inspections, even in areas without internet coverage, through satellite connection. Tax auditors receive alerts that guide the inspections of potentially suspicious vehicles.
- **Alert and Tax Intelligence System:** Detects suspicious tax evasion and fraud patterns through data cross-referencing, automatically dispatching field inspection teams. Currently, the system operates with three alerts: by taxpayer, by license plate, and by structured fraud operations, such as transporting goods by shell companies registered under third-party names (commonly known as “strawmen”).

Implementing FIS has led to a substantial increase in inspection efficiency: the infraction rate rose from 1% to approximately 30%. Additionally, data cross-referencing enabled the identification of tax evasion schemes involving shell companies, many of which were registered under individuals receiving government assistance, and the seizure of goods without proof of origin.

Another significant milestone was the cooperation agreement signed between the Goiás Tax Authority and the State Secretariat for the Environment (SEMAD), granting access to vehicle passage records captured by FIS. This integration has enabled the seizure of illegal timber and mineral shipments, directly contributing to environmental protection. Furthermore, the system facilitated the seizure of entire stockpiles of goods owned by non-compliant producers and the referral of cases to the Public Prosecutor's Office, particularly those involving criminal schemes with shell companies.

Despite these advances, the system still faces challenges, such as expanding the OCR network's coverage, strengthening the field auditing team, and enhancing data cross-referencing mechanisms. Signing new cooperation agreements with federal and state agencies is essential to improve the effectiveness of inspection and intensify the fight against tax evasion on a national scale.

The implementation experience of FIS demonstrates that, although initially designed to combat tax evasion, the system can generate positive impacts in other areas, especially in addressing money laundering involving environmental assets. This innovative initiative should be supported and replicated by different public institutions.

*"Another significant milestone was the cooperation agreement signed between the Goiás Tax Authority and the State Secretariat for the Environment (SEMAD), granting access to vehicle passage records captured by FIS. This integration has enabled the seizure of illegal timber and mineral shipments, directly contributing to environmental protection."*

# 11. The Role of the Financial System in Preventing Environmental Crimes

**Daniel Rico**
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**Paula González-González**
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In the fight against environmental crimes, the financial system plays a crucial, though often underestimated, role. While banks are neither investigative agencies nor judicial authorities, they are well-positioned to detect patterns of suspicious transactions and issue alerts on activities related to environmental crimes, such as illegal mining and deforestation. However, the absence of adequate data, efficient analytical methodologies, and clear regulations limits their ability to act effectively.

This article explores the challenges faced by banks in detecting illicit activities, highlights the need to strengthen financial monitoring mechanisms, and presents two case studies illustrating how the financial system can play a more active role in preventing environmental crimes: the Melka Group case and the gold trade in Colombia.

One of the main challenges financial institutions face in identifying environmental crimes is distinguishing between legal and illegal activities within the same supply chain. Unlike drug trafficking, where every stage of production and distribution is illegal, sectors such as mining and agriculture include both formal, legal links as well as segments where criminal activities infiltrate.

Geography is also a critical factor. Many illegal activities occur in remote areas where cash transactions are predominant, making financial tracking much more difficult. Additionally, traditional methodologies based on general financial crime typologies often prove insufficient. Instead, analyzing specific cases could provide banks with more effective tools for identifying suspicious patterns.

To overcome these challenges, banks can implement artificial intelligence and big data technologies to analyze transactions and detect irregularities. Likewise, cooperation with government agencies and international databases would facilitate access to critical information needed to identify illicit activities.

## Case 1: Melka Group and Deforestation Financing

A revealing example of the link between the financial system and environmental crimes is the case of the Melka Group in Peru. An American citizen established an investment fund in the country and, through corruption and the issuance of falsified environmental certificates, secured bank financing for a palm oil plantation. This project led to the deforestation of approximately 11,000 hectares of virgin forest, causing devastating ecological impacts.

Despite the scale of the disaster, the project was financed by international banks, including Scotiabank. The bank's defense was that all submitted documentation was legally compliant. However, no on-site verification was ever conducted to assess the project's actual impact.

This case underscores the need for banks to complement document-based reviews with environmental impact assessments and stronger due diligence procedures in high-risk sectors. It is essential for financial institutions to:

- **Incorporate advanced technologies and independent audits:** To rigorously assess the environmental and social impacts of the projects they finance.
- **Promote inter-institutional collaboration:** Cooperation among the financial sector, regulatory authorities, and research organizations is essential to close gaps in oversight mechanisms.
- **Strengthen financial controls:** Adopting a proactive approach prevents the financial system from becoming a vehicle for funding activities that threaten ecosystems and communities.

Only through these mechanisms will it be possible to build a robust and effective framework to prevent the financing of activities that harm the environment, thereby protecting both natural resources and the rights of affected communities.

## Case 2: Gold Commercialization in Colombia

The gold market in Colombia illustrates another challenge at the intersection of environmental crime and the financial system. One of the most significant issues is the inability to trace the origin of gold. Regardless of its source, gold can be legalized relatively easily once it enters the commercial supply chain.

An analysis of export data revealed alarming patterns. For instance, numerous individuals were found to be exporting gold worth millions of dollars, indicating potential money laundering schemes. In addition, discrepancies between the values declared in Colombia and those reported by destination countries suggest possible cases of smuggling and underreporting.

Another noteworthy finding is the proliferation of companies exporting gold under categories that do not align with their core business activities, such as used jewelry, gold dust, or electronic components. These practices complicate market oversight and allow illegally mined gold to be laundered through legal channels.

To improve the ability to detect suspicious operations, banks can use international trade databases such as Panjiva or ImportGenius, which allow for the analysis of import and export records to identify discrepancies between countries of origin and destination. Additionally, blockchain technology could offer an immutable record of the gold's provenance, facilitating traceability and reducing the risk of money laundering.

The financial system is responsible for preventing environmental crimes, but it faces significant challenges. The lack of reliable data, fragmented information, and the widespread use of cash in illicit activities hinder the detection of suspicious patterns.

The cases of the Melka Group and gold commercialization in Colombia show that banks can adopt a more proactive role. This requires an approach beyond simple document verification, incorporating advanced technologies, independent audits, and inter-institutional collaboration to strengthen financial controls.

Cooperation between the financial sector, regulatory authorities, and research organizations is essential to close oversight gaps and prevent the economic system from being used to facilitate environmental crimes. Only then will it be possible to build a more effective framework to avoid the financing of activities that threaten our ecosystems and communities.

*"To improve the ability to detect suspicious operations, banks can use international trade databases such as Panjiva or ImportGenius, which allow for the analysis of import and export records to identify discrepancies between countries of origin and destination."*

# 12. Illicit Practices in the Fuel Sector: Strategies for Prevention and Control

**Emerson Kapaz**
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The fuel sector plays a significant role in Brazil's economy, both for its importance as an energy supplier and for its substantial contribution to tax revenue. However, the sector faces persistent structural challenges, including tax evasion, fiscal fraud, and criminal operations, that undermine fair competition and directly affect public finances. The Legal Fuel Institute (ICL) has emerged as one of the leading organizations promoting transparency and combating illegal practices within the sector.

Historically, the debate on competitive ethics in high-tax sectors such as fuels, beer, tobacco, and soft drinks dates back to the founding of the Brazilian Institute for Competitive Ethics (ETCO) in 2003. ETCO was created to address the harmful effects of tax evasion and product adulteration, practices that generate severe market distortions. However, consumer perception remains a challenge. Frequently, consumers are drawn to lower prices without considering the illegalities behind them. Many purchase cheaper fuels or products without realizing that this choice may support fraudulent practices, including fuel adulteration, tax evasion, and smuggling.

Tax evasion remains a major problem faced by the fuel sector. The tax burden on these products is high, ranging from 35% to 36%, which makes tax avoidance an attractive option for companies seeking unfair competitive advantages. Brazil is estimated to lose approximately R$30 billion each year due to tax evasion, fuel adulteration, and operational fraud in the sector, an amount equivalent to what the federal government aims to raise through fiscal adjustments and new taxes in other areas, such as e-commerce.

In addition to tax evasion, operational fraud, such as fuel adulteration and the use of illegal devices in fuel pumps, further worsens the situation, directly affecting consumers. Estimates indicate that of the R$30 billion in annual losses, approximately R$14 billion results from tax evasion, while R$15 billion stems from fraudulent practices and adulteration.

In recent years, organized crime has shown an increasing interest in the fuel sector, using it as a mechanism for money laundering and financing illicit activities such as drug trafficking and arms acquisition. Companies involved in fraudulent schemes can offer fuel at prices far below market rates, precisely because they avoid tax payments, creating unfair competition with law-abiding businesses.

This phenomenon is exacerbated by the growing number of repeat-offender fuel distributors, some of which have accumulated debts exceeding R$20 billion with the federal government. These companies pose serious obstacles to sector competitiveness and the fiscal balance of public accounts. The distortions caused by such practices harm both the formal economy and fair market competition, contributing to the spread of economic crime.

ICL has been actively working to mitigate the impacts of these illegal practices by promoting cooperation among distributors, ethanol producers, and fuel storage companies, and by forming partnerships with regulatory agencies and state tax authorities. Implementing measures such as joint tax liability represents a significant step forward in the fight against tax evasion. In states like São Paulo, holding fuel stations accountable for unpaid taxes by distributors has helped reduce the entry of irregular products into the market, creating a more effective inspection network. Furthermore, ICL has invested in awareness campaigns targeting consumers and industry stakeholders, highlighting the risks and financial losses caused by tax evasion and operational fraud, and promoting a cultural shift toward greater compliance and transparency in the market.

Another relevant issue is the connection between organized crime structures and the formal economy. Criminal enterprises have expanded their operations beyond the fuel sector, reaching areas such as public transportation, and in more sophisticated cases, using offshore funds to finance illicit activities. These funds make it difficult to identify their ultimate beneficiaries while injecting illegal resources into their operations, enabling unfair competition and undermining the integrity of the economic environment. The presence of organized crime in the fuel sector — and its growing infiltration into other segments of the economy — poses a significant threat to the country's economic development and the effectiveness of the legal frameworks that govern the formal economy.

ICL has been a key player in addressing these challenges. The institute collaborates with agencies such as the National Public Security Secretariat, the São Paulo State Finance Department, and other state regulators, establishing a frontline defense against organized crime and fraud within the sector. Advancing stricter legislation, including the creation of a legal framework to identify repeat tax offenders, and strengthening enforcement against criminal schemes remains among ICL's top priorities.

Cooperation between the private sector and public authorities has proven essential for developing solutions that foster greater transparency and fairness in the fuel market. However, significant barriers remain. It is well known that certain political actors aligned with organized crime interests work to obstruct the progress of legislative proposals that could disrupt illicit schemes, such as the proposed Repeat Offender Law, which seeks to deter chronic tax evasion by large-scale offenders.

Another significant development is the implementation of the joint tax liability model, which holds fuel retailers responsible for taxes unpaid by distributors. This approach has proven effective in preventing tax fraud. Successfully adopted in several states, the model aims to strengthen oversight and ensure that all economic agents fulfill their tax obligations fairly. Initiatives involving both the private sector and government are essential to sustain the fight against tax evasion and illegal practices, making the fuel market more transparent, competitive, and fiscally sound, while also contributing to promoting economic justice in the sector.

*"The presence of organized crime in the fuel sector — and its growing infiltration into other segments of the economy — poses a significant threat to the country's economic development and the effectiveness of the legal frameworks that govern the formal economy."*

# 13. Challenges in Combating and Suppressing the Exploitation of Lawful Economic Activities by Criminal Networks in Brazil

**Flávia Maria Valente Carneiro**
*General Coordinator for Supervision and Regulation at Brazil's Financial Intelligence Unit (COAF)*

The Igarapé Institute, with the participation of the Latin American Financial Action Task Force (GAFILAT), hosted its third Regional Meeting, focusing on strategies to address environmental asset laundering and related financial flows.

Within this context, one of the panels was dedicated to discussing the challenges and opportunities for overseeing fuel and heavy machinery trade, both identified as high-risk sectors for money laundering by criminal organizations.

The panel featured representatives from the Legal Fuel Institute (ICL), the Financial Intelligence Units (FIUs) of Brazil and Peru, as well as the National Superintendence of Customs and Tax Administration (Sunat) of Peru.

The exploitation of legitimate economic chains as mechanisms for money laundering, fraudulent schemes, self-financing, and other unlawful activities by criminal networks has become an increasingly prominent issue in public security debates.

Toward this, at a meeting held on June 12, 2024, chaired by Brazil's Vice President Geraldo Alckmin and the Minister of Justice and Public Security Ricardo Lewandowski, the Governance Council of the National Strategy to Combat Corruption and Money Laundering (ENCCLA) defined four strategic priorities for its 2025 agenda:

1. The financial system and electronic fraud
2. Infiltration of organized crime into productive economic chains
3. Artificial intelligence and other disruptive technologies in the fight against corruption and money laundering — regulation and best practices
4. Continuation of the environmental agenda in sectors not yet analyzed

Based on these four thematic pillars, ENCCLA's 2025 action plan was defined. One of its key priorities will be to conduct a diagnostic assessment and risk analysis of the infiltration of organized crime into legitimate productive economic sectors, such as the fuel trade and the market for so-called "yellow line" equipment, including machinery used in mining operations.

This text does not aim to cover all aspects that define the complexity of the issue. Instead, it seeks to present a perspective that highlights some of the challenges within the context of Brazil's national AML/CFT/CPF system, established by Law No. 9,613 of March 3, 1998, which also created the country's Financial Intelligence Unit (COAF).

Law No. 9,613 of 1998, which addresses the crimes of money laundering and the concealment of assets, rights, and values, sets forth in Article 9 a list of economic activities subject to the control mechanisms defined in Articles 10 and 11. These articles establish "*preventive measures aimed at inhibiting and making it more difficult to use sectors of the economy to carry out money laundering operations*."[17] These provisions are part of the law's administrative framework, alongside Article 12, which outlines the penalties applicable for failing to comply with such preventive measures.

The AML/CFT/CPF legislation identifies, without being exhaustive, segments of economic activity that are potentially more vulnerable to use in money laundering schemes and related offenses. The original list in Article 9 of the 1998 law has since been expanded by Law No. 12,683 of July 9, 2012; Complementary Law No. 167 of April 24, 2019; Law No. 14,183 of July 14, 2021; and Law No. 14,478 of December 21, 2022, resulting in the current legal framework in force.

17 Statement of Reasons for Law No. 9,613 of 1998, item 74.

For the activities covered under Brazil's AML/CFT/CPF legislation, individuals and legal entities engaged in such activities are required to identify and maintain updated records of their clients, register data on all transactions, report to the Financial Intelligence Unit (COAF) any operations, transactions, or situations that exhibit signs of money laundering or related offenses, and adopt internal policies, procedures, and controls to ensure full compliance with all other legal obligations.

These measures, when properly observed by actors operating in the covered sectors, especially within the financial and payment systems given their critical relevance, have the potential to provide valuable information to the FIU. Such information is essential for the production and dissemination of financial intelligence to competent authorities responsible for criminal investigations and prosecutions.

Currently, however, accumulated knowledge on criminal networks indicates that the range of activities potentially subject to exploitation for money laundering is even broader than previously acknowledged. In some regions, there is already evidence that certain economic activities are under the control of organizations structured for criminal purposes.

An important observation emerges from the implementation of the administrative framework established by Law No. 9,613 of 1998: it is not sufficient to include a given activity in the list outlined in Article 9. The effectiveness of the preventive measures established in Articles 10 and 11 depends on the existence of a designated regulatory and supervisory body. Without such an authority, the expected outcomes in the respective sector may not be achieved.

Regardless of whether or not a given activity is explicitly listed in Article 9 of Law No. 9,613/1998, the resulting financial flows inevitably pass through institutions operating within the financial and payment systems, virtual asset service providers, international money transfer services, armored transportation companies, and other sectors with their own regulatory or supervisory authorities — all of which are subject to the control mechanisms instituted by the law above.

For this reason, it is proposed that the challenges and opportunities to enhance the effectiveness of efforts to combat the infiltration of criminal networks into the exploitation of lawful economic activities, within the scope of Brazil's AML/CFT framework, be explored from four key perspectives outlined below.

The first perspective concerns the initial stage of the information flow, which originates in the regulated or supervised sectors and proceeds toward the Financial Intelligence Unit (COAF). Approximately 70% of this flow consists of reports on operations, transactions, or situations deemed suspicious or atypical, filed by financial institutions, payment institutions, and other entities authorized to operate by the Central Bank of Brazil (BCB).

The reports submitted by institutions authorized by the BCB to COAFare structured according to scenarios currently defined by BCB Circular Letter No. 4,001, dated January 29, 2020, as amended by BCB Normative Instruction No. 461, dated April 2, 2024. These documents set forth 156 illustrative scenarios that may trigger reports to COAF.

The original framework for these reporting scenarios dates back to 1998, with the publication of the initial set of 43 scenarios in BCB Circular Letter No. 2,826, dated December 4, 1998. This list was later expanded to 106 scenarios through BCB Circular Letter No. 3,542, dated March 12, 2012.

These reporting scenarios serve two essential purposes: within institutions, they guide the configuration of systems for selecting operations, transactions, or situations to be reported to COAF; within the Financial Intelligence Unit (UIF), they enable systemic processing of the reports received through the Financial Activity Control System (Siscoaf).

There is a marked concentration of reports to COAF under a small number of scenarios defined in BCB Circular Letter No. 4,001 of 2020, with just ten scenarios accounting for 70% of all reported occurrences. Moreover, these scenarios are more generic and would benefit from updates to better reflect new realities shaped by previously nonexistent financial products and services, technological innovations, and the risks posed by the infiltration of criminal networks across sectors of economic activity.

Regarding criminal networks, a body of knowledge has already been produced by various State authorities and respected civil society organizations identifying targets, associated relationships, areas of prevalence, and specific activities and services under the control of such networks. If systematically organized, this information could significantly enrich the reports submitted to COAF, especially those originating from the financial and payments systems, given their critical role. This would allow for more targeted reporting in cases where, due to the parties involved, the location, or the type of service or activity, there is evidence suggesting possible involvement in a criminal network. Such targeting could be reflected in the structuring of reporting categories, thus enhancing systemic processing within COAF.

A revision of the BCB regulation, aimed at establishing a more streamlined, risk-focused set of reporting scenarios, could also support the optimization of monitoring, selection, and analysis systems implemented by institutions operating in the financial and payments sectors to submit reports to COAF.

Continuing along the information flow, the second perspective concerns COAF's capacity to produce financial intelligence focused explicitly on criminal networks. Improving the inflow of information from regulated and supervised sectors is not sufficient. It is also essential to expand COAF's access to existing knowledge on the operations of criminal networks held by State authorities.

The FIU possesses institutional tools, as provided by law, that enable it to proactively share relevant information and securely receive intelligence derived from data reported by both regulated and supervised sectors, as well as by criminal enforcement authorities.

*"Improving the inflow of information from regulated and supervised sectors is not sufficient. It is also essential to expand COAF's access to existing knowledge on the operations of criminal networks held by State authorities."*

The third perspective concerns the current rules governing the establishment of institutions that provide public services within the financial and payments systems, as well as cryptoasset and international transfer service providers. There is a clear need to strengthen the criteria and requirements for granting authorization to operate. It is also essential to implement effective mechanisms to prevent criminal networks and their agents from creating de facto financial enterprises resembling banks, a situation that has been frequently reported in the media.

Within this perspective, particular attention should also be given to companies engaged in the transportation and safekeeping of physical cash, given the risk that they may be used to establish parallel payment systems operating outside the BCB's supervision.

The final, and arguably most critical, perspective concerns the need to enhance cooperation among competent authorities, within the boundaries of legally established information-sharing safeguards, while leveraging appropriate initiatives and platforms that foster greater synergy in their actions. Currently, fragmentation persists: authorities continue to operate according to their own priorities and plans, without developing a comprehensive, coordinated, and targeted strategy to counter criminal networks. As a result, dissociation, redundancy, and reduced effectiveness are common outcomes.

Civil society organizations, such as the Igarapé Institute and ICL Legal, have much to contribute, for example, by developing projects to organize available information and open data related to this issue.

These brief remarks are not intended to provide the depth that each of the perspectives mentioned would require. Nor do they aim to offer superficial solutions, as complex problems demand well-structured responses — ideally developed in collaboration with regulated sectors, supervisory bodies, the FIU, and other competent authorities, especially those operating within Brazil's AML/CFT/CPF system. The aim here is simply to offer points for reflection, particularly in forums such as the III Regional Meeting hosted by the Igarapé Institute.

*"The final, and arguably most critical, perspective concerns the need to enhance cooperation among competent authorities, within the boundaries of legally established information-sharing safeguards, while leveraging appropriate initiatives and platforms that foster greater synergy in their actions."*

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