

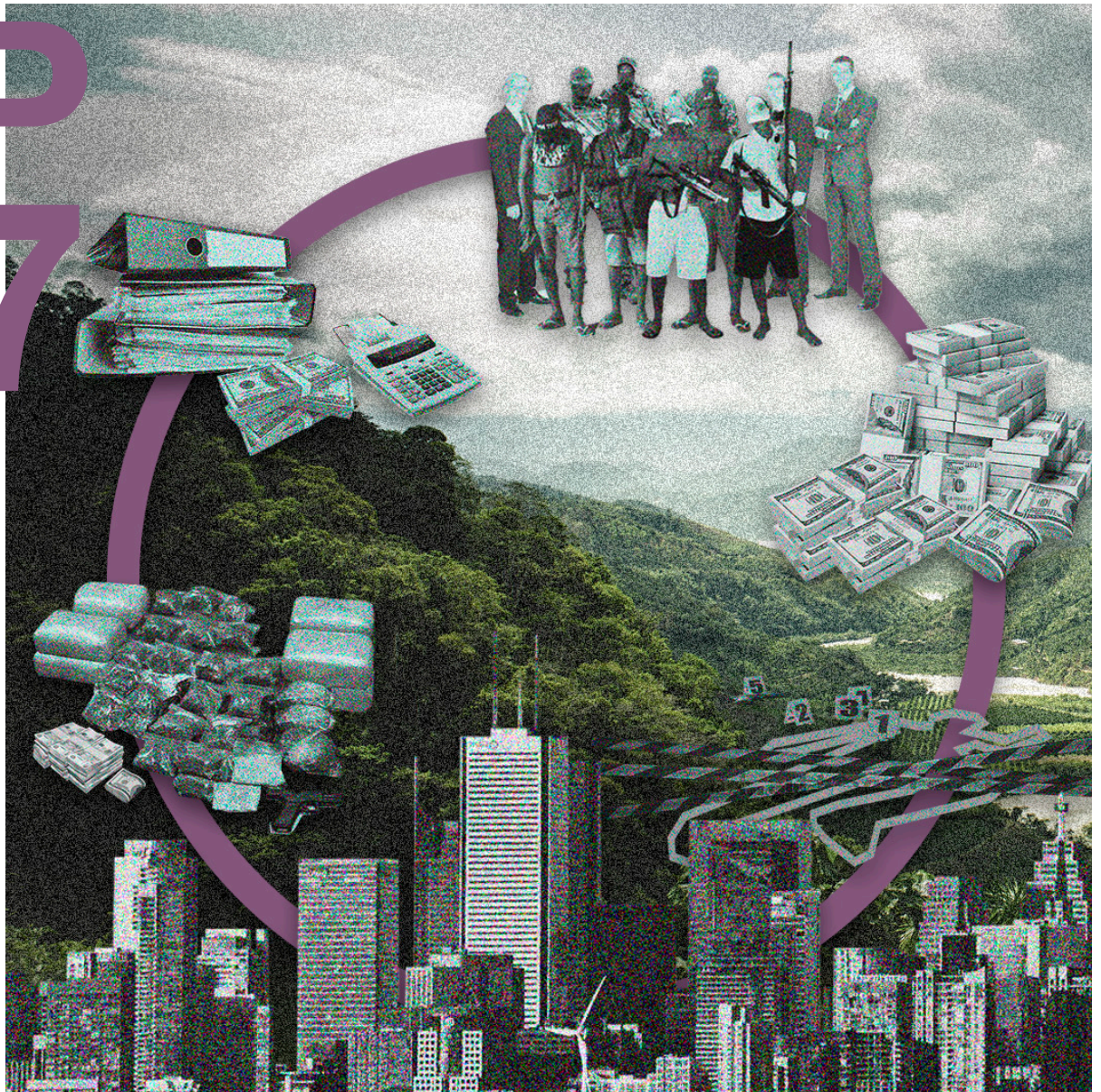


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# **CONNECTING THE DOTS:** Territories and Trajectories of Environmental Crime in the Brazilian Amazon and Beyond

Laura Trajber Waisbich, Terine Husek and Vinicius Santos

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# CONNECTING THE DOTS: Territories and Trajectories of Environmental Crime in the Brazilian Amazon and Beyond

Laura Trajber Waisbich, Terine Husek and Vinicius Santos<sup>1</sup>

## Introduction to the Series “Mapping Environmental Crime in the Amazon Basin”

The series “Mapping Environmental Crime in the Amazon Basin” provides a clear picture of the current dynamics of environmental crime and other illegal activity in the Amazon Basin, as well as offering guidance for those working to combat these crimes at the local, national and regional levels.

The Amazon Basin straddles eight countries (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela) and one territory (French Guiana). Scientists and experts now have a solid understanding of the processes of deforestation and degradation in the world’s largest tropical forest, a pattern of destruction fueled largely by economic activities carried out under various licensing, authorization and concession mechanisms. The studies developed for this series shed light on a lesser-known aspect of the phenomenon: the role of criminal and illegality-tainted economies, and of the players involved in deforestation and degradation of the Amazon.

While mindful of the ongoing socio-environmental impact of nominally “legal and authorized” economic activities on the forest and its peoples, the four studies in this series explore a more complex situation. A closer look reveals the spatial and temporal contours of specific environmental crimes and their connection to both legal and authorized economic activities as well as other types of crime and violence. The series also depicts the political economy underlying illegal markets and the inner workings of organized crime groups and their collusion with public agencies. The studies outline the history of the measures adopted by countries in the region to break up criminal organizations throughout the Amazon Basin as they diversified their economic activities and funding sources in their unlawful pursuit of the Amazon’s natural capital.

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<sup>1</sup> The researchers would like to thank Rennan Sanches, Pedro Silva, Lycia Brasil, Melina Risso, Andreia Bonzo Araujo Azevedo, and Ilona Szabó for their assistance.

sweep the region. The studies depict a complex situation. On one hand, government and public agencies have been paying closer attention and acting to combat environmental and converging crimes, mainly to reduce deforestation and illegal mining. On the other, high ranking politicians and wealthy individuals cash in on – or fail to impede – attempts to weaken socio-environmental safeguards and regulations designed to protect the Amazon rainforest.

This series of studies portrays lesser known aspects of crime in the Amazon: the various entities – governments, entrepreneurs and criminal organizations – that interact with and foster lawlessness and environmental degradation even as a climate emergency and fast-paced socio-political change sweep the region. The studies depict a complex situation. On one hand, government and public agencies have been paying closer attention and acting to combat environmental and converging crimes, mainly to reduce deforestation and illegal mining. On the other, high ranking politicians and wealthy individuals cash in on – or fail to impede – attempts to weaken socio-environmental safeguards and regulations designed to protect the Amazon rainforest.

## Brazil

Throughout 2022, the Igarapé Institute is publishing a series of strategic papers that shed light on how environmental and converging crimes contribute to the deforestation of the Brazilian Amazon rainforest, as well as identify the individuals and groups responsible for the destruction, degradation and violence that plagues the region. The first article, “The Ecosystem of Environmental Crime in the Amazon: An Analysis of the Illicit Rainforest Economies in Brazil”, published in February 2022, provides an unprecedented overview of environmental and converging crimes in Brazil’s Legal Amazon (*Amazônia Legal*), based on an analysis of the government’s approach to the problem, using a sample of over 300 Federal Police operations carried out from 2016 to 2021. These operations were either initiated independently by the Federal Police in its legal enforcement role or in concert with more than 50 other institutions (mainly agencies of the National Environmental System – SISNAMA, the judiciary and other security forces). The database was assembled by the Igarapé Institute using information obtained from the Federal Police through a request for access to information, as well as through additional research of public sources.

This strategic paper represents a continuation of this work, and gives a unique and broad view of the spatial aspects of these phenomena, with a focus on the territories investigated in the police operations. Although not exhaustive, this strategic paper brings visibility to environmental crime and related illegal activities in the Amazon, examines the ramifications for Brazil as a whole, and provides the foundation for a series of debates to be held in the second half of 2022 regarding the particular patterns of the ecosystem in each of the states of the Legal Amazon.

# Executive Summary

The ecosystem of environmental crime in the Amazon is largely to blame for the current levels of deforestation and degradation of the biggest tropical forest on the planet. Several illegal economic activities, representing the main drivers of destruction in the river basin, take a heavy toll on the forest and its inhabitants. Based on an analysis of the spatial distribution of the Federal Police operations to fight environmental crime in the Legal Amazon between 2016 and 2021, this study highlights the hotspots for a range of illicit forest-based economic activities in the region, while also showing how other locations within and outside the Brazilian Amazon form part of a broader nexus of environmental crime.

The study reviewed more than 300 Federal Police operations and identified 846 territories that make up the ecosystem of environmental crime in the Amazon. These territories are located in 262 municipalities, both in the Legal Amazon and beyond its borders. Of the cities mapped, 75% are located in the Legal Amazon, 22% are in other regions of Brazil and 3% are in neighboring countries. These territories are where environmental and associated crimes converge to fuel illegal deforestation, illegal logging, public land grabbing (known as *grilagem*, in Portuguese), agriculture and livestock rife with environmental illegalities and illegal mining.

The continuous expansion and breadth of the ecosystem of environmental crime in the Amazon attest to the involvement of locations and actors outside the river basin. Of the 302 operations carried out, 56 (19%) had ramifications beyond the Legal Amazon, reaching 24 out of the 27 Brazilian states (Alagoas, Pernambuco and Paraíba were the only exceptions).

The state of Pará looms large in the overall crime mapping. Out of 83 Federal Police operations carried out in the state, the study identified criminal activity in 161 venues in 46 municipalities. The state of Rondônia ranked second, with 122 territories investigated for illicit acts in 29 municipalities, followed by the state of Amapá, with 101 hotspots in 10 municipalities. Outside the Amazon, the state of São Paulo was the biggest target of police operations (36 territories implicated), followed by Paraná (14 territories) and Goiás (10 territories). Beyond Brazilian borders, operations spread to French Guiana and Venezuela (five territories targeted in each), Suriname (four territories), Colombia (two territories), Paraguay and Bolivia (one territory each).

Of all illicit activity tracked in the study, Illegal logging leaves the widest footprint, reaching 87% in the Legal Amazon and 13% beyond the river basin. All told, 23 Brazilian states and 166 cities were implicated in the illegal logging ecosystem. Illegal mining has also spread widely. A total of 125 municipalities, spread across 20 Brazilian states and also in neighboring countries are linked to the illegal mining sub economy, with important hubs in Alto Alegre (in Roraima) and Ourilândia do Norte, Itaituba and Jacareacanga (in Pará), but also São Paulo. From all the illegal mining territories, 55% were main mining sites, while 45% were sites where the Police investigated additional environmental and non-environmental converging crimes, including fraud, tax evasion, and money laundering. Twenty percent of the mapped territories were found to be in other regions of Brazil or outside the country.

This analysis found that protected areas of the Amazon, including Indigenous Lands, Conservation Units and Permanent Protection Areas, have been increasingly impacted by the ecosystem of environmental crime, principally illegal logging and gold mining. More than a fifth (22%) of the territories and almost half (45%) of the Police operations mapped in this

study fall within protected areas. Investigators probed illegal activities in 37 Indigenous Lands in the Amazon. The Yanomami in Roraima, the Munduruku in Pará and the 7 de Setembro community in Rondônia have been especially hard hit by environmental and converging crimes. Investigators also documented acts of violence linked to environmental crimes in 19 Amazonian Indigenous territories and 21 environmentally protected areas, especially the Gurupi Biological Reserve, in Maranhão, and the Roraima National Forest.

The study also followed the flow of resources and products from the forest to other locations in the Amazon and beyond. These trajectories were found to be rife with violence, acutely so in the conflicted gold mining areas of Indigenous Lands in Pará and Roraima and wherever land grabbing and illegal deforestation flourish, notably in the south of Amazonas. Such criminal assaults on the environment typically come bundled with an array of converging crimes, such as fraud, corruption and money laundering. The study also draws attention to the alarming levels of deforestation and the socio-environmental damage that organized crime groups inflict upon historically preserved areas and native forests of the Amazon, both within and outside the traditional “Arc of Deforestation”.

While the Federal Police investigations are an important piece in the complex institutional puzzle of confronting environmental crime, the findings of this study underscore that the proper designation of public lands is critical to protecting the forest. More broadly, these findings point to public policies and regulations as valid mechanisms for the Brazilian government to identify and combat illegal activity. The connections between illicit and crime-tainted economic activities in the Brazilian Amazon and in neighboring countries highlight the need for public authorities and private markets to coordinate efforts. None of that can be achieved without improved monitoring and control of supply chains by the players in the market, and absent innovative economic alternatives for local populations that value the Amazonian natural capital.

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*The continuous expansion and breadth of the ecosystem of environmental crime in the Amazon attest to the involvement of locations and actors outside the river basin.*

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# Introduction

The situation in the Amazon is critical. Accelerated deforestation throughout the Amazon Basin, especially in the vast stretch of the forest within Brazil's borders<sup>2</sup>, has pushed the planet's largest tropical biome close to its tipping point. According to data from Global Forest Watch, in 2021, Brazil lost more primary tropical forest – 1.5 million hectares – than any other country. Over 40% of tropical primary forest cleared worldwide was in Brazil.<sup>3</sup>

Even as forests fall in the Brazilian Amazon, the systematic dismantling of instruments of environmental protection in Brazil has hampered efforts to prevent the environmental and converging crimes that drive the destruction. At the same time, Brazilians have been hit with a growing barrage of anti-environmental speech emanating from many in positions of economic and political power. Underlying such rhetoric is the belief that development, wealth and prosperity requires the exploitation of natural resources without regard for the forest or the traditional communities that live there. And yet even as one of the planet's greatest natural habitats is under siege, the Amazon is emerging as a centerpiece in global climate negotiations and a defining issue on Brazil's geopolitical agenda; ironically, the Amazon is both the country's biggest asset and its greatest liability.<sup>4</sup>

Not only are the prevailing political conceits shortsighted, they also gain traction amid a dearth of data needed to support public and corporate policy to combat illegal economic practices in the region, across Brazil and throughout the world. Where do environmental crimes and the knock-on illegal activities that destroy and degrade the world's largest tropical forest in the Brazilian Amazon occur? Which protected territories in the states of Brazil's Legal Amazon are most affected and where else does this complex ecosystem of environmental and related non-environmental crimes flourish? To answer these questions, this strategic paper offers a comprehensive analysis of actions to combat environmental and converging crimes in the Legal Amazon carried out by the Federal Police between 2016 and 2021, as well as an analysis of the sites that comprise the environmental crime ecosystem in the Amazon. The analysis of the spatial distribution of the ecosystem identifies the main hotspots of illicit forest-related economic activities in the states of the Legal Amazon. It also analyzes other areas in Brazil, both within and outside the Amazon, that are part of this ecosystem and thus contribute, enable and/or promote environmental crime in the Amazon.

2 Marcos Daisuke Oyama and Carlos Afonso Nobre. 2003. 'A New Climate-Vegetation Equilibrium State for Tropical South America'. *Geophysical Research Letters* 30 (23).

3 Global Forest Watch. '[Perda florestal permanece resistentemente alta em 2021](#)', April 28, 2022.

4 Izabella Teixeira and Ana Toni. 'A Crise Ambiental-Climática e Os Desafios Da Contemporaneidade: O Brasil e Sua Política Ambiental'. *CEBRI Revista* 1 (1): 71–93, 2022; Mathias Alencastro and Laura Trajber Waisbich. 'A Jangada Brasileira'. In *Reconstrução: O Brasil Nos Anos 20*, overseen by Felipe Salto, João Villaverde and Laura Karpuska. São Paulo: Saraiva, 2022, 452–74.

In Section 1 of this strategic paper, we give an overview of the concept of the ecosystem of environmental crime in the Amazon. Section 2 deals with the locations of environmental crime in the Amazon, while Section 3 looks at the trajectories that link locations in and outside the Brazilian Amazon. In Section 4, we explore the impacts of the ecosystem of environmental crime on several protected areas in the Amazon considering the different uses, designation, and characteristics of the forest coverage. The conclusion offers observations on how the environmental crime ecosystem in the Amazon affects other areas throughout Brazil. A methodological note at the end of the paper provides details on how we gathered and analyzed the data.

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*The Amazon is emerging as a centerpiece in global climate negotiations and a defining issue on Brazil's geopolitical agenda.*

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## Igarapé Institute's Database of Federal Police Operations

This series of strategic papers is based on a exclusive mapping done by the Igarapé Institute with information obtained through the Right to Information Law (Law No. 12.527/2011) and additional background research in public sources on 371 operations carried out by the Brazilian Federal Police to fight environmental and converging crimes in the Legal Amazon between 2016 and 2021. The Institute was able to glean detailed information on the locations where crimes were committed and other locations impacted by crimes for 302 operations carried out by the Federal Police during the period in question. Further details on the strategy used can be found in the methodology section.

The table below compares our sample of Federal Police operations in the Legal Amazon to the larger universe of operations to fight environmental crime in Brazil on the whole during the period studied, according to data from the Ministry of Justice and Public Safety annual reports.<sup>5</sup>

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<sup>5</sup> The Ministry of Justice and Public Safety management reports are available to the public on the Ministry's website. At the time of publication of this paper, there were no disaggregated data for operations in response to environmental crimes for the years 2020 and 2021.



**Table 1.** Federal Police Operations to Combat Environmental Crime in Brazil (2016-2021)

Year	Operations across Brazil	Operations in the Legal Amazon mapped by Igarapé	Coverage Ratio
2016	57	16	28%
2017	79	33	42%
2018	104	40	38%
2019	281	51	18%
2020	Data not available	61	N/A
2021	Data not available	101	N/A

## Glossary

**Federal Police Operations** - Criminal investigations by the Federal Police to combat environmental and converging crimes in the Legal Amazon. This includes both large-scale operations, called “special operations” or “regular operations,”<sup>6</sup> as well as “simple operations” and “support operations” which involve fewer technical and human resources and that are not necessarily related to ongoing investigations, including flagrante delicto and providing support to other public agencies.

**Territories** - Territories are locations of one or more crimes or illegal activities in the ecosystem of environmental crime in the Amazon. Territories are shown as geographical points or polygons that correspond both to protected areas in which illicit economic activity was investigated by the Federal Police in the Amazon, and to locations in which the police caught criminals in the act, and carried out searches and/or seizures as part of an investigation. While all territories are located within a political boundary (state/municipality) in Brazil or abroad, the analytical use of the category “territory” here goes beyond the political geography definition. The territories in this study are divided into two groups: (i) main location (or main locus) where the environmental offense under investigation took place and which prompted the Federal Police action, and (ii) additional location (or additional locus) involved in the illegal economies in the Amazon as the site of other environmental offenses or converging crimes under investigation.

**Trajectories** - Trajectories are the connections/networks linking locations involved in the ecosystem of environmental crime in the Amazon, and where one or more mapped police operations occurred. The trajectories spotlight the variety of linkages between these locations – in Brazil and abroad – under investigation by the Brazilian Federal Police during the period studied.

<sup>6</sup> Federal Police operations are classified based on criteria such as the number of officers involved and the investigative methods employed. For further information, see the [Relatório de Gestão Exercício 2018](#) (in Portuguese), Brasília: MSP, 2019.

# 1. The Ecosystem of Environmental Crime in the Amazon: Drivers of Deforestation

It is public knowledge that a significant forest loss and degradation in the Brazilian Amazon are the result of illegal activity. In 2020, almost all reports of deforestation by the National Institute of Space Research (INPE) indicated wrongdoing or illegal acts. That year, 99.8% of the reports – corresponding to 95% of the area deforested – were of unauthorized clearing of native vegetation, including in protected areas and violations of the Forestry Code (Law No. 12.651/2012).<sup>7</sup>

These numbers clearly indicate that the exploitation and destruction of the forest and the conversion of forest into agricultural land are the result of an increase in **illegal or tainted with illegality economic activities** in native forest areas. These activities may be completely or partially illegal, lack proper authorization, and/or be related to production chains that may cause illegal deforestation.<sup>8</sup> They are part of an underlying **ecosystem of environmental crime** consisting of environmental and non-environmental offenses (known as converging crimes), as seen in Figure 1.

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*The exploitation and destruction of the forest and the conversion of forest into agricultural land are the result of an increase in illegal and illegality-tainted economic activities in native forest areas.*

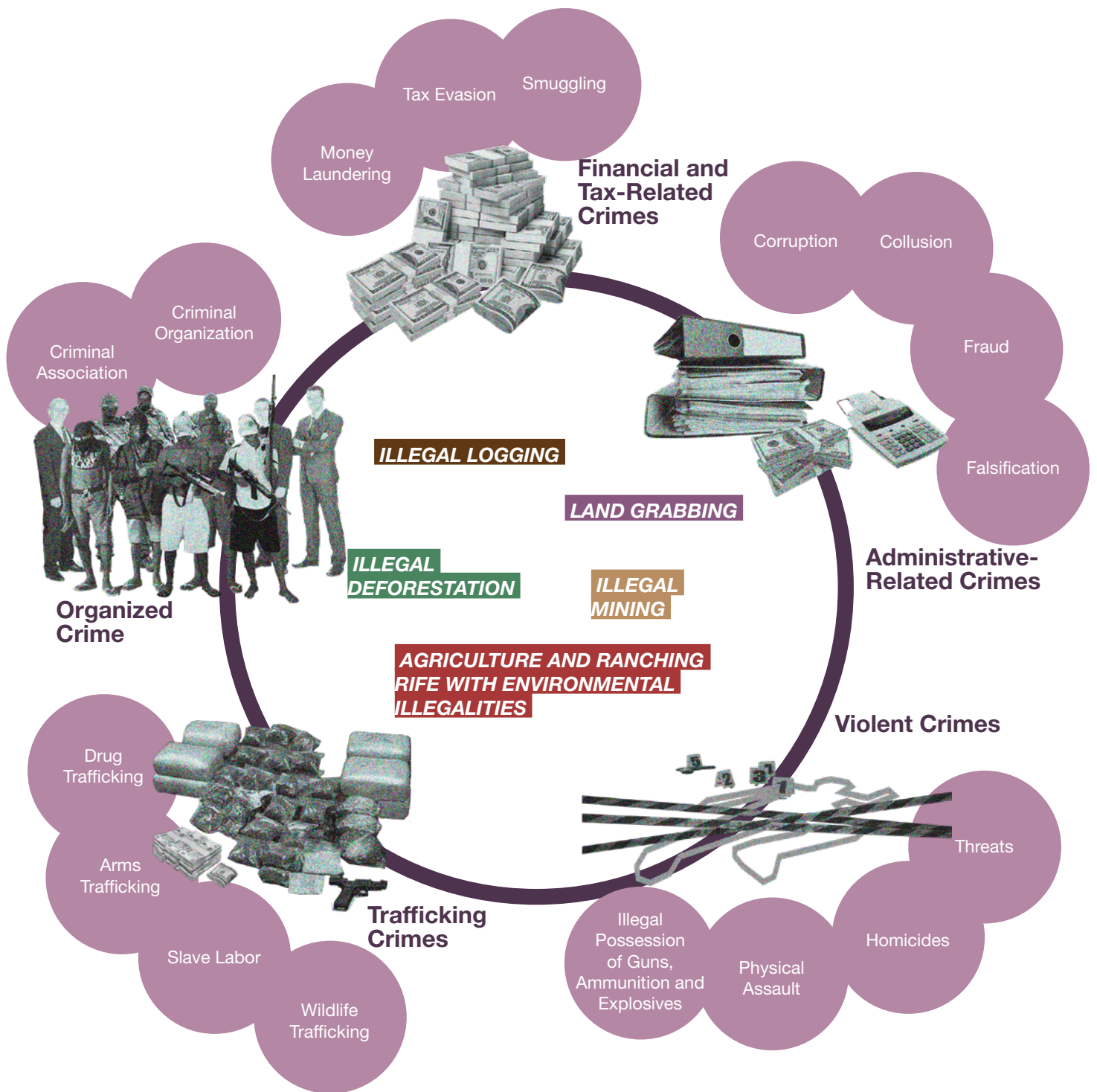
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7 See [MapBiomias Alerta](#). Ana Paula Valdiones, Paula Bernasconi, Vinícius Silgueiro, Vinícius Guidotti, Frederico Miranda, Julia Costa, Raoni Rajão and Bruno Manzolli. [Desmatamento ilegal na Amazônia e no Matopiba: falta de transparência e acesso à informação](#). ICV; Imaflora; LAGESA: March 2021.

8 Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022.

**Figure 1:** Illegal Economies and the Ecosystem of Environmental Crime in the Amazon



Source: Igarapé Institute, from Waisbich et al. (2022).  
 See Methodology for an explanation of the crime categories included in the figure.

This strategic paper examines clearing of vegetation by clear-cutting and illegal deforestation, and also looks at **four major illegal or tainted with illegality economies**: 1) public land grabbing, 2) illegal logging, 3) illegal mining, and 4) agriculture and livestock farming rife with illegalities, including deforestation.

While each of these economic activities involves different degrees and types of wrongdoings, they all rely on the “**laundering**” of natural resources from the Amazon. Laundering in this context means the attempts by the perpetrators of environmental crime to give a semblance of legality to illicit acts or environmental damage caused by extracting resources or producing in forest areas and to enable resources and products from protected areas in the Amazon to be integrated into legal markets in Brazil and abroad.

There are a myriad of methods to “launder” Amazonian goods that can be employed at any given stage of the supply chain: during authorization for use or extraction, extraction or land conversion, and production or sale of products. “Laundering” serves, for instance, to hide the actual origin of timber and gold extracted from protected territories in the Amazon. The concealing of unauthorized extraction of protected tree species is also a common practice. Perpetrators of illegal farming or ranching often obscure the effects of illegal deforestation caused by the conversion of forest land – sometimes obtained illegally through *grilagem* – into arable land or pasture.

The exact nature of “laundering” and the specific methods used to give an appearance of legality vary depending on the laws and regulations of the particular illicit or illegality-tainted economy in the Amazon. Timber and cattle production, for example, have more robust, albeit imperfect, certification processes than gold mining.<sup>9</sup> However, systematic **document fraud** is an issue in all cases.

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*While each of these economic activities involves different degrees and types of wrongdoings, they all rely on the “laundering” of natural resources from the Amazon.*

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9 Ministério Público Federal. Câmara de Coordenação e Revisão, 4. [Mineração ilegal de ouro na Amazônia: marcos jurídicos e questões controversas](#). Brasília: MPF, 2021.

## Rivers of Fraud

Given that **document fraud** is an integral element in the ecosystem of environmental crime in the Amazon, uncovering this activity is a priority issue for public agencies responsible for environmental inspection and criminal investigation.<sup>10</sup> The systematic use of fraud and falsification in organized environmental crime in the Amazon is emblematic of the current situation of widespread illegal resource exploitation in which individuals and companies hatch ever more complex schemes to subvert and distort policies, regulations and laws established to regulate economic activities in the forest. The criminal and administrative investigations carried out by agencies of the National Environment System (SISNAMA) and the judicial system have found fraud at specific points along the different supply chains in all illegal or tainted with illegality economies in the Amazon. Fraud and falsification in the realm of environmental crime are committed by different actors, from workers extracting and transporting products from Amazonian territories, to public servants and technical experts who falsify authorization and inspection documents, as well as vendors of products from the Amazon, usually selling to buyers hundreds or thousands of kilometers from the forest.

In the ecosystem of fraud, government corruption and tax and/or financial crime are interconnected.<sup>11</sup> For example, there is fraud in land and environmental compliance, including on land tenure certification documents, the Rural Environmental Registry (CAR),<sup>12</sup> land management plans, and forest inventories. Fraud is also common in authorization for logging (such as the AUTEF, by its Portuguese acronym), and gold mining (such as the PLG, by its Portuguese acronym), as well as other authorization, traceability and financial documents related to the origin, transport and sale (such as the Document of Forest Origin - DOF or the Extraction Authorization - AUTEX, in the case of timber, or the tax documents for the initial purchase of gold).<sup>13</sup> Other types of fraud facilitate not only laundering of goods and resources from illegal and illegality-tainted forest economies, but also permit the laundering of money from drug trafficking, including cocaine, and other illicit markets.<sup>14</sup>

There are, for example, frauds in land or environmental governance instruments, such as documents proving land tenure, the Rural Environmental Registry (CAR), Management Plans and Forest Inventories. There is also fraud in exploration authorization documents (such as AUTEFs for wood or PLGs in the case of gold) or in authorization documents, traceability and tax documents in the transport and commercialization (such as DOFs or AUTEXs, in the case of timber, or the tax documents at the time of the “first purchase” of gold from mining). Finally, there are other types of fraud make it possible not only to launder goods or resources from illicit or illicit forest economies, but also to camouflage or launder money from trafficking in other illicit markets, such as cocaine.

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10 Fraud is used here as a broad concept that includes a number of illicit acts defined under Brazilian law as both crimes and environmental infractions (Law No. 9.605/1998), as well as fraudulent misrepresentation (Penal Code).

11 Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022.

12 IPAM. [‘Novo projeto de lei pode criminalizar fraudes no Cadastro Ambiental Rural’](#), March 14, 2022.

13 FSC International Center. [Avaliação Nacional de Risco FSC para o Brasil](#). FSC: 2019; Ministério Público Federal. Câmara de Coordenação e Revisão, 4. [Mineração ilegal de ouro na Amazônia: marcos jurídicos e questões controversas](#). Brasília: MPF, 2020.

14 Clarissa Levy, Ricardo Terto and Ciro Barros. [Deu match: desmatamento e narcotráfico](#). *A Pública, Podcast*. September 3, 2021. Allan de Abreu, Luiz Fernando Toledo and Eduardo Goulart. [‘How Endangered Brazilian Timber Ends Up in the US’](#), OCCRP, February 4, 2022.

Combating such crimes requires interventions to prevent, deter and hold actors involved in the ecosystem of crime accountable, including workers and vendors (individuals and companies) directly involved in the extraction, production, transport, and financing of these activities. Other participants in the ecosystem of crime include public servants and technicians acting in bad faith to facilitate illicit activities or sell illegal forest products, such as forestry engineers in the case of timber and financial institutions that buy gold mined in the Amazon.

Government authorities have the means to address these issues and impose consequences on those involved, namely the beneficiaries of environmental and converging crimes. Environmental inspection (which potentially leads to administrative sanctioning) can occur at a number of points along the supply chain. For a forest product like timber, for example, with a well-established traceability process, agencies within SISNAMA, notably the environmental agency IBAMA can intervene during the authorization, extraction, transport, and processing stages. In the case of agriculture and livestock farming rife with environmental illegalities, inspection can take place at the time of land conversion (with suspensions and fines for illegal deforestation) and sale (prohibiting transport of cattle from illegally deforested lands). Given the spotty traceability system for gold, government sanctions generally involve on-site seizure and destruction of equipment.

Alternatively, the process of criminal accountability, which begins with a police investigation, is focused on sanctioning offenses already typified as crimes, from all the actors and organizations involved. The Federal Police frequently acts in concert and in parallel with environmental agencies.

In addition to “command and control” strategies, there are a number of other measures the government can employ to prevent environmental crime, namely public policy and incentives for businesses committed to keeping the forest standing. These preventive strategies aim to improve land management in the Amazon by expediting designation of public forests and demarcation of Indigenous and traditional Quilombola lands, as well as enabling sustainable development activities to take place.

In the coming sections, we proceed with the territorial analysis of Federal Police operations in the Legal Amazon between 2016 and 2021 in the hope to support ongoing efforts by the Brazilian government to combat organized environmental crime in the Amazon.

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## 2. Territories of the Ecosystem of Environmental Crime in the Amazon

This section provides an analysis of the territories according to their political-administrative boundaries (municipalities and states) related to the body of the Federal Police operations to fight environmental crime in the Legal Amazon between 2016 and 2021.

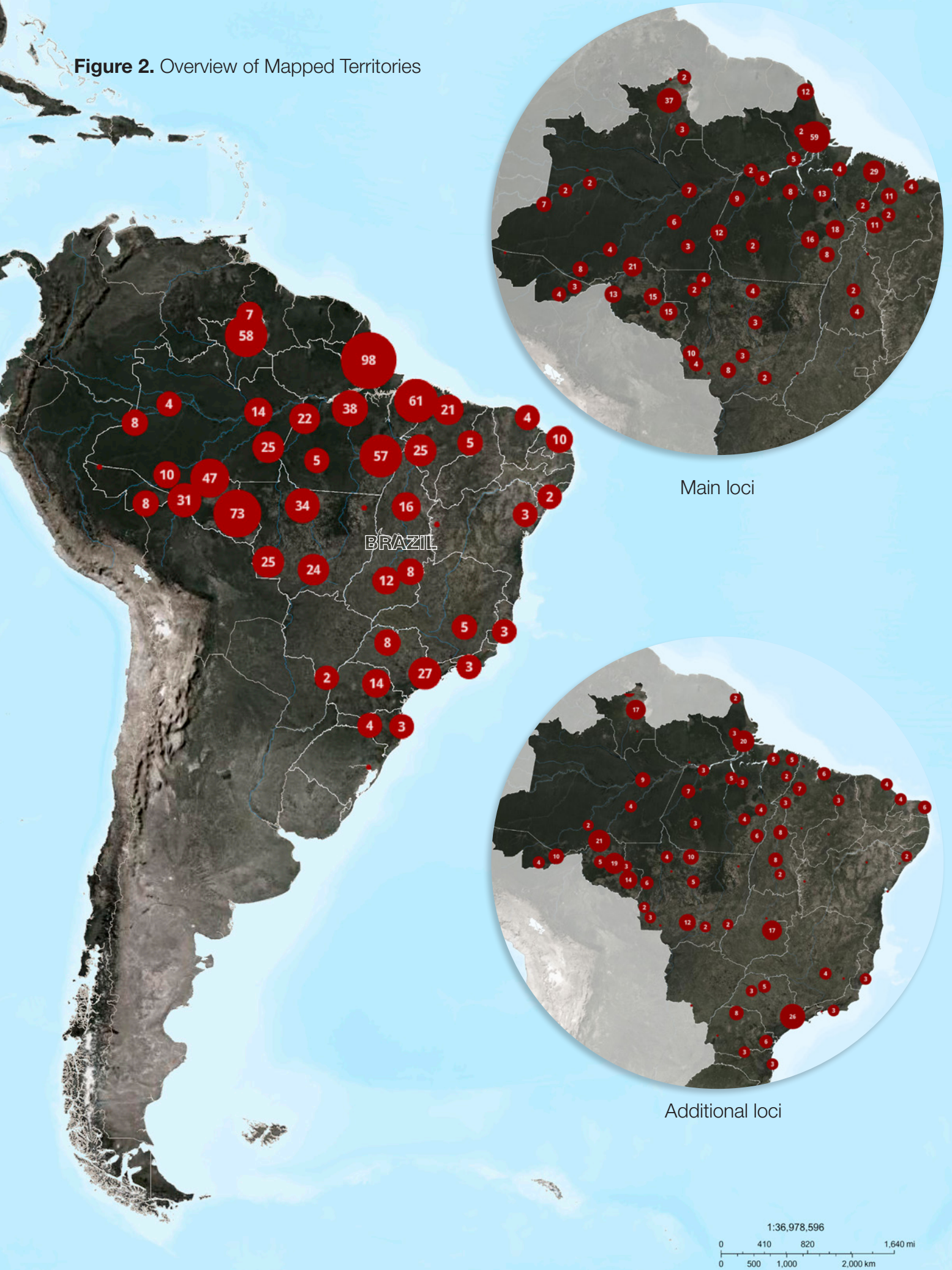
The **302 Federal Police operations** analyzed in this study encompass **846 territories** in what we call the ecosystem of environmental crime in the Amazon. The high number of territories reflects the fact that 64% of the operations mapped involved more than one location under investigation or with connections to illegal or tainted with illegality supply chains. Some investigations involved only one or two territories while others involved more than ten. Criminal investigations that gave rise to Operation Rio Voadores in the state of Pará in 2016 and the Ouro Perdido operation in Amapá, both discussed at length in this paper, are illustrative of complex investigations in several interconnected territories. It is important to point out that any given territory may be the target of multiple police operations.

Of the over 800 territories mapped, 451 (53%) are locations defined as the **locus of environmental crime**. These territories are all within the borders of the Legal Amazon, and are at the center of criminal investigations of illicit economic activities carried out in the forest. Our mapping also identified 395 (47%) **additional territories** that play different roles in the workings of the illegal economies of the Amazon. They may be the site of other environmental crimes in the supply chain of any of the illegal or tainted with illegality economies (for example, the transport or sale of ore or

forest products), or the site of converging crimes, such as corruption on the part of public employees, money laundering, or tax fraud. Additional locations might also be places where the Police carried out searches and seizures as part of an investigation or places where suspects possess assets, property or capital. The additional territories are located within and outside the Legal Amazon.

As seen in Figure 2, the territories mapped (both main and additional locations) show that the ecosystem of environmental crime in the Amazon extends across a number of towns and cities in the Amazon. However, it is not limited to this geographic space. In fact, the ecosystem of crime spreads from the Amazon region to the rest of the country and beyond Brazil's borders, especially to neighboring countries. The interconnectedness of illicit markets in the Brazilian Amazon and other markets throughout Brazil and in neighboring countries underscores the need for the government and the private sector to collaborate on monitoring the ecosystem of crime, which is not currently occurring.

**Figure 2.** Overview of Mapped Territories



Main loci

Additional loci

1:36,978,596

0 410 820 1,640 mi  
0 500 1,000 2,000 km

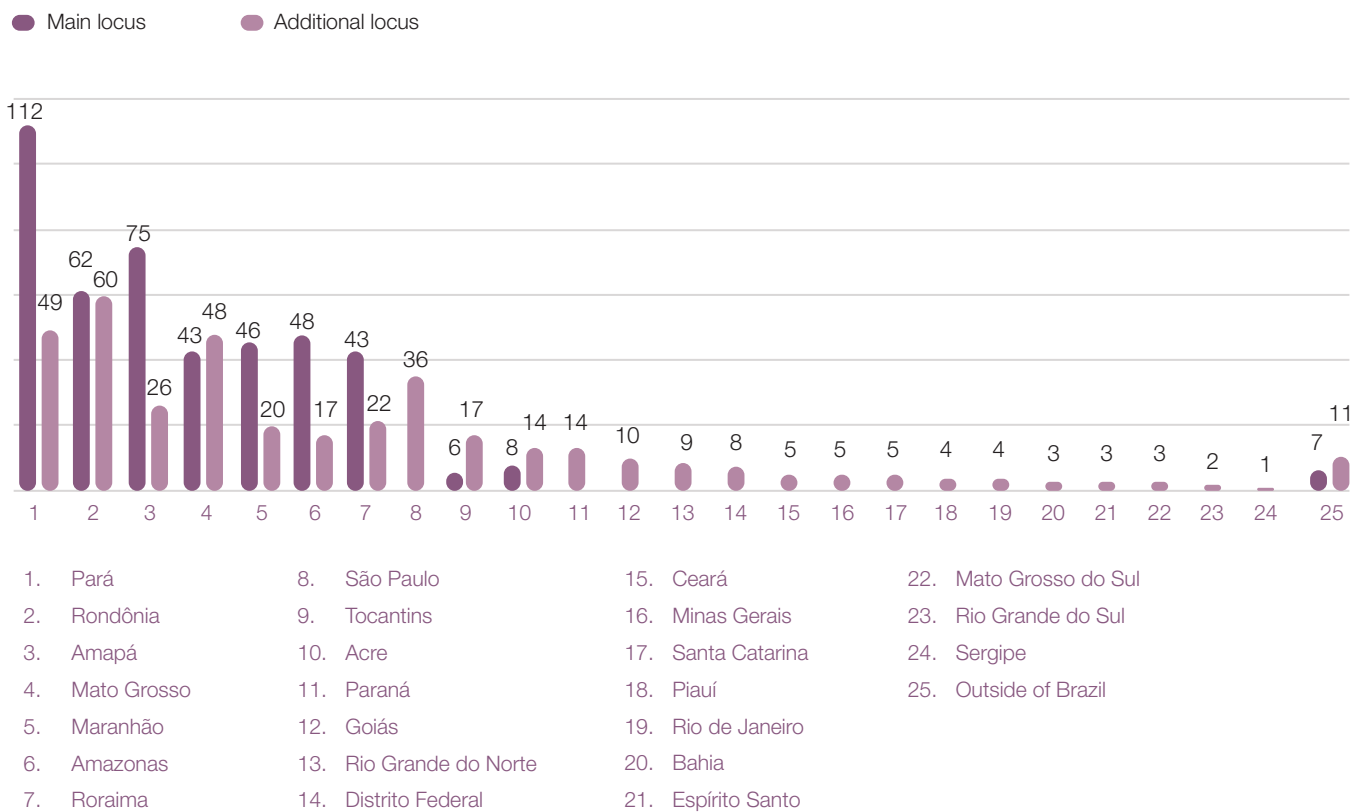
Esri, Garmin, FAO, NOAA, USGS, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



The distribution of mapped territories illustrates different yet complementary dynamics when considering political-administrative boundaries in Brazil as compared to taking a socio-environmental perspective of protected territories of the

Amazon. Chart 1 shows the distribution of mapped territories by state and whether each is a main locus or additional territory in the ecosystem of environmental crime.

**Chart 1.** Number of Territories Mapped by Brazilian State



Pará is the state with the highest number of mapped territories, with 83 Federal Police operations occurring in 161 territories mapped in the state. These territories are located in 46 municipalities in Pará. The Amazon states of Rondônia and Amapá also have a large number of mapped locations: 122 and 101, respectively. In Amapá, 10 of the 16 municipalities in the state appear in the mapping. In Rondônia, territories in 29 of the 52 municipalities appear in the mapping.

Territories in states outside the Legal Amazon are also part of the ecosystem of crime. More territories (36) in the state of São Paulo are involved than in the Amazon

states of Acre and Tocantins. Paraná has 14 territories mapped while Goiás, Rio Grande do Norte and the Federal District have 10, 9 and 8 territories mapped, respectively. Only three states in Brazil - Alagoas, Pernambuco and Paraíba – all located in the Northeast of the country, are not on the list. Moreover, the mapping identified 18 territories in South America, outside Brazil: French Guiana and Venezuela (with five territories each), Suriname (with four territories), Colombia (with two territories), and Paraguay and Bolivia (with one territory each). These data illustrate that the ecosystem of environmental crime in the Amazon extends across borders. This is particularly true in the cases

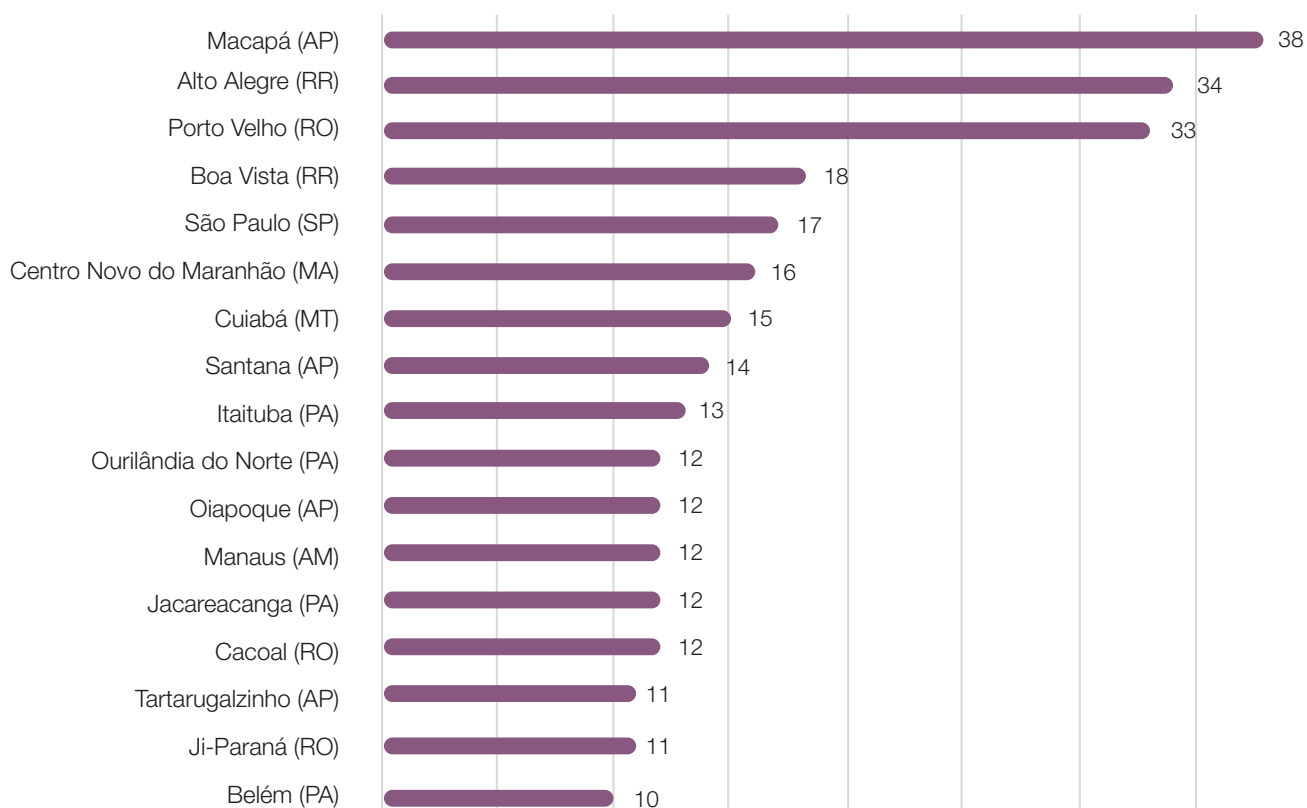
related to gold mining, as we will show later in the paper.<sup>15</sup> The 846 territories mapped out are located in 262 municipalities in Brazil and abroad: 197 municipalities in the Legal Amazon (75% of all cities identified), 57 outside the Legal Amazon (22%) and 8 in neighboring countries outside Brazil (3%).

A closer look at the distribution of mapped territories in the Legal Amazon (as seen in Figure 2) shows areas with a high concentration of Federal Police investigation of criminal activities, as well as some areas where no investigations have taken place. Many investigations have taken place in the north of Roraima; in Amapá (around the capital, Macapá, and in Oiapoque); across the state of Rondônia; in southern Amazonas state and eastern Acre, as well as in western Maranhão.

There is also a significant concentration of territories in the tri-border area of Brazil, Peru and Colombia, and on Brazil's borders with Venezuela, Bolivia and French Guiana. In addition, there are some voids in parts of the interior of Amazonas and Acre, eastern Mato Grosso and the most southern and northern regions of Pará. A more in-depth analysis of the attention or lack of attention given each state by the Federal Police will be the subject of a future report to be published by the Igarapé Institute.

Viewed from a political geography standpoint, several municipalities in Brazil stand out. The 17 municipalities in Chart 2 are those with the largest number of territories identified in the Federal Police operations analyzed, all with ten or more mentions. São Paulo is the only municipality outside the Legal Amazon on this list.

**Chart 2.** Top Municipalities for Environmental and Converging Crimes

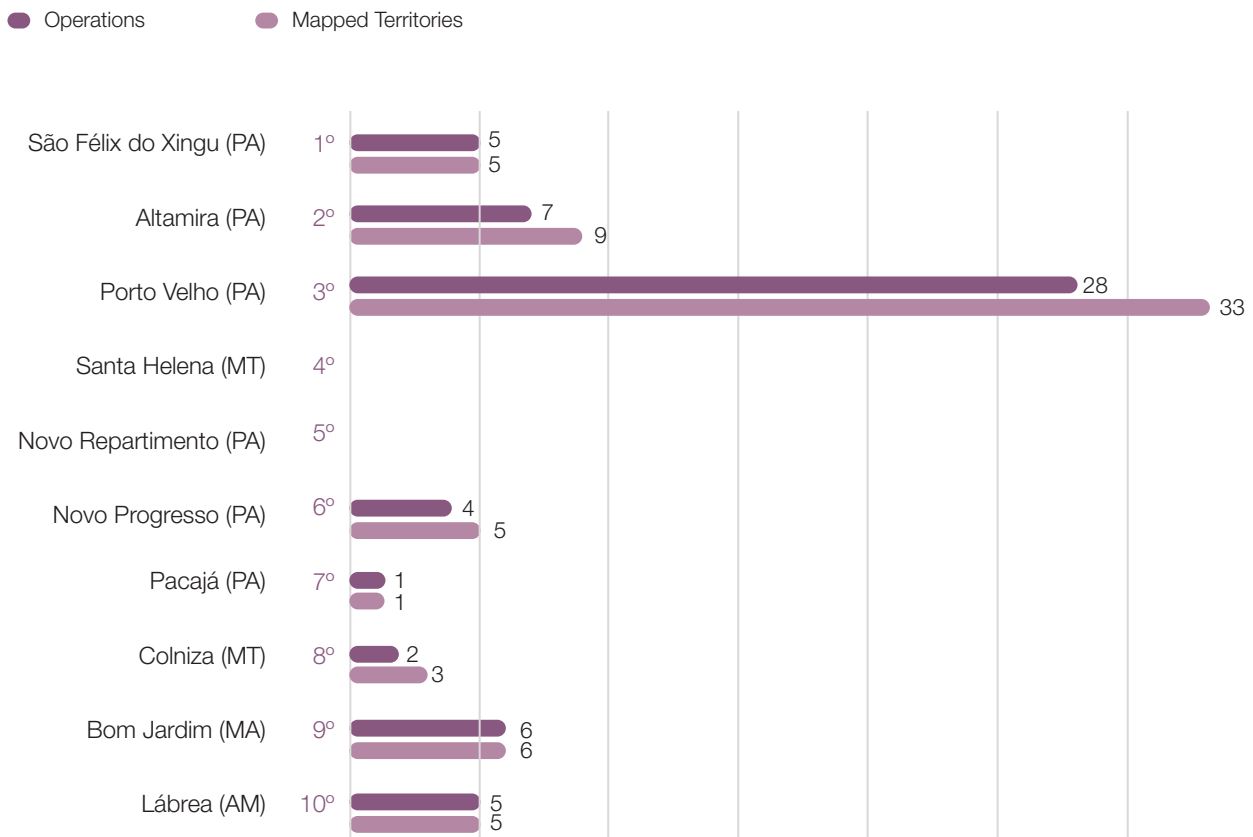


15 Igarapé Institute and INTERPOL. [Guidance note on combating environmental crime: Lessons from fighting illegal gold mining in the Amazon Basin](#). Rio de Janeiro: 2021; InSight Crime and Igarapé Institute. [The Roots of Environmental Crime in the Colombian Amazon](#). Bogotá, Rio de Janeiro: 2021; Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022.

It is noteworthy that of the municipalities in the Amazon most impacted by the ecosystem of environmental crime, only Porto Velho is also among the ten municipalities with the highest rate of deforestation according to data from INPE for the period from 2000 to 2019.<sup>16</sup>

Eight of the ten municipalities dubbed “champions of deforestation” are also key locations for environmental and converging crimes through the lenses of the Federal Police, as illustrated in Chart 3.

**Chart 3.** The Champions of Deforestation and Environmental Crime in the Legal Amazon



Source: Igarapé Institute, based on data from INPE (2009-2019)

The following section gives an analysis of the trajectories for each of the different illicit forest economies.

16 See Data Zoom Amazônia. [‘Ranking de Campeões de Desmatamento’](#), Projeto Amazônia 2030.

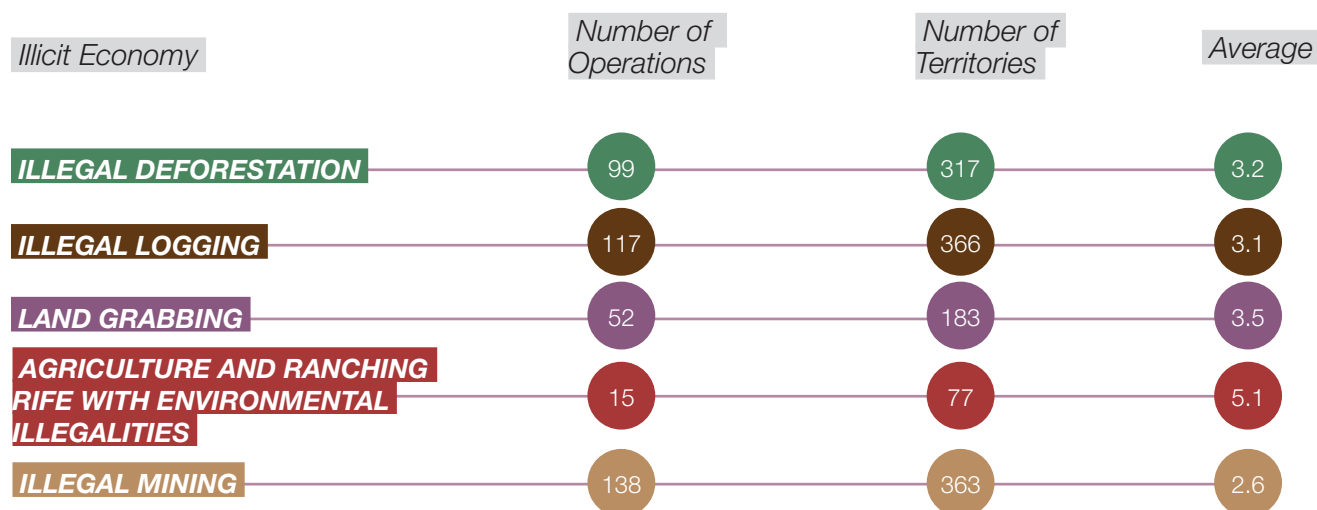
# 3. Trajectories in the Amazonian Ecosystem of Environmental Crime

This section provides an explanation of the relationship between territories of the environmental crime ecosystem in the Amazon based on two complementary analyses. The first examines the network of territories and their connections to several illegal or tainted with illegality economies in the Amazon region. The second looks at the dispersion of the ecosystem of environmental crime in Brazil, highlighting the fact this is a nationwide problem. We will pay special attention to the subsystems of logging and illegal mining, given their importance in the set of mapped operations.

## *Distribution of Illicit and Illegality-tainted Economies in the Amazon*

Although illegal or tainted with illegality economies often overlap within a given territory<sup>17</sup>, they have different origins and trajectories in the Legal Amazon. According to the set of operations analyzed in this study, the operations of the Federal Police that focused<sup>18</sup> illegal logging have more territories in the mapping, followed by illegal mining. These illicit economies were also most often the object of police actions to combat environmental crime in the period studied, as shown in Table 2 below.

**Table 2.** Illicit Economies in Ecosystem of Environmental Crime in the Amazon



\*N > 846 territories, considering any given Federal Police action may have more than one focus

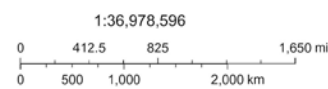
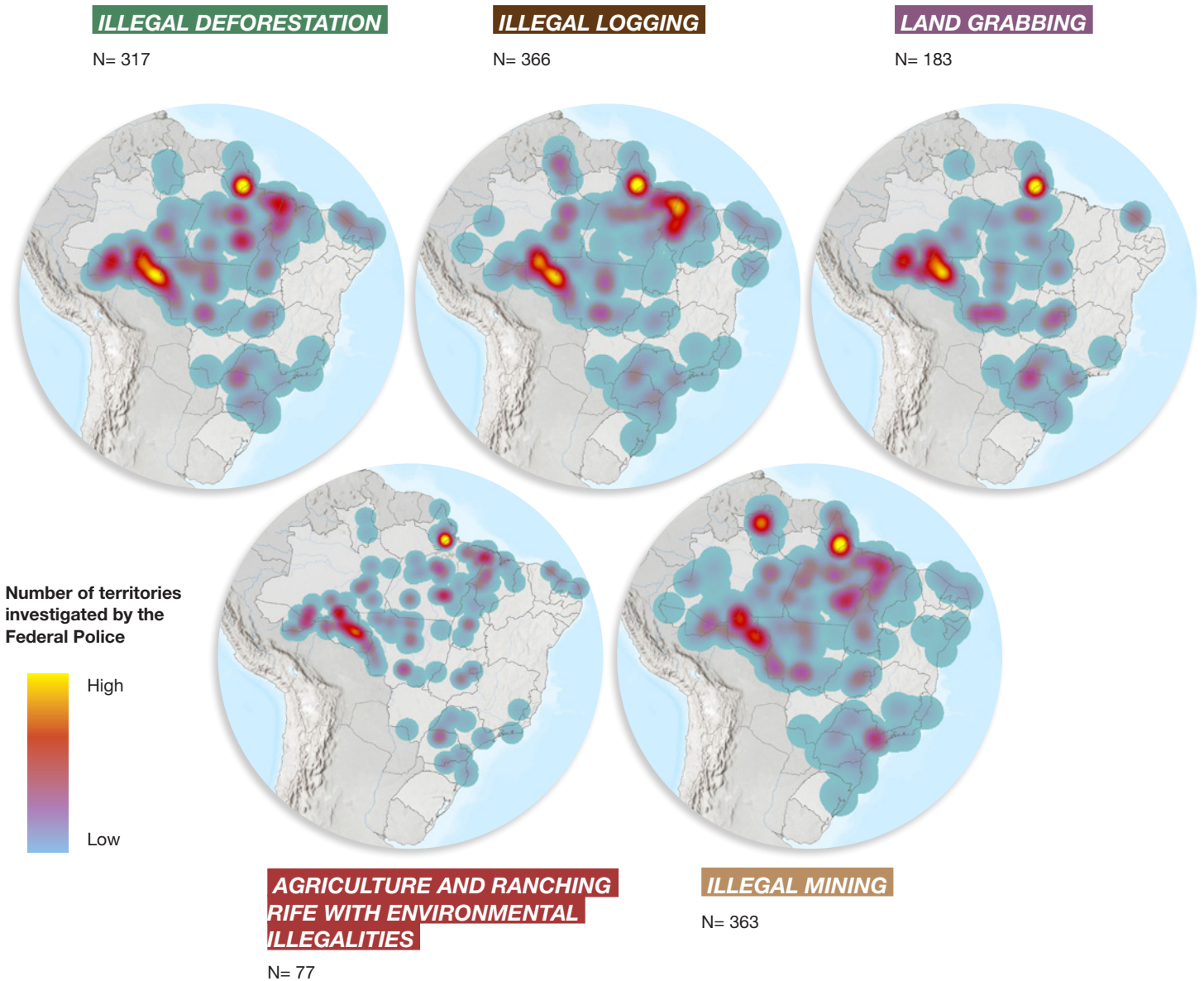
17 For information on the interconnectedness of illegal and illegality-tainted economic activities in the Amazon from the point of view of the Federal Police, see Laura Trajber Waisbich, Melina Rizzo, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022.

18 For information on the “focus” variable in the Igarapé Institute’s Database of Federal Police Operations, see the methodology section.

Figure 3 shows the spatial distribution of each illegal economy. Each of the juxtaposed maps corresponds to a cluster, based on the economic activities that prompt Federal Police

action, namely: (i) illegal deforestation, (ii) illegal logging, (iii) land grabbing, (iv) farming with environmental liabilities and (v) illegal mining.

**Figure 3.** Distribution of Illicit and Illegality-tainted Economies in Brazil



Esri, USGS, Esri, Garmin, FAO, NOAA, USGS, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

An analysis of the spatial distribution of territories of the Amazonian environmental crime ecosystem outside the Legal Amazon reveals the networks of interconnected municipalities involved in each of the illicit forest economies, here called **trajectories**, as illustrated in Figure 4.

An examination of the networks of illegal activities makes it clear that states and municipalities have different functions in the various chains of illegal activities. A subsystem of illegal logging exists in several municipalities, mainly in Maranhão, Rondônia and Pará, including Amarante do Maranhão (Maranhão), Ji-Paraná, Cacoal and Porto Velho (Rondônia), Altamira and Anapu (Pará). An illegal mining subsystem is active in municipalities including Alto Alegre (Roraima), Ourilândia do Norte, Itaituba and Jacareacanga (Pará). Land grabbing and agriculture and livestock farming rife with environmental illegalities occur in the municipalities of Macapá (Amapá), Boca do Acre (Amazonas), Rio Branco (Acre), Porto Velho (Rondônia), Ji-Paraná (Rondônia), as well as the municipalities Altamira and Anapu, both in the Xingu region of Pará. Macapá, Porto Velho, Altamira, Anapu are municipalities that serve as key hubs in all subsystems. The configuration of networks also shows the importance of the city of São Paulo (São Paulo) in almost all illicit economies, predominantly in the illegal mining subsystem and with no participation in agriculture and livestock with environmental liabilities. We will examine São Paulo's role in the ecosystem later.

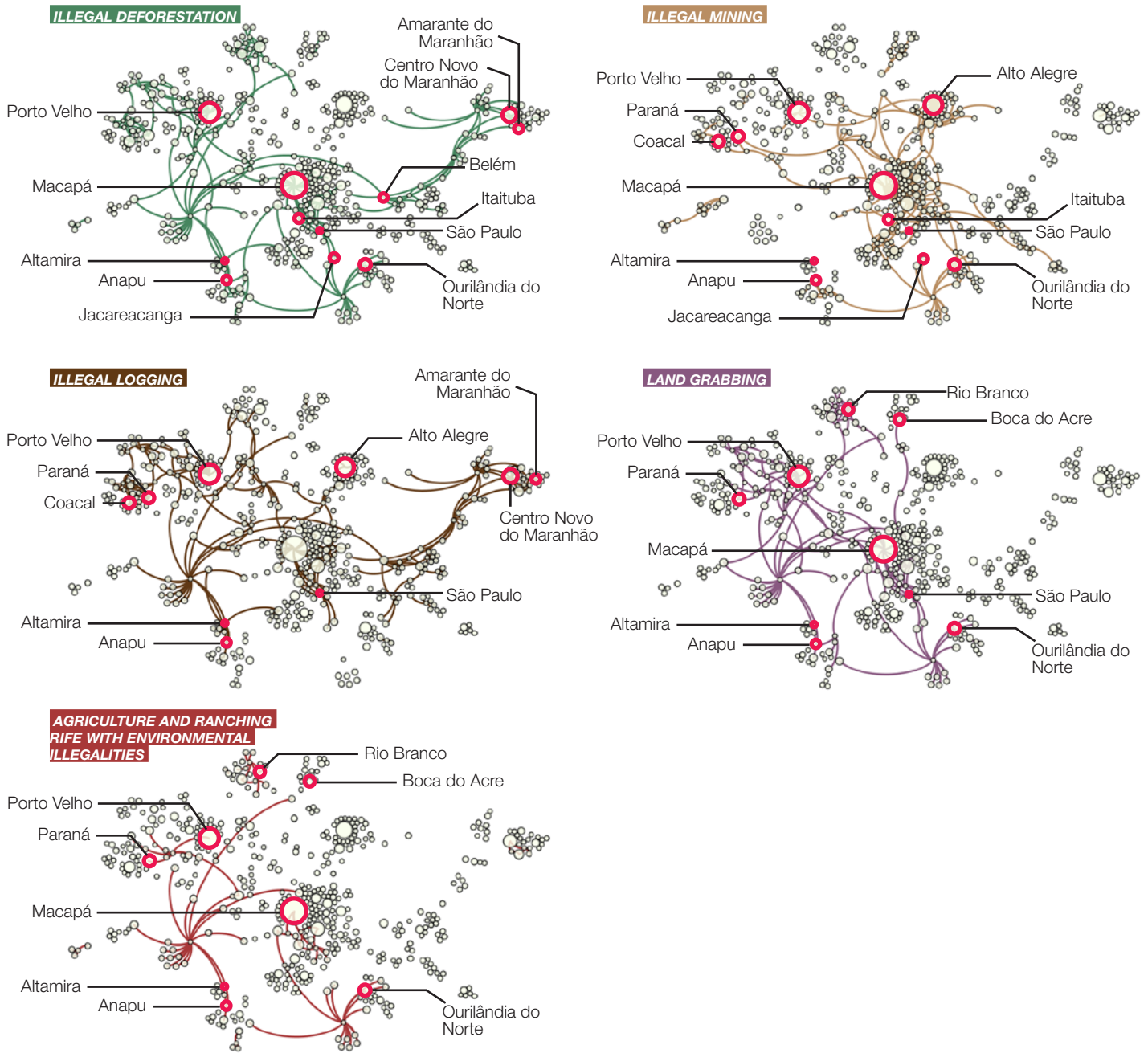
The spatial distribution and network of each illegal or illegality-tainted economic activity shown here highlights the various manifestations of the subsystems of environmental and converging crimes in the territory. The spatial representations of Federal Police investigations for each illicit economy also make it clear that organized environmental crime occurs both in and outside the Amazon. Despite the fact that they took place in the Legal Amazon, 56 (19%) of the 302 operations in the period studied had ramifications outside the Legal Amazon. And of the 846 mapped territories, 132 (16%) were outside the Legal Amazon. The number of territories identified outside the Amazon region also tended to increase. While there were only 16 territories in 2016, in 2019, this number rose to 27, and in 2021, there were 30 territories outside the Legal Amazon under investigation by the Federal Police. In other words, the ecosystem of organized environmental crime in the Amazon has continued to spread across Brazil, rendering the problem the responsibility of the country as a whole.

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*56 (19%) of the 302 operations in the period studied had ramifications outside the Legal Amazon.*

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**Figure 4.** Trajectories of Illicit and Illegality-tainted Economies in the Ecosystem of Environmental Crime in the Amazon



## From the Amazon to the World

Two aspects of the spatial distribution and the trajectories of the various illegal or tainted with illegality economies in the Amazon, as presented above, deserve further study. One is the dual role of the “Amazon city hubs” in the different subsystems, either as the

loci of environmental crime or as key links in the distribution and commercialization of natural resources extracted from more remote regions of the Amazon, as shown in the table below. The second aspect is the trajectories that link the ecosystem with cities outside the Amazon. São Paulo, Pará and Goiás and their capital cities stand out among the states and municipalities identified outside the Amazon region.

## Amazon City Hubs and the Trajectories of Environmental Crime

While environmental crime is spread throughout the forest, state capitals in the Legal Amazon are generally hubs in the networks of environmental crime in the Amazon. State capitals are usually major economic and shipping centers in the sub-regions, as well as the location of public agencies that may be investigated for fraud or corruption.<sup>19</sup> A number of small- and mid-sized cities are playing an increasingly important role in the supply chains of natural resources illegally extracted from forest areas, as shown in the following table.

Municipality	Total territories mapped in the municipality	Mentions as locus of environmental crime	Mentions as additional location
Alta Floresta (MT)	5	1	4
Altamira (PA)	9	4	5
Buriticupu (MA)	8	3	5
Campo Novo de Rondônia (RO)	3	0	3
Itaituba (PA)	13	6	7
Ji-Paraná (RO)	11	7	4
Pacaraima (RR)	4	1	3
Santana (AP)	14	6	8
Santarém (PA)	9	6	3
Vilhena (RO)	4	0	4

As previously mentioned, 36 territories in the state of São Paulo were identified as figuring in the operations in the study. Municipalities in the state of São Paulo are mainly noted in operations to combat illegal mining (17 of the 23 operations involving São Paulo territories). But the state also participated in the criminal subsystems of logging, illegal deforestation, land grabbing and agriculture and livestock farming rife with environmental illegalities, albeit to a lesser extent. Of the 16 municipalities in the state of São Paulo

that participate in the ecosystem, the capital city appears most frequently. Several mid-sized agricultural cities in São Paulo are also mentioned: São José do Rio Preto (three mentions), Araçatuba and Limeira (two mentions each). The location of municipalities in São Paulo in the networks of territories in the environmental crime ecosystem of the Amazon is shown in Figure 5.

<sup>19</sup> In addition to these reasons, when building the database, the research team opted to use general or unspecific mentions of territories (for example, in cases where the locus mentioned by the Federal Police and the communication outlets was “public lands of the state”, “protected areas of the state” or “municipality”) in each state capital.



**Figure 5.** Municipalities in the State of São Paulo in the Amazonian Ecosystem of Environmental Crime

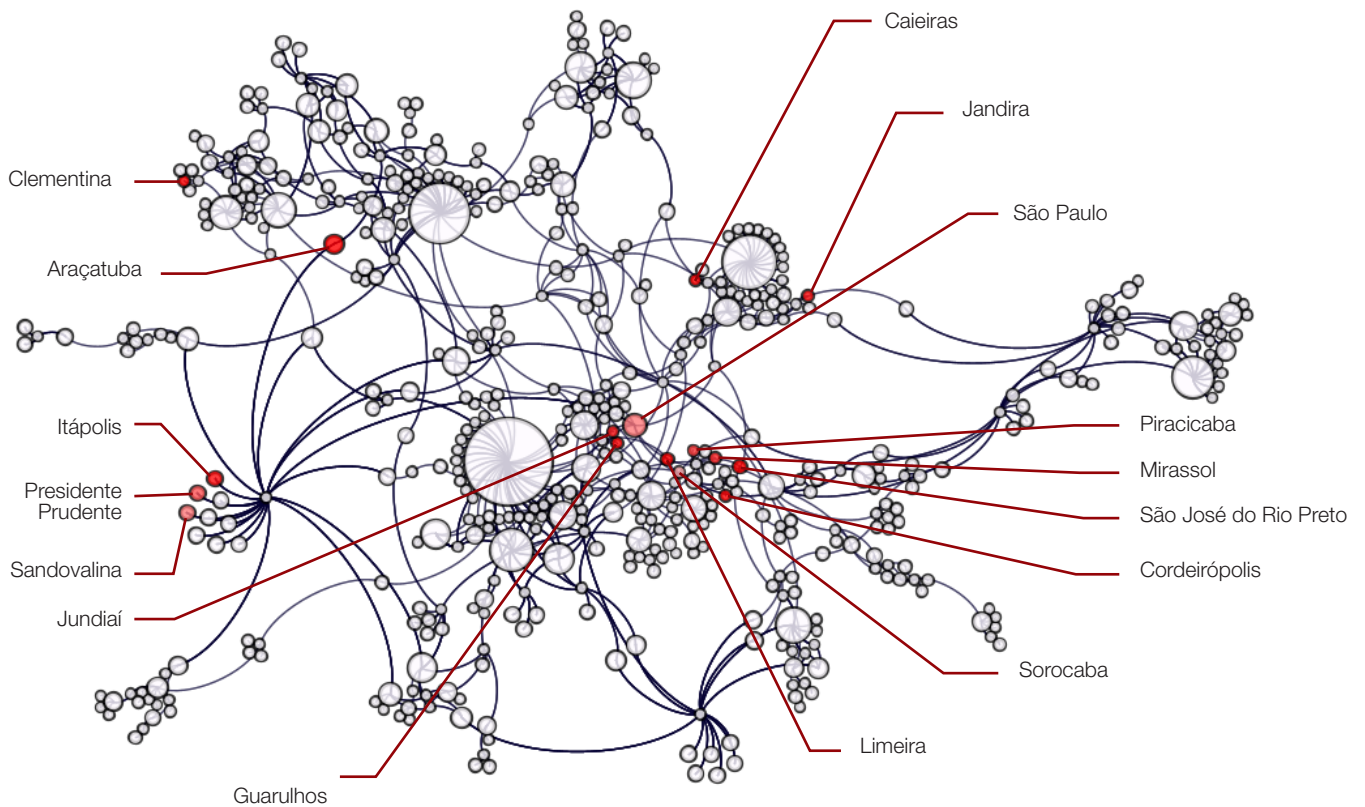
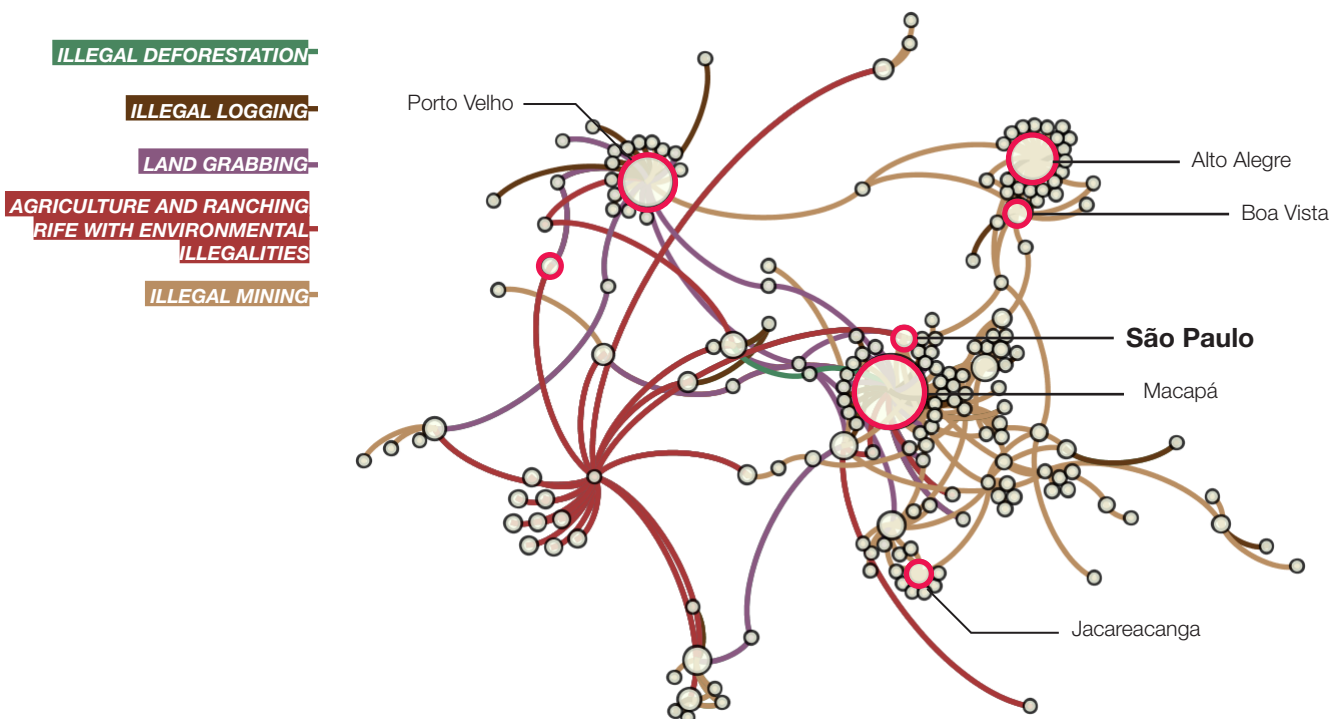


Figure 6 shows the trajectories to the city of São Paulo, the municipality that appears most frequently in the ecosystem and ranks fifth overall (see Chart 2). Figure 6 also shows Amazonian city hubs (state capitals and mid-sized cities) such as Porto Velho, Macapá, Boa Vista, Alto Alegre and Jacareacanga. It is clear that illegal mining operations (with all its connections colored in light green) are located principally on the trajectories that lead to the city of São Paulo.

**Figure 6.** Trajectories to São Paulo city



In Paraná, the second most noted state outside the Legal Amazon, 12 operations mention six municipalities in the state. Maringá and Curitiba had five mentions each. The most common illicit economies are illegal logging and land grabbing. Goiás, the third non-Amazonian state with a major presence in the environmental crime networks, appears in ten Federal Police operations centered in two municipalities: Goiânia (nine mentions) and Goianésia (one mention). In Goiás, mining is the main illicit economy that connects the territories in the state to the Amazon.

This information makes it clear that the states of São Paulo and Goiás are involved in the illegal mining supply chains, principally gold mining, while land grabbing and illegal logging are the primary illicit activities in Paraná. São Paulo plays a central role in financing illegal mining in the Amazon. The Federal Police has been aware of the link between Brazilian richest state and the extraction of natural resources on the Yanomami Indigenous Land for over a decade, as evidenced by Operation Warari Koxi (launched in 2015) which revealed the essential role of São Paulo jewelry businesses in financing the illegal extraction of gold from protected indigenous lands.<sup>20</sup>

As exemplified in the case of mineral extraction on the Yanomami Indigenous Land, environmental crime stems from illicit economies that access consumer markets and financing outside the Amazon. The participation of municipalities in the Midwest, South and Southeast of Brazil are illustrative of the involvement of the country's economic centers in the ecosystem of environmental crime in the Amazon.

## Trajectories of the Timber and Gold Subsystems

As previously described, the fight against illegal logging and mining, especially gold, was the main focus of the Federal Police's activities. These illegal or tainted with illegality economies also generated the most territories in our mapping. Thus, we will provide a more detailed analysis of the paths that connect territories in each of these subsystems.<sup>21</sup>

### TIMBER

The timber ecosystem appears most among the territories mapped. Of the 366 locations mapped, 193 (53%) were main sites of environmental crime, while 173 (47%) additional territories had some connection to environmental or converging crimes. Of the mapped territories, 318 (87%) are within the Legal Amazon and 48 (13%) are outside the region.

The states of Rondônia and Maranhão are key players in this subsystem. Again, states outside the Legal Amazon – mainly Paraná and São Paulo – are involved. A total of 23 states and 166 municipalities in Brazil appear in territories connected to this illicit economy. Federal Police investigations of logging do not explicitly link territories in other countries in the Amazon to the criminal ecosystem.

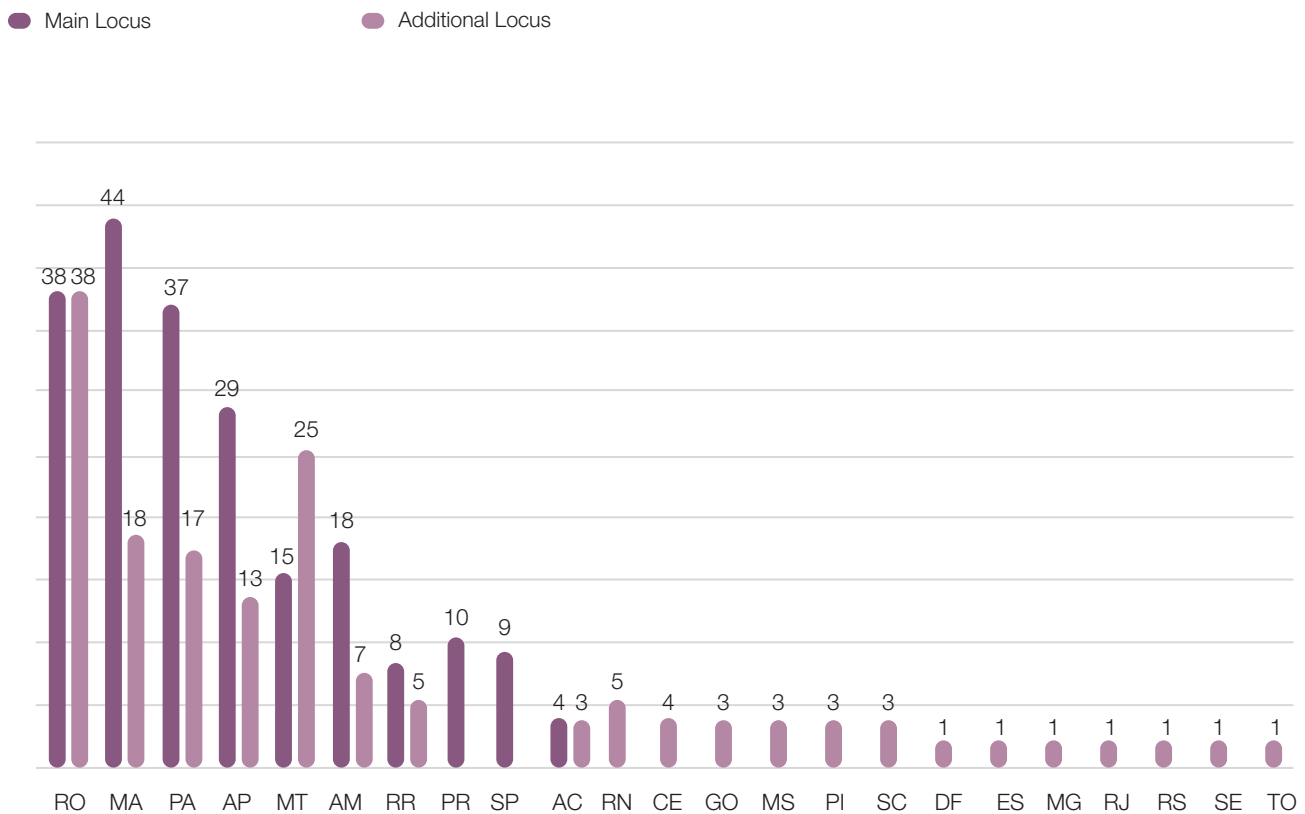
20 G1, 'PF faz operação de combate à extração ilegal de ouro em Roraima', G1, May 7, 2015; Kátia Brasil, 'PF desarticula organização criminosa de extração de ouro na reserva Yanomami', *Amazônia Real*, July 15, 2022.

21 For further information about the focus of Federal Police operations involving different illicit and illegality-tainted economies during the period studied período, see Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil, *The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil*. Strategic Paper 55, Igarapé Institute, 2022.

This does not mean, however, that investigations did not identify, albeit indirectly, transnational connections in the illegal timber supply chain, especially to consumer markets in North America and Europe.<sup>22</sup> However, as there have been more sales of illegally sourced Amazon timber to domestic than foreign markets,<sup>23</sup> and these supply chains do not necessarily involve countries around Brazil, this aspect of the phenomenon does not appear in the mapping presented here.

This should not, however, diminish the growing significance of transnational linkages in this market, either as foreign consumer markets, or for the link between the illicit extraction of timber and other transnational organized crime networks operating in other illicit economies, such as drug trafficking, as mentioned in the first section.<sup>24</sup>

**Chart 4.** Territories Mapped by Brazilian State with Involvement in Illegal Logging



22 This is the case, for example, in operations like *Arquimedes I* (2017), *Handroanthus GLO* (2020) and *Ka'apor* (2018).

23 Pablo Pereira. 'Problema maior da madeira ilegal não é exportação, mas comércio interno, diz biólogo', *Estado de São Paulo*, November 20, 2020.

24 Clarissa Levy, Ricardo Terto and Ciro Barros. *Deu match: desmatamento e narcotráfico*. *A Pública, Podcast*. September 3, 2021. Allan de Abreu, Luiz Fernando Toledo and Eduardo Goulart. 'How Endangered Brazilian Timber Ends Up in the US', *OCCRP*, April 2, 2022.

Of the 117 operations with this focus, almost half of them (53) investigated environmental crimes on Indigenous Lands. There were 70 territories (19%) related to illicit logging present in 26 distinct Indigenous Lands. The most affected were Araribóia (in Maranhão) with seven mentions, Alto Rio Guamá (in Pará) and Caru (in Maranhão) with six mentions each. The Alto-Turiaçu and Awá Indigenous Lands (in Maranhão), as well as the 7 de Setembro and Igarapé-Lourdes Indigenous Lands (in Rondônia) appear with five mentions each.

In addition, 22 Federal Police operations sought to combat illegal logging in ten different protected natural areas (Conservation Units and Permanent Protection Areas). For five operations mapped (two in Mato Grosso, two in Pará, and one in Amazonas) it was not possible to identify the specific protected area affected. Overall, the most affected protected area was the Gurupi Biological Reserve (in Maranhão), which appears seven times in the mapped operations.

## The Trajectories of Timber

The Federal Police investigated 19 occurrences of illegal logging that took place in more than five locations. Operation Rio Voadores was launched in Pará in 2016 to combat illegal logging, land grabbing, illegal deforestation, and agriculture and livestock farming rife with environmental illegalities in and around the Menkragnoti Indigenous Land in Altamira. The operation covered 19 territories in the Legal Amazon and beyond. A formal complaint about ongoing environmental crime on and around the Indigenous Land was initially submitted to Ibama by Kayapó indigenous communities in 2014. The police operation involved 15 members of the Federal Revenue Agency, 95 Federal Police officers, and 30 agents from IBAMA. According to the Public Prosecutor's Office, this operation was among the ten largest operations to combat deforestation in the Amazon since 2014.<sup>25</sup>

According to investigations, a criminal organization in Pará systematically converted forests into pastures by taking control of land, removing and selling the valuable timber and then clearing the remaining forest by burning it down. The degraded areas were turned into pasture and subdivided for sale or lease to farmers for livestock. The criminal organization use forged documents, and forced laborers who worked in slave-like conditions. The scheme also involved falsifying names on the rural land regularization registration application (CAR, by the Portuguese acronym) to avoid penalization for the environmental damage. The group also evaded environmental inspection by employing geoprocessing professionals to assist in “multipoint deforestation” (destroying the forest below the canopy while leaving enough vegetation cover to deceive satellite monitoring). The scheme involved the creation of fictitious companies to facilitate payments to members of the crime organization. In addition to the crimes of logging, land grabbing, illegal deforestation and arson, the suspects *modus operandi* included fraud, money laundering and human trafficking.

According to IBAMA inspection data, the criminal organization was headed by a São Paulo rancher who received the highest fines ever imposed in the Brazilian Amazon (a total of BRL 119.8 million for ten citations). The area seized was the largest ever seized in the region by IBAMA (29 thousand hectares or 290 km<sup>2</sup>).<sup>26</sup> According to police reports, the scheme generated BRL 1.9 billion over four years (2012-2015)

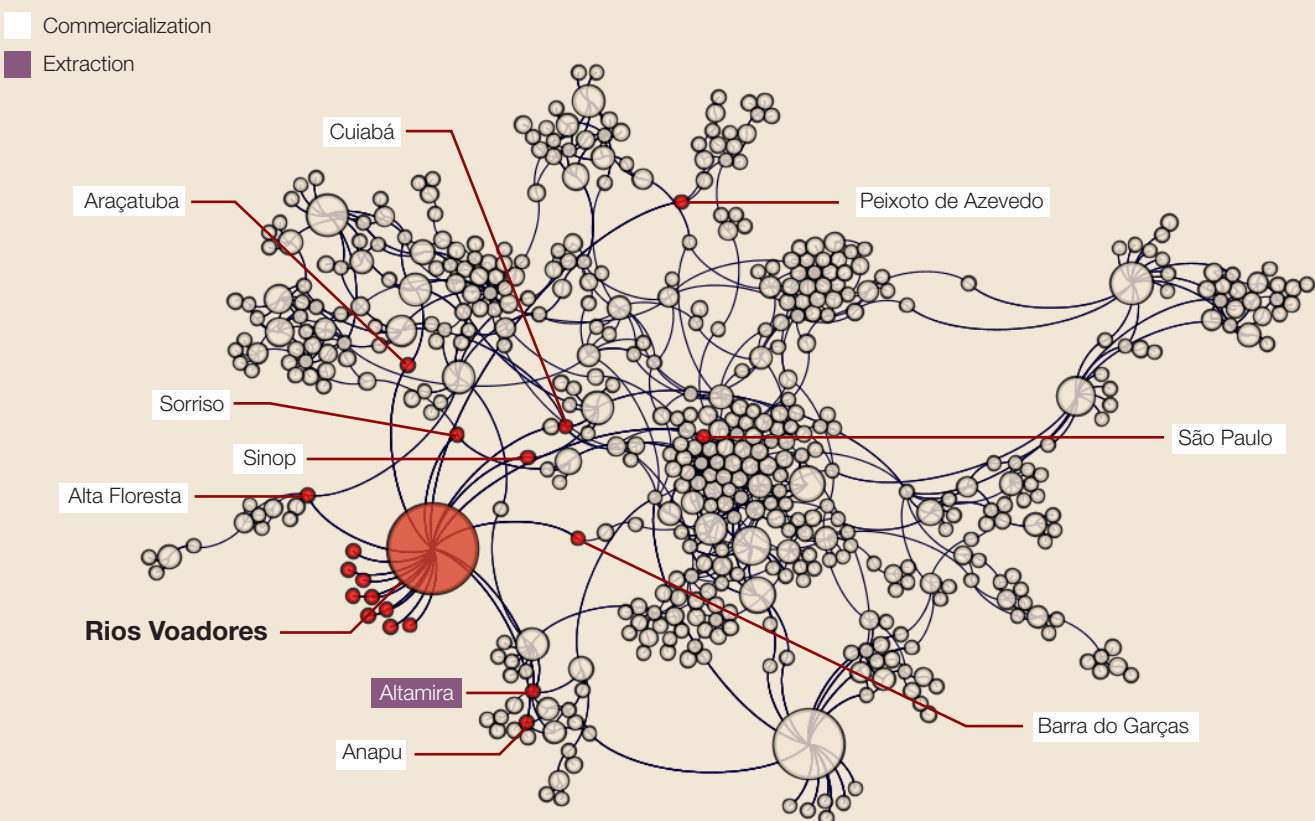
25 Jornal Nacional. '[Nenhum desmatador da Amazônia foi condenado nos últimos cinco anos](#)', G1, September 13, 2019.

26 Ibama. '[Operação desarticula quadrilha de desmatadores que movimentou R\\$ 1,9 bi no Pará](#)', June 30, 2016.

and caused environmental damage of more than BRL 160 million. The cost to public coffers in non-payment of taxes was estimated by the Federal Revenue Service at BRL 50 million.<sup>27</sup>

While the conversion of forests into pasture was concentrated around Altamira, investigations found that the trajectories in this environmental crime network reached other locations in Pará (Anapu and Novo Progresso), Mato Grosso (Alta Floresta, Barra do Garças, Cuiabá, Guarantã do Norte, Peixoto de Azevedo, Porto Alegre do Norte, Rondonópolis, Sinop and Sorriso), Mato Grosso do Sul (Ponta Porã), Santa Catarina (São José) and São Paulo (Araçatuba, Itápolis, Presidente Prudente, Sandovalina and São Paulo). The considerable number of locations in the state of Mato Grosso is related to timber and livestock supply chains, including the purchase of equipment and sale of cattle raised in Pará to slaughterhouses in Mato Grosso, as well as the participation of local environmental authorities from Mato Grosso in the scheme.<sup>28</sup> The locations in São Paulo, on the other hand, are the result of the key role of a rancher from São Paulo, who used family members as point people for the concealment of illegal financial gains.<sup>29</sup> The Federal Public Prosecutor has been unable to obtain a conviction for the leader of the scheme, who is thought to be one of the principal deforesters in the Amazon.

## Trajectories of Timber: Operation Rios Voadores



27 Receita Federal. 'Operação Rios Voadores: Receita Federal combate organização criminosa especializada em grilagem de terras públicas, crimes ambientais e lavagem de dinheiros e lavagem de dinheiro', June 30, 2016.

28 Federal Public Prosecutor. 'Rios Voadores: ex-gerente do Ibama dava 'cobertura' ao maior desmatador da Amazônia', January 1, 2017.

29 Maiana Diniz. 'Operação desarticula a maior quadrilha de desmatamento e grilagem da Amazônia', *Agência Brasil*, June 30, 2016; Juliana Tinoco and Márcio Isense e Sá. 'O grileiro dos Jardins', *((o))eco*, October 7, 2016; Mauricio Torres, Sue Branford. 'A máfia do desmatamento', *The Intercept Brasil*, March 22, 2017.

## MINING

Illegal mining is another major illicit economy and the target of 138 Federal Police operations in 363 mapped territories. In operations in 2016, 13 territories were surveyed. Over the years, the number of territories rose, reaching a total of 126 territories surveyed in 2021. The increased number of illegal mining territories is related not only to the attention given to combating illegal extraction of gold and other minerals (manganese, cassiterite and diamond, among others) during the period studied,<sup>30</sup> but also because the Federal Police and the Public Prosecutor's Office intensified their efforts to fight crime along the supply chain by prioritizing investigation and prosecution of illicit acts related to the commercialization of ore.<sup>31</sup>

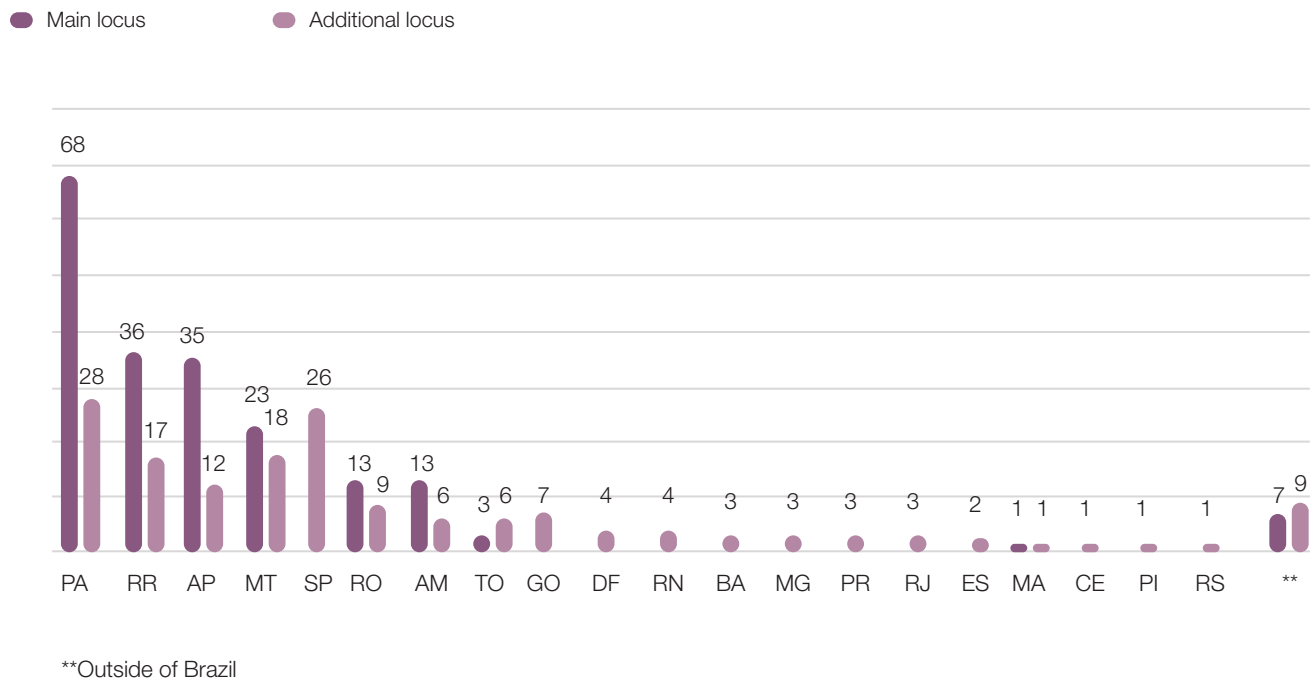
Of the more than 350 territories involved in mining, 199 (55%) are central locations for environmental crime and 164 (45%) are ancillary sites. In addition, 289 (80%) are within the Legal Amazon and 74 (20%) are spread across Brazil or in neighboring countries, with a slightly higher incidence of locations outside the Legal Amazon than observed in the case of timber. Of the territories surveyed, Pará is clearly the most affected state, followed by Roraima. Both serve as the locus of environmental crime and are the site of additional locations of extreme relevance in the trajectories of illegal mining in Brazil, as in the case of the municipalities of Santarém and Itaituba. Of the states in the Legal Amazon, Acre does not appear in this survey. In all, 125 cities are involved in the mining ecosystem, in Brazil and abroad.

Outside the Legal Amazon, the state of São Paulo stands out with 26 territories spread over 12 cities. The city of São Paulo alone accounts for almost half the mentions (12). Unlike what was observed in the case of logging, starting in 2019, cross-border connections with territories located in other Amazonian countries began to appear, namely in French Guiana, Venezuela and Suriname.

30 Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022..

31 Brasil. Ministério Público Federal. Câmara de Coordenação e Revisão, 4. [Mineração ilegal de ouro na Amazônia: marcos jurídicos e questões controversas](#). Brasília: MPF, 2020; Manzolli et al, 2021. See also Reynaldo Turolo Jr., João Pedroso de Campos and Adacioni Santos. ['O polêmico prefeito da cidade de onde sai 81% do ouro ilegal do Brasil'](#), *Revista Veja*, April 22, 2022.

**Chart 5.** Territories Mapped by Brazilian State with Involvement in Illegal Mining



A large number of territories linked to illegal mining overlap protected areas in the Amazon. Of the territories mapped in this subsystem, 70 overlapped Indigenous Lands. There were 53 Federal Police operations carried out in 16 Indigenous Lands in the Legal Amazon. The Yanomami Indigenous Land alone accounts for 24 mentions, while the Munduruku Indigenous Land for eight. Another 11 mapped territories overlap eight distinct environmental protection areas. The Roraima National Forest had three mentions, and the Madeira River Environmental Protection Area had two. In total, the 81 territories in protected areas in the Amazon account for 22% of the total territories linked to the mining ecosystem. This number rises to 41% if we consider only the territories that are the main site of environmental crime.

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*A large number of territories linked to illegal mining overlap protected areas in the Amazon. Of the territories mapped in this subsystem, 70 overlapped Indigenous Lands.*

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## The Trajectories of Gold

Beginning in 2019, there were 11 Federal Police operations to combat illegal mining in more than five territories. Operation Ouro Perdido, launched in 2019 in Amapá by the Federal Police in conjunction with the Federal Revenue Service, the Federal Public Prosecutor's Office, the Brazilian Air Force, and the Brazilian Army, identified illicit extraction around the tri-border area of French Guiana, Suriname and Amapá (near Oiapoque). They determined that the gold was sold in Brazil. The operation targeted eight territories, including those linked to the environmental crime of illicit gold extraction in Amapá and neighboring countries, as well as the territories involved in the ecosystem as the location of the sale of gold, such as other Amazonian cities (Macapá and Itaituba) and cities outside the Amazon (Goiânia and four cities in the state of São Paulo: Jundiá, Limeira, Guarulhos and São Paulo).

The investigations uncovered a criminal association headed by Brazilian miners operating gold mines in the Amazon in Brazil and neighboring countries. The gold was sold to individuals and businesses, including a bank, in the municipality of Oiapoque and several other areas in Brazil. This gold acquisition and sales operations earned approximately BRL 145 million<sup>32</sup> between 2012 and 2017. At least 20 companies were found to be involved in the purchase and sale of gold and jewelry making in Oiapoque. The transactions were not registered with the Financial Activities Control Council (COAF) and the sale of the gold was done without authorization from the Central Bank. The company that purchased the gold was located in São Paulo.<sup>33</sup> This same company figured in other investigations of illegal gold extraction, corruption, fraud, and money laundering in Roraima. According to investigations in Operation Hespérides (launched in Roraima in 2019), the São Paulo company that purchased illegal gold extracted from the Amazon exported more than BRL 1 billion worth of gold in 2018.

Operation Ouro Perdido led to indictments for economic and financial crime, money laundering, as well as tax fraud, among others. This case is one of the few mapped to date in which the police investigation took place in collaboration with French law enforcement in Saint-Georges-de-l'Oyapock, French Guiana. The chart below shows the networks of territories in Operation Ouro Perdido.

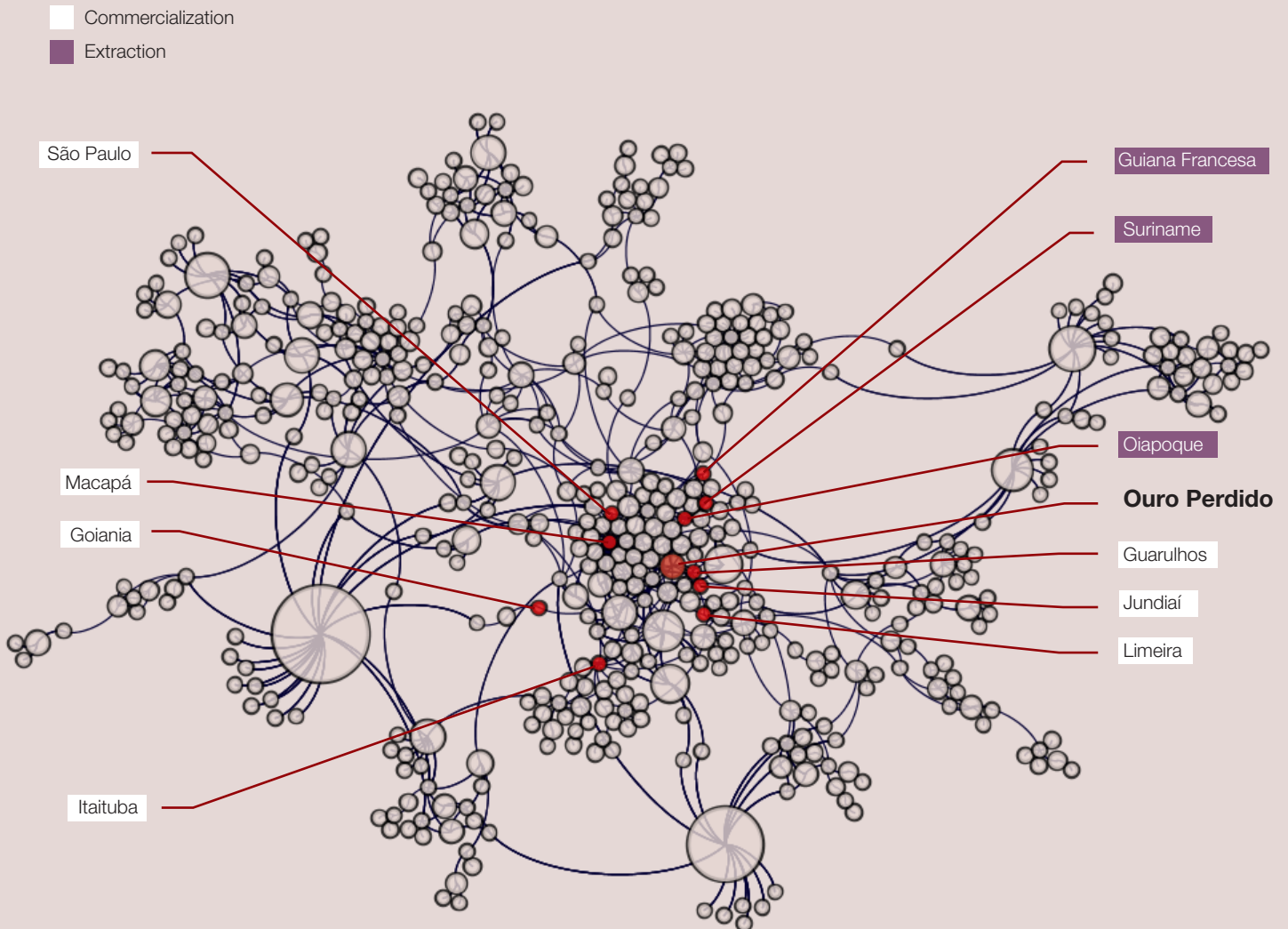
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32 G1. ['Operação da PF em 4 estados investiga destino de ouro extraído ilegalmente no Amapá'](#), G1, June 18, 2019.

33 Vania Souza. ['PF desarticula esquema que movimentou R\\$ 230 mi em ouro'](#), Agência Record, R7, December 6, 2019.



## Trajectories of Gold: Operation Ouro Perdido



It was discovered in Operation Ouro Perdido that raw gold from forest areas is transported to cities, such as São Paulo and municipalities in the Amazon, where it enters value chains and is eventually exported. This is the case in Manaus (Amazonas), Santarém (Pará) and Itaituba (Pará) which serve as points of purchase for gold extracted from illegal mining in different parts of the Amazon, in other words, “gold laundering.” The same phenomenon occurs with gold extracted in the

state of Roraima, which does not have current small-scale mining authorization (PLGs). The illegally extracted gold must be transported to other points of sale and purchase in the Amazon to be “laundered” and thus integrated into legal markets,<sup>34</sup> such as Manaus, Santarém and Itaituba.

<sup>34</sup> Guilherme Henrique and Ana Magalhães. ‘HStern, Ourominas e D’Gold: as principais compradoras do ouro ilegal da TI Yanomami’, *Repórter Brasil*, May 24, 2021.

## 4. The Ecosystem of Environmental Crime in the Amazon

In this section, we provide an in-depth analysis of the pressure exerted on the Amazon region by the ecosystem of environmental crime through an examination of the types of land use and designation, and the various levels of socio-environmental protections in effect. Regulations that affect the mosaic of both designated and undesignated areas generate different types of illegal activity and, in turn, reactions by public agencies, including the Federal Police.

Next, we focus on the territories identified inside the Legal Amazon, focusing our attention to areas with social and environmental protections in place, such as Indigenous Lands, Conservation Units and other environmental protection areas, agrarian reform settlements, undesignated public lands, and regions under intense deforestation pressure. We provide an overview of the pressure put on each of these spaces by the ecosystem of environmental crime.

### ***Environmental and Converging Crimes in Protected Areas***

Of the more than 800 territories investigated, 188 (22%) of them were in previously designated forest areas that were demarcated and approved as protected territories in the Legal Amazon. Of these, 141 overlapped with Indigenous Lands and 47 with Conservation Units (UCs) and Environmental Protection Areas (APPs, by the Portuguese acronym).

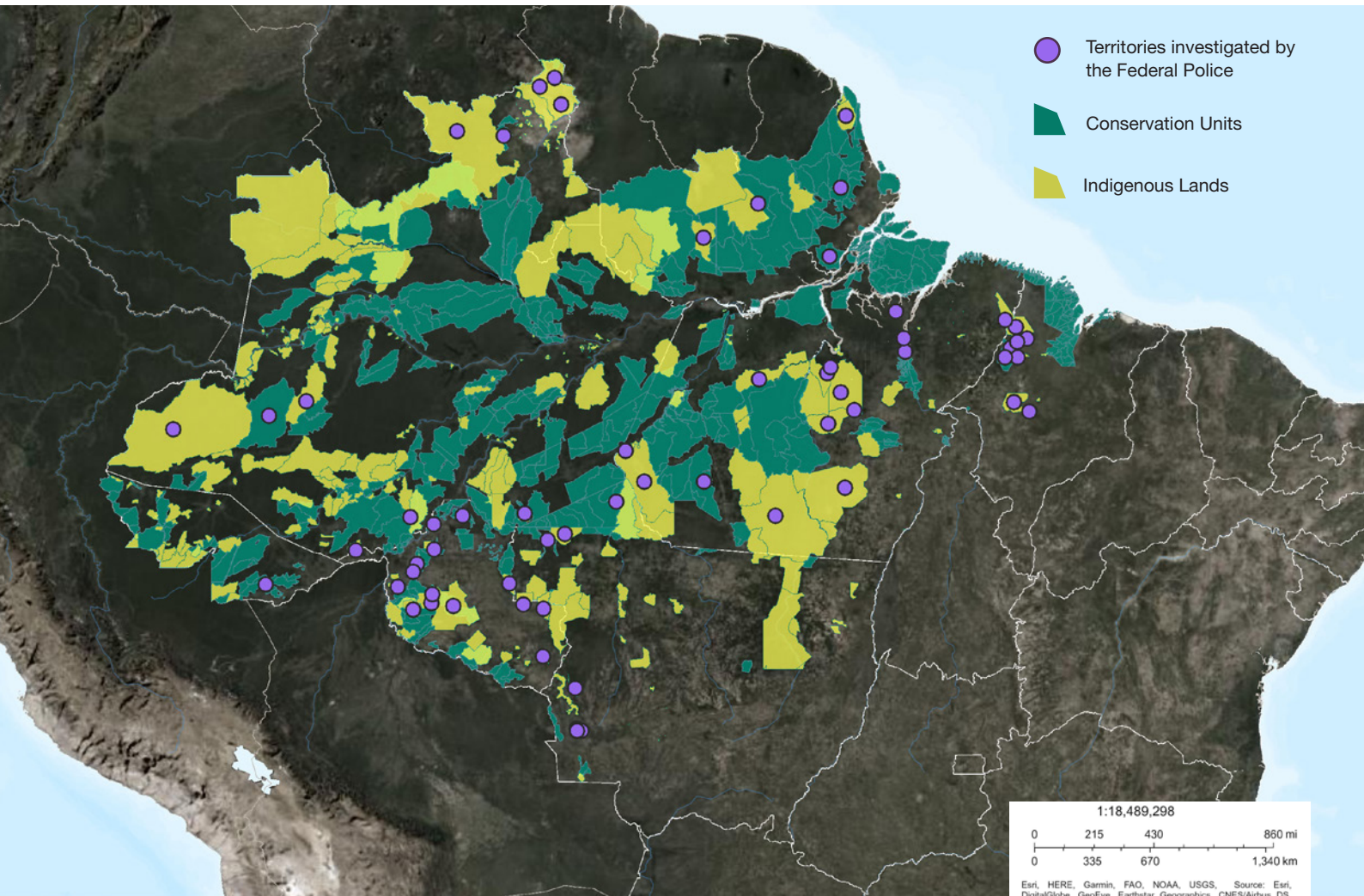
Of all operations carried out in the period, 45% (135 of the 302 mapped) were aimed at combating environmental crimes in protected areas in the Amazon.

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*Of all operations carried out in the period, 45% were aimed at combating environmental crimes in protected areas in the Amazon.*

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**Figure 7.** Territories of the Ecosystem of Environmental Crime Overlapping Protected Areas in the Brazilian Legal Amazon



Less vegetation cover has been lost in the patchwork of designated protected areas than in other areas. This is true both historically as well as in recent years, when rates of deforestation in the Amazon have accelerated. Research shows that between 2005 and 2012, rates of loss of native vegetation in traditional Quilombola Lands and Conservation Units were approximately six times lower than in unprotected areas of the Amazon,<sup>35</sup> while on Indigenous Lands, rates were 17 times lower. Data from MapBiomias further shows that over

the last 30 years, Indigenous Lands lost 1% of native vegetation, while there was a 20.6% loss on private rural properties.<sup>36</sup> In addition, the demarcated Indigenous and Quilombola Lands contributed two to three times more to the regeneration of native vegetation between 2012 and 2017.<sup>37</sup> These territories, however, are increasingly the target of illegal extraction and devastation, as shown by the Police Federal actions analyzed here.

35 Lais Modelli. '[Perda florestal na Amazônia é 17 vezes menor em Terras Indígenas que em áreas não protegidas](#)', *Mongabay*, April 25, 2022.

36 MapBiomias. [Fatos sobre o papel das Terras Indígenas na proteção das florestas](#), MapBiomias, April 2022.

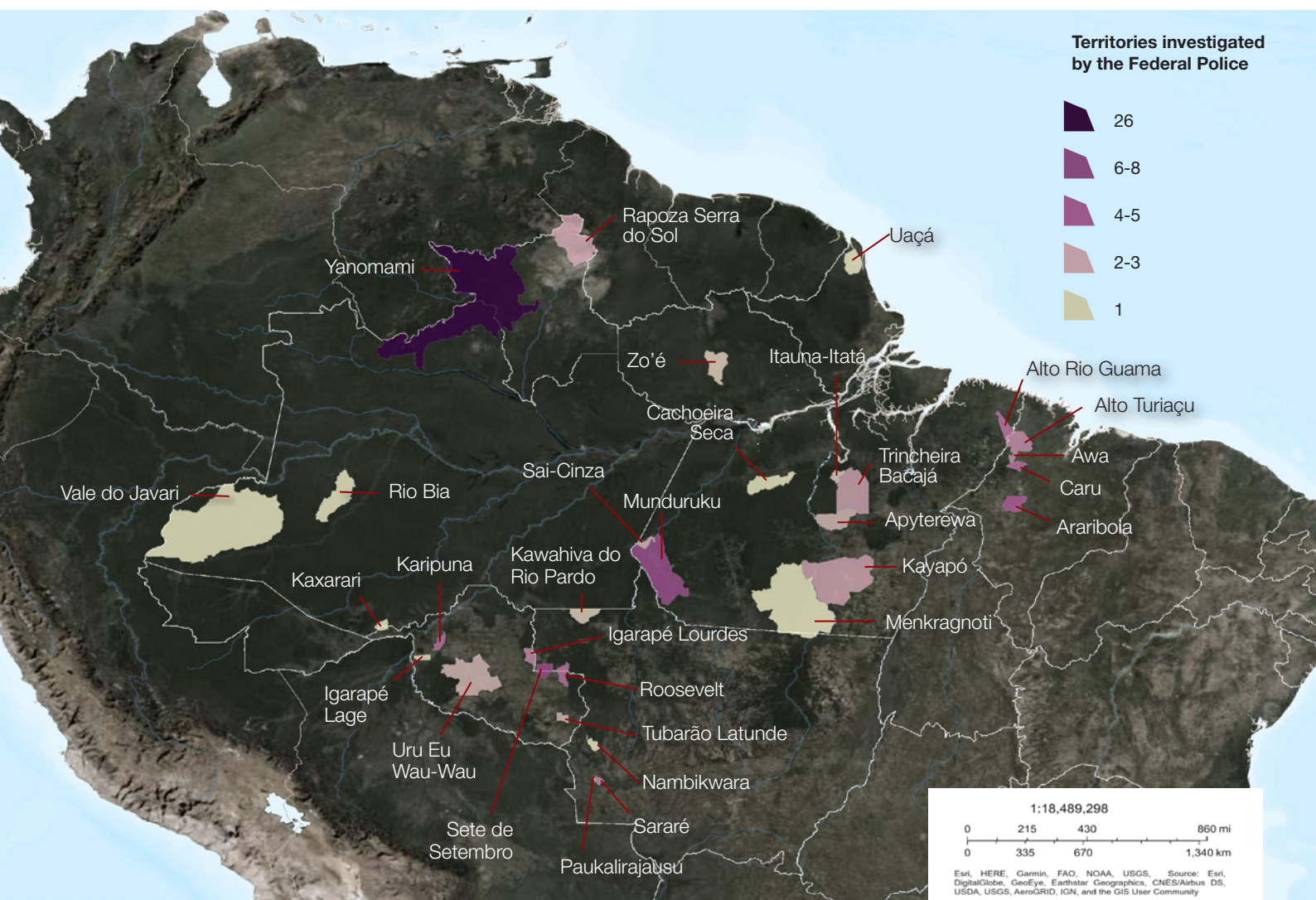
37 Lais Modelli. '[Perda florestal na Amazônia é 17 vezes menor em Terras Indígenas que em áreas não protegidas](#)', *Mongabay*, April 25, 2022.

## Indigenous Lands Under Threat

Of the 451 territories mapped as the locus of environmental crime in the Legal Amazon, 141 (31%) are located on Indigenous Land. In total, 37 Indigenous Lands were affected by environmental and related crime in the Legal Amazon in the period studied. The greatest impacts were seen on the Yanomami Indigenous Land in Roraima (with 26 police actions to combat illegal logging and mining), the Munduruku Indigenous Land in Pará (with

eight mentions linked to illegal mining), the 7 de Setembro Indigenous Land in Rondônia (with eight mentions linked to illegal mining and logging), the Araribóia Indigenous Land in Maranhão (with seven mentions linked to land grabbing and illegal logging), the Caru Indigenous Land in Maranhão (with six mentions related to illegal logging), the Karipuna Indigenous Land and the Alto do Rio Guamá Indigenous Land in Pará (with six mentions linked to illegal logging), and the Roosevelt Indigenous Land in Rondônia (with six mentions linked to illegal logging and mining).

**Figure 8.** Overlapping Territories of Environmental Crime and Indigenous Land In Brazil's Legal Amazon

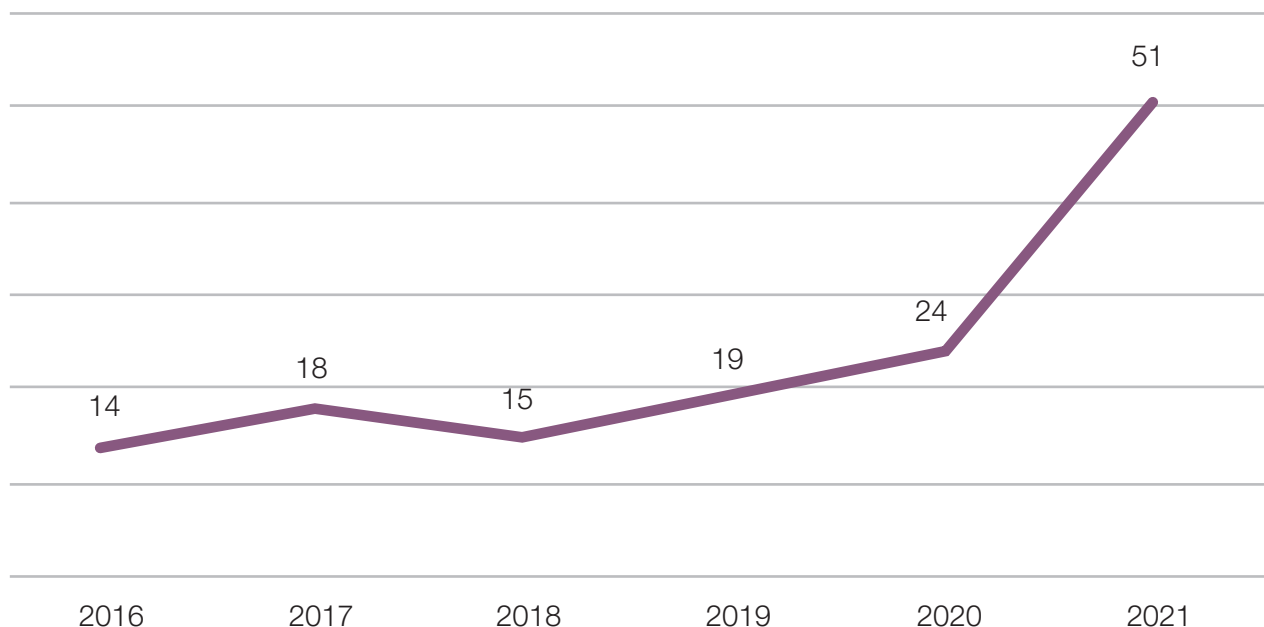


Federal Police actions reflect the expansion of environmental and related crime on Indigenous Lands in the Legal Amazon, especially since 2019, and more sharply in 2021, as shown in Chart 6. This rise is due in large part to increased mining on and near Indigenous Lands, particularly in Roraima and Pará, where there were more police actions to prevent criminal acts and remove invaders, as well as additional large-scale investigations of perpetrators of illegal sale and extraction of gold from Indigenous Lands in the Amazon, including financial institutions (stocks and securities companies known as DTVMs) that made the initial purchase of gold.<sup>38</sup>

*Federal Police actions reflect the expansion of environmental and related crime on Indigenous Lands in the Legal Amazon, especially since 2019, and more sharply in 2021.*

**Chart 6.** Territories of Environmental Crime on Indigenous Land in Brazil's Legal Amazon, by Year

\*N =141 territories

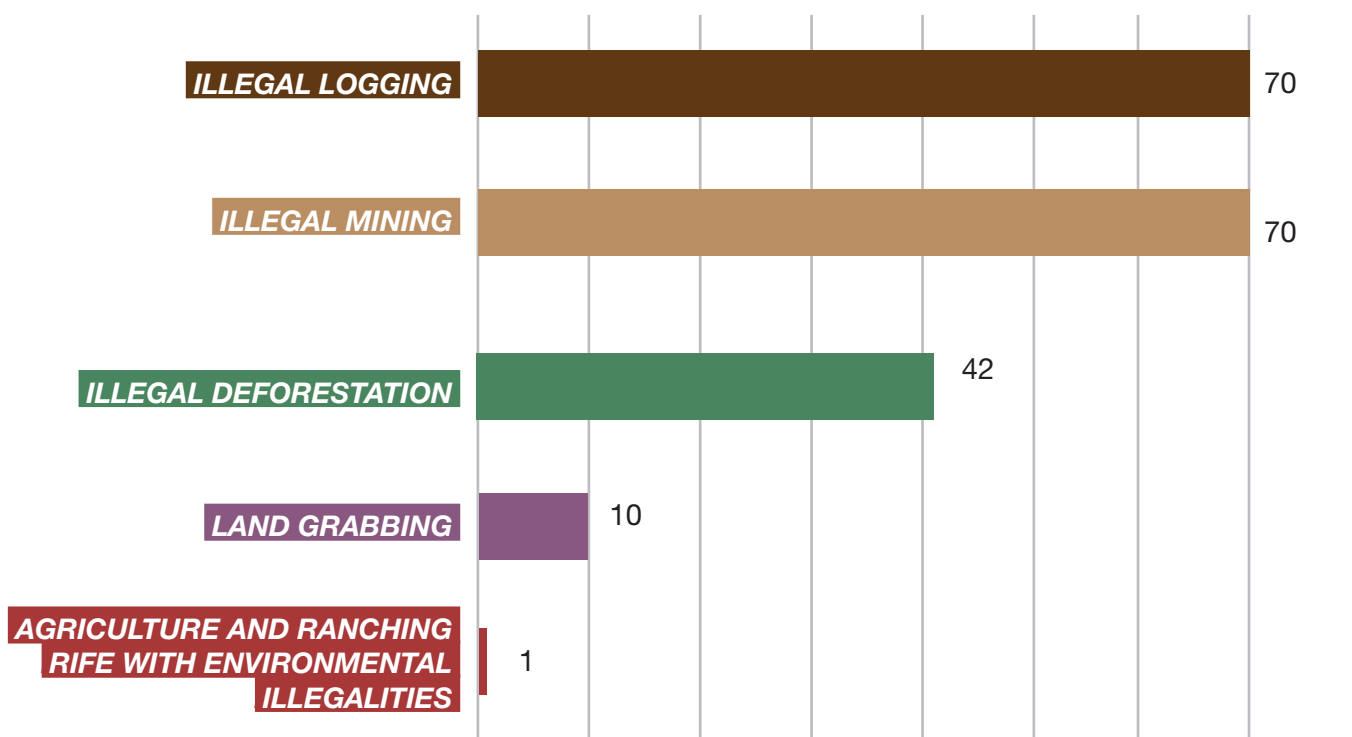


38 See Reynaldo Turolo Jr., João Pedrosa de Campos and Adacioni Santos. 'O polêmico prefeito da cidade de onde sai 81% do ouro ilegal do Brasil', *Revista Veja*, April 22, 2022. See also Ministério Público Federal. [Notícia de Fato nº 1.23.008.000149/2021-00. Ação Civil Pública, Itaituba/PA, 2021](#); Ministério Público Federal. [Inq. Civ. n. 1.23.008.000206/2018-47. Ação Civil Pública, Itaituba/PA.](#)

A considerable amount of illegal mining and logging occurs in territories that overlap Indigenous Lands, as shown in Chart 7. However, other illegal economic activities like land grabbing and agriculture and livestock farming rife with environmental liabilities are less common on Indigenous Land. This is explained by the role that indigenous peoples play in territories demarcated as protected forestland. The indigenous peoples hinder the invasion of their land, thereby preventing permanent appropriation of land by non-indigenous people for conversion into fields and pastures. Due to the protection by their inhabitants, Indigenous Lands continue to be places where the standing forest is preserved. However, there are occasional incidents of land grabbing and unauthorized conversion of forestland into

pasture on Indigenous Land. Between 2016 and 2021, the Federal Police acted to combat these practices in the Uru-Eu-Wua-Wua Indigenous Land (on three occasions), the Karipuna Indigenous Land (on three occasions), and the Ituna-Itatá Indigenous Land (on one occasion). In addition, other Indigenous territories, especially in Pará (such as the Apyterewa and Cachoeira Seca Indigenous Lands), are under serious threat of land grabbing and illegal land conversion for agriculture.<sup>39</sup>

**Chart 7.** Environmental Crime on Indigenous Land in Brazil’s Legal Amazon: Number of Territories affected by Illicit Economies



\*N > 141 territories, considering that any given Federal Police action may have more than one focus

39 IPAM. *Amazônia em Chamas: desmatamento e fogo nas terras indígenas*. Nota Técnica No 6, March 2021. See also André Borges. ‘Distribuidora leva luz para invasores em terra indígena no Pará’, *Estado de São Paulo*, May 7, 2022.

Recent studies of the leading threats to indigenous populations in the Amazon corroborate the situation described here. According to MapBiomas, the average amount of forest cover loss detected by the DETER system in Indigenous Lands in the Amazon rose by 1.7 during the last three years as compared to 2016 to 2018. The number of reports by DETER has surged in the last three years, both for deforestation in general and related to mining, in particular.<sup>40</sup> INPE data also show that from 2011 to 2021, the most extensive deforestation took place on Indigenous Lands in Pará. For example, in that ten-year period, in Cachoeira Seca, 304,000 km<sup>2</sup> were deforested; in Apyterewa<sup>41</sup> 266,000 km<sup>2</sup>; and in Ituna-Itatá, 220 thousand km<sup>2</sup>. Along the same lines, an IPAM study shows that in 2020, the Indigenous Lands most affected by deforestation were the Apyterewa, Trincheira Bacajá, Cachoeira Seca, Ituna-Itatá and Kayapó, all in Pará.<sup>42</sup>

increased by 2.6, and the rate of fires was 2.2 times greater on Indigenous Lands where mining occurred than on Indigenous Lands where there was no mining.<sup>46</sup> Table 3 shows the extent to which the Indigenous Lands most affected by deforestation and illegal mining were on the radar of Federal Police operations in the period studied.

MapBiomas also estimates that 94% of the area impacted by illegal mining in Brazil today is in the Amazon, with half this area overlapping protected areas – in flagrant violation of the law.<sup>43</sup> From 2010 to 2020, the area mined on Indigenous Lands rose by approximately 500%, namely on the Kayapó, Munduruku and Yanomami Indigenous Lands.<sup>44</sup> From 2019 to 2020, mining activities on designated Indigenous Lands resulted in a loss of 5,000 hectares of forest cover, mostly in Pará, where 2,137 hectares were affected on the Kayapo Indigenous Land, and 1,925 hectares on the Munduruku Indigenous Land.<sup>45</sup> According to IPAM, Indigenous Lands where gold mining takes place were disproportionately impacted. From 2019 to 2020, the rate of deforestation

40 MapBiomas. [Fatos sobre o papel das Terras Indígenas na proteção das florestas](#), MapBiomas, April 2022.

41 The Apyterewa Indigenous Land, located in the municipality of São Félix do Xingu (PA), is currently the most deforested in Brazil.

42 IPAM. [Amazônia em Chamas: desmatamento e fogo nas terras indígenas](#). Technical Note No 6, March 2021.

43 41% of the overlapping area identified by MapBiomas was in UCs, and 10% on Indigenous Lands.

44 MapBiomas Brasil. ['Área ocupada pela mineração no Brasil cresce mais de 6 vezes entre 1985 e 2020'](#), MapBiomas Brasil, August 2021.

45 Bruno Manzolli, Raoni Rajão, Ana Carolina Haliuc Bragança, Paulo de Tarso Moreira Oliveira, Gustavo Kenner de Alcântara, Felipe Nunes and Britaldo Soares Filho. [Legalidade da Produção do Ouro no Brasil](#). Belo Horizonte: Editora IGC/UFMG, 2021.

46 IPAM. [Amazônia em Chamas: desmatamento e fogo nas terras indígenas](#). Technical Note No. 6, March 2021.

**Table 3.** Indigenous Lands in the Legal Amazon Under Threat of Environmental Crime and Deforestation

Indigenous Land	Number of Federal Police Operations (2016-2021)	Sources of Pressure
Apyterewa (PA)	3	Illegal Mining (3)
Cachoeira Seca (PA)	1	Illegal Logging (1)
Ituna-Itatá (PA)	1	Land Grabbing (1)
Kayapó (PA)	4	Illegal Mining (4)
Munduruku (PA)	8	Illegal Mining (8)
Trincheira Bacajá (PA)	4	Illegal Mining (3), Illegal Logging (1)
Yanomami (RR)	26	Illegal Mining (23), Illegal Logging (3)

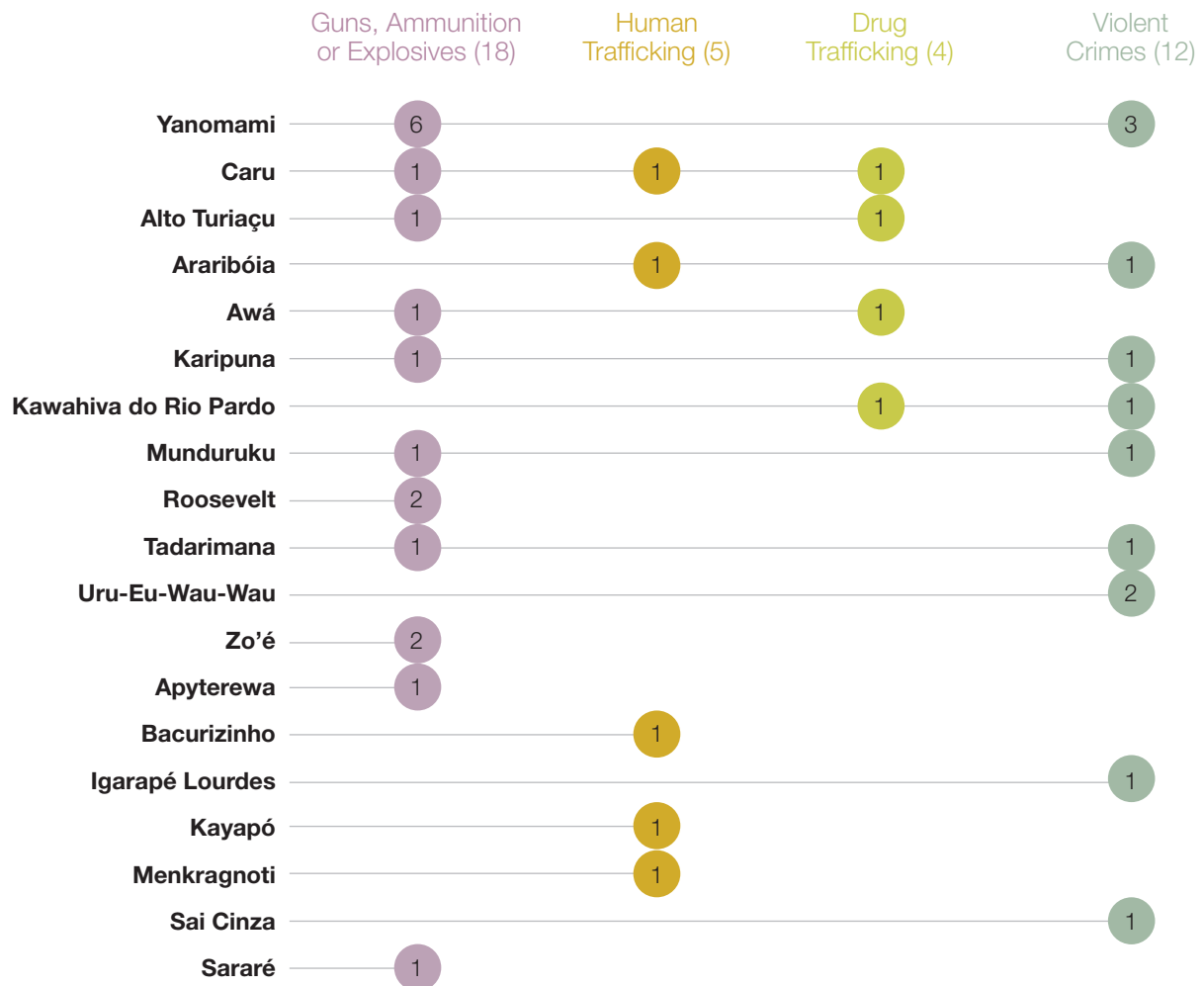
In addition to causing damage to the forest, the expansion of illegal mining has resulted in mercury contamination of waterways and incidents of violence against Indigenous peoples and other traditional Amazonian communities. Federal Police operations in the period studied attest to the rise in violence on Indigenous Land. As shown in Table 4, investigations focused not only on environmental offenses, but also on converging crimes with elements of violence, such as possession of guns, explosives or ammunition; violent crimes such as assault, threat or murder; human trafficking, and drug trafficking. A total of 19 Indigenous Lands were the subject of investigations in connection with crimes with some element of violence. The violence has had a major impact on the Indigenous Lands of the Yanomami, in Roraima, and Caru, in Maranhão. Also noteworthy is the case of the Uru-Eu-Wau-Wau with two occurrences of investigations related to violent crimes against the person in the period studied.

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*A total of 19 Indigenous Lands were the subject of investigations in connection with crimes with some element of violence.*

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**Table 4.** Indigenous Land in Brazil's Legal Amazon and Converging Crimes Involving Violence

## Gold and Blood

According to the Pastoral Land Commission (CPT), in 2021, many indigenous people, particularly the Yanomami, were killed or died as a result of conflicts in rural areas, and were frequently the victims of violence.<sup>47</sup> In 2021 alone, the commission counted three murders, 12 attempted murders, and 101 deaths linked to the illegal mining ring. In addition, rivers were contaminated with mercury, disease proliferated, and there was a lack of public health assistance. The commission also registered three death threats made by miners against public officials working on the Yanomami Indigenous Land.<sup>48</sup> Sexual violence also increased on the Yanomami Indigenous Land as a result of the incursion of illegal mining, according

47 The categories of deaths directly or indirectly related to conflicts in rural areas, as well as the violent episode are those used by the CPT to map the different forms of violence in rural areas.

48 Data posted on CPT Nacional's Twitter feed on April 18, 2022. See <https://twitter.com/cptnacional/status/1519039453364465664?t=yV9xp1xr9UCNFEVYBSxldA&s=19>. See also Bianca Muniz and Rafael Oliveira. 'Assassinatos no campo em 2021 batem recorde dos últimos quatro anos', Agência Pública, April 18, 2022.

to the most recent report by the Yanomami Hutukara and Wanasseduume Ye'kwana associations.<sup>49</sup> The cases documented by civil society organizations are echoed in a recent statistical study carried out by Climate Policy Initiative. It argues that municipalities with significant gold deposits on Indigenous Land and Permanent Protection Conservation Units showed a substantial rise in homicides per 100,000 inhabitants after 2013,<sup>50</sup> as compared to municipalities with gold deposits outside this type of territory. The authors link the increase in violence to the expansion of illegal gold mining activity in protected areas. They also note that protected areas that do not have gold reserves or that are the site of mining for other minerals did not show the same rise in violence.<sup>51</sup>

## Conservation Units and Protection Areas under Threat

Of the 451 territories mapped as the locus of environmental crime in the Legal Amazon, 47 (11%) are located inside territories that are protected for their environmental importance: Conservation Units and Permanent Protection Areas, UCs and APPs, respectively. During the period studied, 21 protected areas were affected by the ecosystem (13 Sustainable Use Conservation Units, six Integral Protection Conservation Units and two Permanent Protection Areas). In addition, there were six operations in unspecified protected areas: two in Pará, two in Mato Grosso, one in Amazonas and one in Amapá. The units most affected during the period studied were the Gurupi Biological Reserve, in Maranhão (seven mentions) and the Roraima National Forest (five mentions), as shown in Figure 9.

49 Hutukara Associação Yanomami and Associação Wanasseduume Ye'kwana. [Yanomami sob ataque: garimpo ilegal na Terra Indígena Yanomami e propostas para combatê-lo](#). Boa Vista: 2022.

50 The choice of the 2013 time frame originates with the approval of Law n. 12,844/2013, which article 39 enshrines the “principle of presumption of good faith” of financial institutions – stocks and securities companies and gold buyers – that make the initial purchase of gold. According to the Public Prosecutor’s Office, this legal framework has been misinterpreted, resulting in “willful blindness” and self-exemption of those who do exempt financial institutions from liability for the initial purchase of gold from the Amazon.

51 Leila Pereira and Rafael Pucci. [A Tale of Gold and Blood: The Unintended Consequences of Market Regulation on Local Violence](#). Rio de Janeiro: Climate Policy Initiative. Working Paper 005, August 2021.

**Figure 9.** Territories of Environmental Crime in UCs and APPs in Brazil’s Legal Amazon

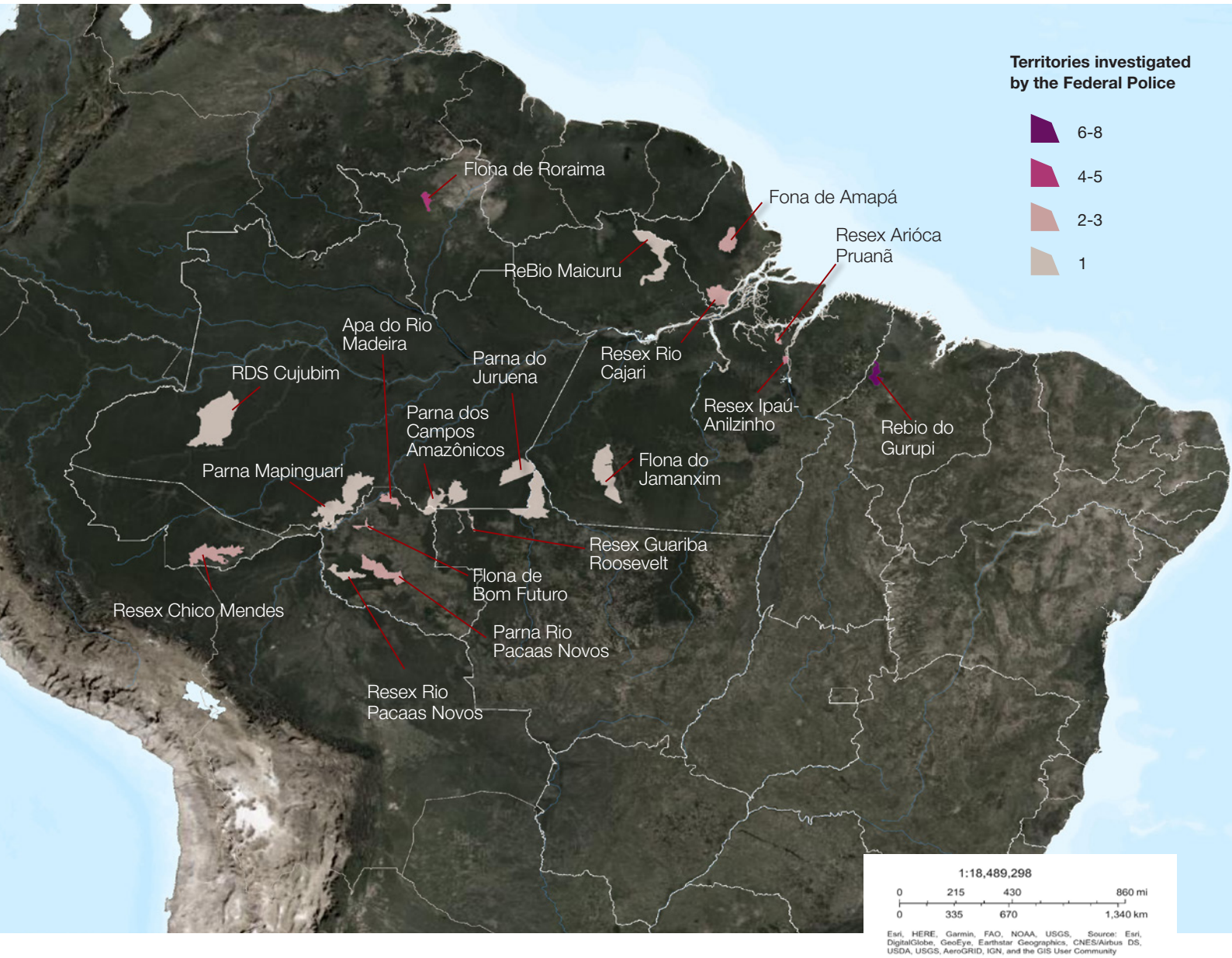
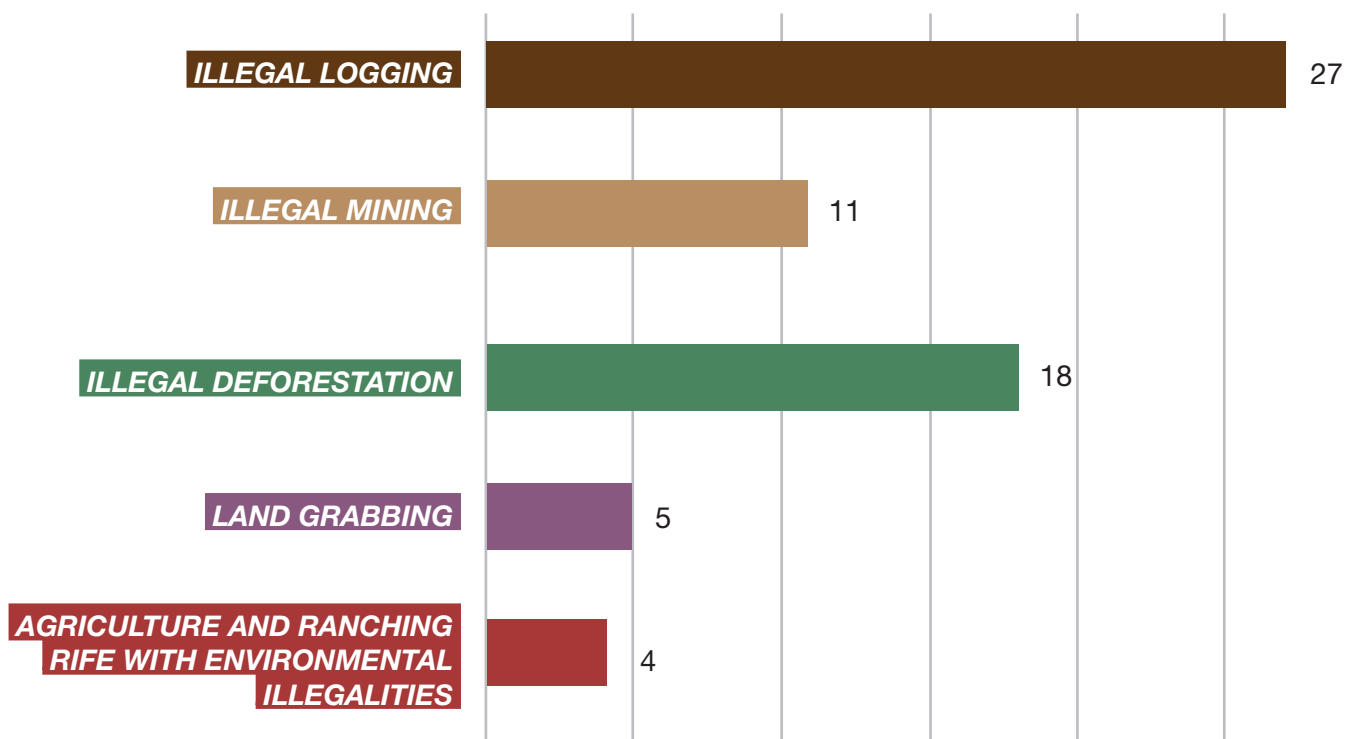


Chart 8 shows that, of the illicit economies investigated in the Federal Police operations, protected natural areas were most threatened by illegal logging and deforestation. Illegal mining, land grabbing and agriculture activities account for a smaller number of mapped territories.

**Chart 8.** Environmental Crime in CUs and APPs in Brazil’s Legal Amazon: Number of Territories by Illicit Economy

\*N > 47 territories, considering that any given Federal Police action may have more than one focus



## Environmental and Converging Crime in Agrarian Reform Settlements

In addition to socially and environmentally protected areas, other types of spaces in the non-urban Amazon overlap with Federal Police operations mapped between 2016 and 2021. This is the case of agrarian reform settlements: agricultural units implemented by the National Institute of Colonization and Agrarian Reform

(INCRA) to benefit families without the means to purchase rural property. In the Legal Amazon, these settlements occupy 392,196 km<sup>2</sup> (8% of the region’s area).<sup>52</sup>

Of operations mapped in the period, 16 (5%) took place in settlement territories, both traditional Settlement Projects (known as PA) as well as Sustainable Development Projects (known as PDS) and Extractive Settlement Projects (known as PAE), in which the settled population must live sustainably on the land (see Table 5).<sup>53</sup>

52 Daniel Santos, Rodney Salomão, Adalberto Veríssimo. *Fatos da Amazônia 2021*. Projeto Amazônia 2030. Imazon; Centro de Empreendedorismo da Amazônia, March 2021.

53 For a list of categories used by INCRA, see <https://www.gov.br/incra/pt-br/assuntos/reforma-agraria/assentamentos>.

**Table 5.** Territories of the Ecosystem of Environmental Crime in Agrarian Reform Settlements in Brazil's Legal Amazon

Name	Number of Settlements	Protection	Source of Pressure
PA ENA (MT)	3	Only Legal Reserve	Illegal Deforestation (2), Illegal Logging (2)
PA Margarida Alves (RO)	4	Only Legal Reserve	Illegal Deforestation(4), Land Grabbing (4), Illegal Logging (1)
PA Padre Ezequiel (RO)	1	Only Legal Reserve	Illegal Deforestation (1), Land Grabbing (1)
PA Paredão (RR)	1	Only Legal Reserve	Illegal Mining (1)
PAE Antimary (AM)	3	Sustainable Use	Illegal Deforestation (3), Land Grabbing (3), Agriculture (1)
PAE Chico Mendes (AC)	2	Sustainable Use	Illegal Deforestation (2)
PAE Santa Quitéria (AC)	1	Sustainable Use	Illegal Deforestation (1), Land Grabbing (1), Agriculture and Ranching Rife with Illegalities (1)
PDS Liberdade (PA)	1	Sustainable Use	Logging (1), Land Grabbing (1)
PDS Virola-Jatobá (PA)	1	Sustainable Use	Illegal Logging (1)

Although there were relatively few operations to combat environmental and converging crime in settlements in the Amazon, they are indicative of the social dynamics in these types of settlements. Unlike operations on Indigenous Lands, the main environmental crimes investigated in operations in settlements were illegal deforestation (seen in 13 of the 16, or 81% of mapped operations) and land grabbing (seen in 10, or 63% of mapped operations). Five operations (31%) focused on combating illegal logging; two operations (13%) on agriculture and livestock with environmental illegalities, and one (6%) on illegal mining. Of operations dealing with converging crimes, five (nearly a third)

investigated fraud, while six operations (38%) related to crimes with violence against persons or possession of guns.

A joint operation in 2020 between the Federal Police, environmental agencies, the Army and the Federal Public Prosecutor at the Antimary PAE (located in southern Amazonas near the border with Acre), aimed to block land grabbers and others from outside the settlement from deforesting, occupying the protected areas allocated to chestnut harvesting communities, and expand cattle pastures, which is not permitted in the legal boundaries of a PAE. In all, over 2,000 hectares were illegally deforested on the site

between 2011 and 2018, resulting in climate-related damage valued at over BRL 44 million. The joint efforts of the Federal Police and the Public Prosecutor's Office also uncovered a number of threats made by the invaders against extractivists. Claiming that they were the rightful owners, the illegal invaders charged the community for the extraction of chestnuts and used intimidation tactics to force them off the property that had been given them by INCRA.<sup>54</sup> In 2021, the federal court granted the request of the Federal Public Prosecutor and ordered not only the removal of the entire cattle herd with environmental illegalities, but also suspended the issuance of Animal Transport Guides and invoices for the movement of cattle. The public civil suit is still in court.

In addition to the cases investigated by the police, violence associated with land and agrarian conflicts in settlements has been a very disturbing phenomenon in the Amazon over the last decade. From 2016 to 2021, the period analyzed in this study, the CPT recorded almost 400 conflicts in settlements in municipalities in the Legal Amazon, with almost 50 community leaders murdered, exposing the violence to which the people are exposed.<sup>55</sup>

## Environmental and Converging Crime on Undesignated Land

So-called undesignated public forest land was not a priority for the Federal Police during the period studied. From 2016 to 2021, only seven operations (2%) were launched in this category of territory, which covers 57.5 million hectares of the biome, or 14% of the total area, mostly in the state of Amazonas.<sup>56</sup> Deforestation on undesignated public lands surged between 2018 and 2021, from 185,000 to 367,000 hectares, and is one of the principal vectors of loss of forest cover in the Brazilian Amazon.<sup>57</sup> Deforestation in this kind of space is frequently related to land grabbing, based on the cross referencing of CAR records.

Federal Police investigations of crimes committed on undesignated public forest land during the period studied are divided into two categories. Two operations investigated environmental offenses on specific federal land properties (known as *glebas*), one focused on illegal mining and illegal deforestation in Novo Mundo, Mato Grosso, and the other was geared toward combating illegal logging and land grabbing in Oiapoque, Amapá. The investigations also dealt with converging crimes, namely corruption and fraud in environmental and land management agencies, known to be mechanisms for facilitating and enabling illegal land grabbing and deforestation on undesignated public lands.<sup>58</sup> Four of the five Federal Police investigations with this scope took place in Amapá.<sup>59</sup> It is noteworthy that, since 2019, the Federal Police has bolstered

54 Ministério Público Federal. [Recomendação N. 03/2019 – Força-Tarefa Amazônia, Inquérito Civil n. 1.13.000.001719/2015-49](#).

55 Data on conflicts and killings in rural areas are prepared and made available by the Centro de Documentação Dom Tomás Balduino da Comissão Pastoral da Terra - CPT. Link: <https://www.cptnacional.org.br/biblioteca-virtual> (accessed on May 5, 2022).

56 IPAM. [Amazônia em Chamas: desmatamento e fogo nas terras indígenas](#). Technical Note No. 6, March 2021.

57 Instituto Socioambiental. [Conexões entre o CAR, desmatamento e o roubo de terras em áreas protegidas e florestas públicas](#). Technical Note, April 2021.

58 IPAM. ['Fraude no CAR responde por 65% do desmatamento em terras públicas da Amazônia'](#), May 30, 2022.

59 This is the case of the *Terras Caídas I* and *II* and *Terra do Nunca I* and *II* operations, launched in Amapá in 2018 and 2020, respectively.

engagement in inspection and combating illegal deforestation and arson in the Amazon in conjunction with other public authorities, such as IBAMA, the Armed Forces and the Public Prosecutor's Office.<sup>60</sup> The participation of the Federal Police in this type of operation could lead to expanding the agency's activities in lands not yet designated, but already under pressure from the ecosystem of environmental crime.

The scant attention paid by the Federal Police to these spaces as compared to protected areas during the period studied is revealing. The lack of more systematic engagement on the part of the police is likely due, at least in part, to the lack of robust socio-environmental protections in place for these forest areas. This supports the argument for speeding up the designation of pending public lands as a means to combat and control deforestation in the Amazon. It also illustrates the need for implementation and support of economic activities that promote the standing forest over leaving them vulnerable to economic agents to occupy, deforest and convert public forest areas into fields or pastures.

## *Environmental and Converging Crime on Deforestation Borders*

As previously mentioned, the spatial dynamics of deforestation in the Amazon is a well-studied phenomenon. The ongoing monitoring of forest cover loss by INPE in recent decades has clarified the contours of the so-called "Arc of Deforestation", a region that extends west from western Maranhão and southern Pará through Mato Grosso, Rondônia and Acre. According to INPE geospatial monitoring, approximately 75% of deforestation in the Amazon has taken place in the 256 municipalities that make up this region. And it is the focus of public policies created by the Ministry of the Environment (MMA) to combat deforestation. Since 2019, however, a new arc has been forming, and with it new pressure vectors in the region known as AMACRO (on the tri-border of Amazonas, Acre and Rondônia), among others.<sup>61</sup>

Chart 9 lists the 52 municipalities that are priorities for the MMA and the Federal Police as targets for environmental inspection to monitor, prevent and control deforestation in the territories of the ecosystem of environmental crime mapped in this study.<sup>62</sup> The MMA list includes 177 territories in 39 municipalities where environmental and converging crimes were identified. The municipality that particularly stands out from this list is Porto Velho (Rondônia), with 29 mentions, followed by the municipalities of Itaituba (Pará), Jacareacanga (Pará) and Altamira (Pará). A total of 13 of the 52 priority municipalities for the MMA had no Federal Police action mapped between 2016 and 2021.

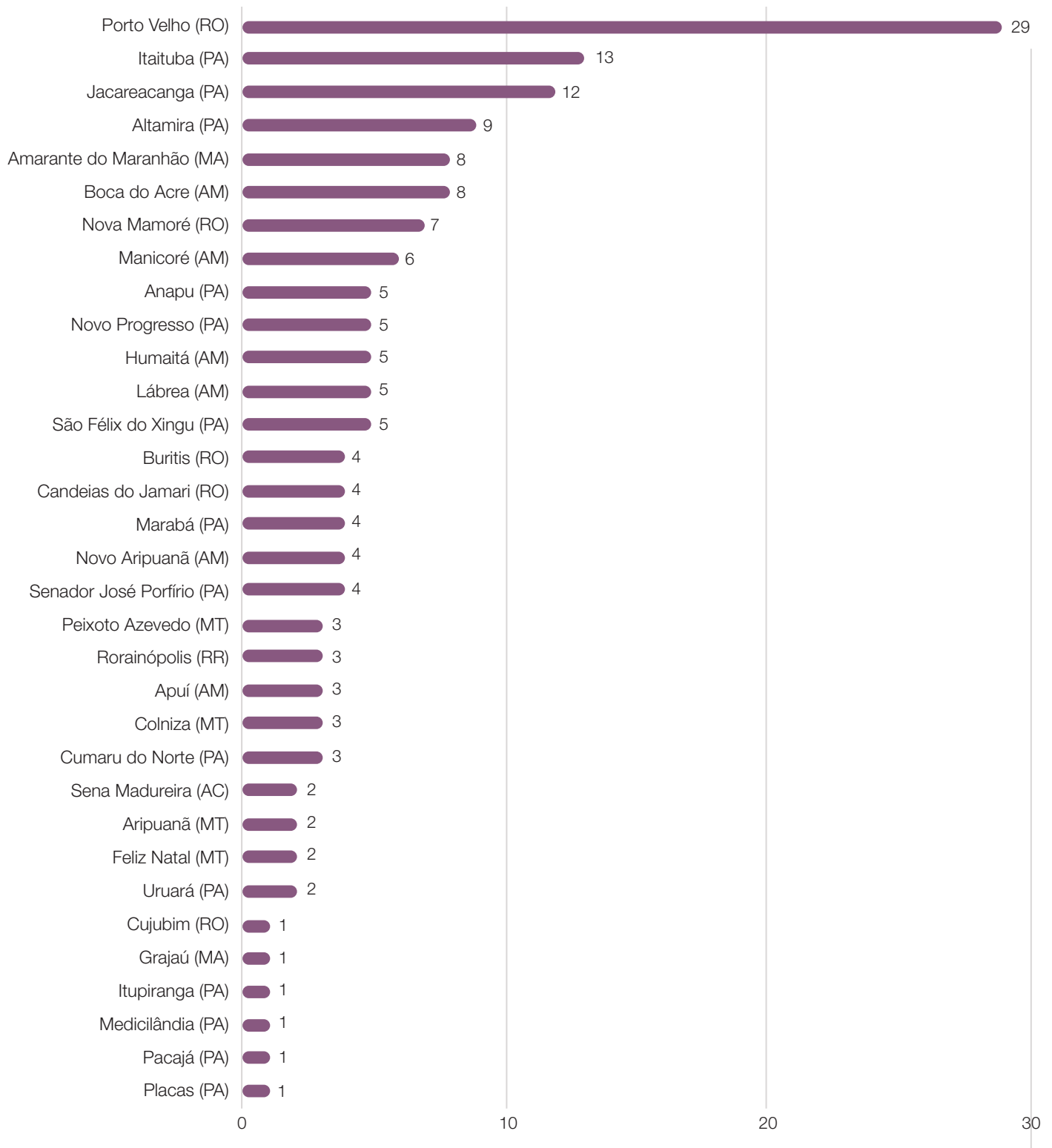
60 Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. *The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil*. Strategic Paper 55, Igarapé Institute, 2022.

61 Instituto Socioambiental. '*Novo arco do desmatamento: fronteira de destruição avança em 2019 na Amazônia*'. December 17, 2019.

62 The list was created in 2007 and is periodically updated through ordinances. The last update was in 2021. See [Listagemmunicipiosprioritriosparaaesdepreveno2021.pdf \(www.gov.br\)](#). Of the 52 priority municipalities on the MMA list, two are in Acre, six are in Amazonas, two are in Maranhão, 14 are in Mato Grosso, 19 are in Pará, seven are in Rondônia and two are in Roraima. No municipalities in the states of Amapá and Tocantins are on this list.

**Chart 9.** Distribution of Territories of Environmental and Converging Crimes in the Municipalities on the Ministry of the Environment's Priority List

\*N = 77 territories

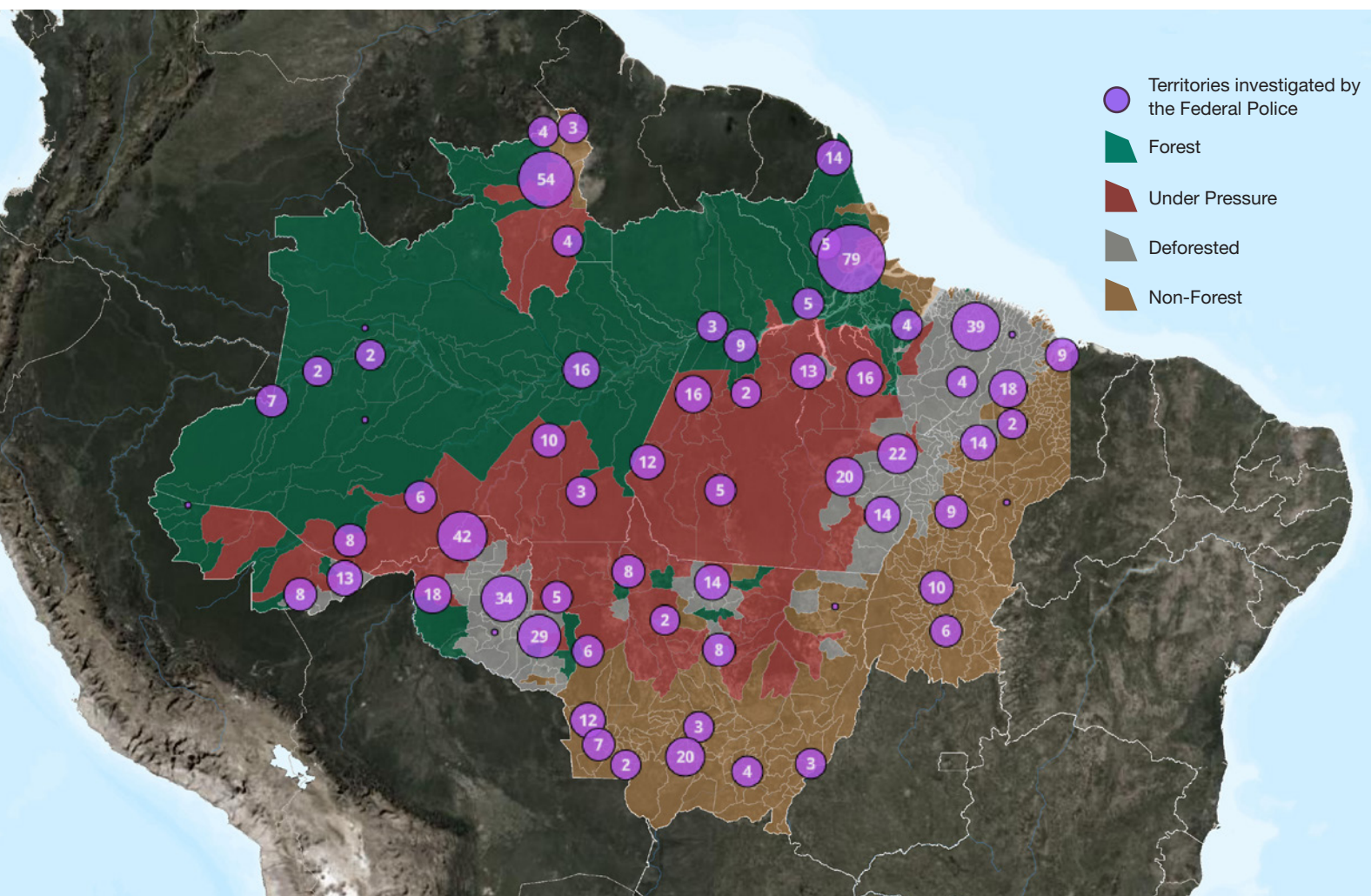




In addition to the MMA list, the notion of “deforestation frontiers,” created by Amazon Project 2030, is another lens through which to understand how the actions of the Federal Police between 2016 and 2021 dialogue with the dynamics of deforestation and degradation of the Amazon at the municipality level. Under their categorisation, Amazonian municipalities

are divided into four categories, (i) Non-Forest, (ii) Deforested, (iii) Under Pressure, and (iv) Forest. The distribution of territories in the Amazonian environmental crime ecosystem identified through Federal Police operations according to this categorization can be seen in Figure 10.

**Figure 10.** Distribution of Territories in the Environmental Crime Ecosystem on the Deforestation Frontiers in Brazil’s Legal Amazon

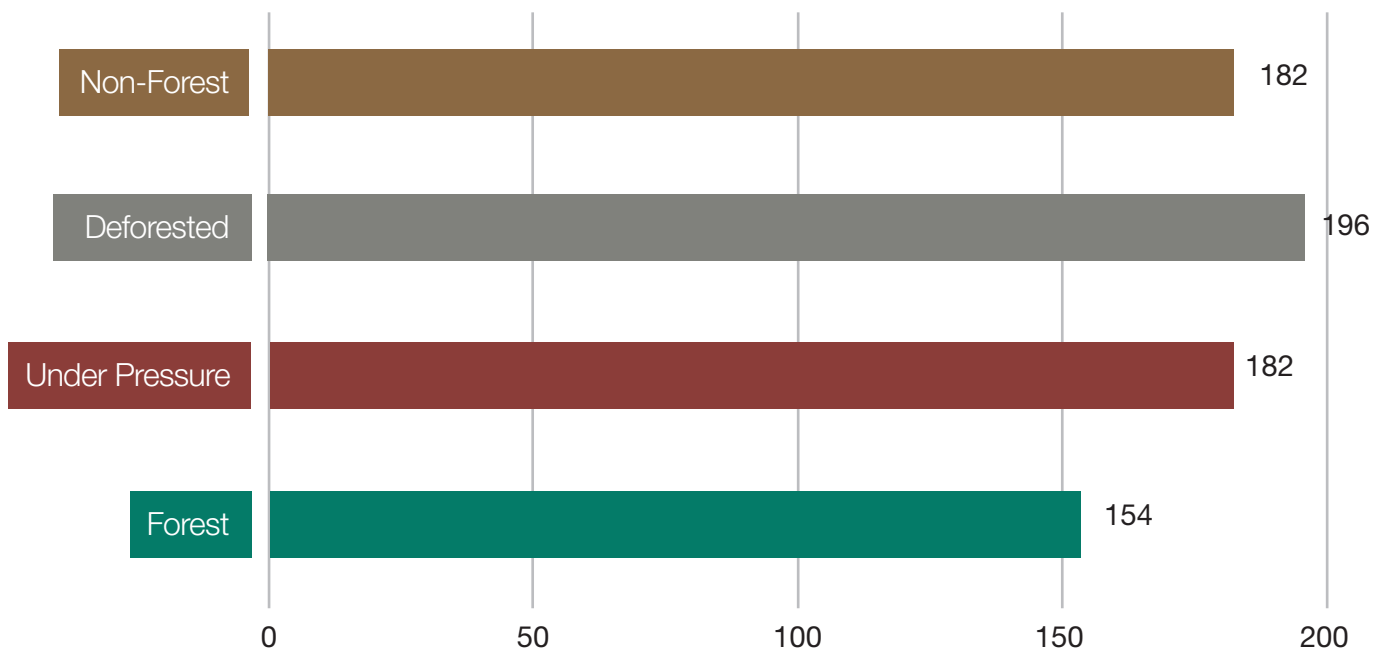


Source: Igarapé Institute, based on data from Projeto Amazônia 2030 (2020).

Federal Police operations enabled the mapping of locations of environmental and converging crimes in the four regions on deforestation frontiers. In the “Non-Forest” category (savannas and swamps, known as Cerrado and Pantanal areas) in the Legal Amazon, 182 territories were cited in 52 different municipalities, with Macapá and Boa Vista most frequently cited. This represents 25.5% of the 714 territories affected by the ecosystem of environmental crime in the Legal Amazon identified in this study. In the “Deforested” category, 196 sites were mentioned in 64 municipalities, with Centro Novo do Maranhão, Cacoal and Ourilândia do Norte cited the most (27% of territories mapped within the Legal Amazon). In the “Under Pressure”

deforestation category, 182 sites were identified in 40 different municipalities, with Porto Velho and Itaituba mentioned the most (25.5% of territories mapped within the Legal Amazon). Finally, in the well preserved “Forest” areas, 154 locations were cited in 40 different municipalities, mostly in Alto Alegre (22% of territories mapped in the Legal Amazon). Chart 10 illustrates this distribution for each of the four “Deforestation Frontier” macro-regions in the Amazon.

**Chart 10.** Territories Affected by the Ecosystem of Environmental Crime, by “Deforestation Frontier”



These data indicate a worrying trend. On the one hand, territories affected by the ecosystem of environmental crime are fairly evenly distributed among the different frontiers. Thus, in numerical terms, although the deforested Amazon frontier area is somewhat more impacted by the ecosystem of environmental crime, the under pressure and forest frontiers also have a significant number of territories affected by environmental and related crime. That even the most protected areas are under threat serves as a warning and underscores the need to combat environmental and converging crimes to control deforestation in the Amazon.

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*That even the most protected areas are under threat serves as a warning and underscores the need to combat environmental and converging crimes to control deforestation in the Amazon.*

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## Conclusion

This strategic paper discusses the spatial distribution of the environmental crime ecosystem that affects the Brazilian Amazon. By identifying the territories involved, we illustrate the trajectories of this ecosystem, consisting of sites of extraction of forest resources and alternative land use that reflect the flow of forest supply chains and commodities within and outside the Amazon. These trajectories enable the spread of environmental crime and related illegal activity. The extensive list of environmental and associated crime in and beyond the Amazon, and the network of perpetrators behind these illicit economies, reinforce the challenge of cleaning up these complex supply chains.

The trajectories of the timber and mining supply chains illustrate the role of territories outside the Legal Amazon. In the case of timber, the trajectories link a greater number of municipalities, especially in the states of Rondônia and Maranhão, to locations outside of the Amazon, namely in Paraná and São Paulo. In the case of gold, the trajectories lead mainly to Pará and Roraima, loci of environmental crime and key points of sales, and then to locations outside the Legal Amazon, mainly in the state of São Paulo.

The study of the territories in Federal Police actions to combat crime also reveals the extent of the multidimensional impact of illicit forest economies on different protected areas and on areas under pressure of deforestation in the Amazon. In the period studied, the proliferation of illegal gold mining – largely on indigenous land – was the focus of a number of Federal Police actions to tackle this illicit economy and its effects in and outside the Amazon. The analysis highlights the growing and worrisome impact of environmental and converging crimes in the swaths of land under pressure of deforestation in the Amazon, as well as in large areas of still largely preserved forest, such as the AMACRO region.

The trajectories of environmental crime in the Amazon described here illustrate the complexity of supply chains that not only foster deforestation, but are also rife with environmental and other illicit acts. These chains reach the heart of the Amazon forest beyond the traditional “Arc of Deforestation” and flow into urban centers and other hubs of environmental crime in the Amazon. These contaminated supply chains then flow on to other locations in Brazil and abroad. The Amazonian capital cities are key, but smaller cities, such as Itaituba (Pará), Santana (Amapá) and Ji-Paraná (Rondônia), also act as important urban hubs in the networks of the ecosystem of environmental crime in the Amazon. These cities are also involved in the flow of products illegally produced in and extracted from the forest to other markets in Brazil and abroad. These supply chains increasingly connect actors and processes in Brazil to neighboring countries, such as Venezuela and French Guiana.

By mapping the trajectories of natural resources and commodities from the Amazon to the rest of Brazil and the world, this study unequivocally demonstrates that the entire country plays a role in environmental crime in the Amazon. This is evidenced by the repeated involvement of several midwestern and southern states in almost all illicit forest economies and/or related illegal activities, primarily in the gold supply chain.

The network of the ecosystem of environmental crime exposed here serves as a warning not only in terms of the impact of illicit acts on the largest tropical forest in the world and on planetary climate security, but also in light of the challenges it poses for sustainable development and human security in the region. Such findings point to the urgency of improving mechanisms for regulating the commercialization of Amazon-based natural resources, as well as identifying, investigating and prosecuting economic, tax and financial crimes. This analysis also bolsters the hypothesis that designating public forests

for sustainable use also helps in command and control and combating crime, as they generate the necessary legal framework for state authorities action, including by the Federal Police.

Increased attention from the Federal Police and the justice system as a whole is important but evidently insufficient. It is essential that the Brazilian government enact public policies on land and territorial governance, as well as implement incentives to accelerate the growth of the bioeconomy. It is through this holistic perspective that the networks described in this paper – insofar as they illustrate the organization of markets for Amazonian environmental goods – also highlight the need for action from financial institutions and private companies to improve their assessment of socio-environmental risk within their supply chains.

Together with the first strategic paper on the Federal Police response to environmental crime in the Brazilian Amazon, this study clearly demonstrates the logistical and institutional obstacles that complicate the coordination of on-site investigations, as well as the political challenges in bringing criminals to justice. The papers also emphasize the urgent need for structural political change to address the pervasive exploitation of natural resources at the expense of the Amazon rainforest and its traditional populations.

# Methodology

The territorial analysis presented here is based on an analysis of the **Database of Federal Police Operations** to combat the ecosystem of environmental crime in the Amazon, built by the Igarapé Institute. This database was produced in 2021 and 2022 using public information obtained by the Institute from the Federal Police via the Right to Information Law (LAI), in addition to research using public sources, including institutional websites and media.<sup>63</sup> Of the 369 operations in the first study (published in February 2022), new operations were added and 70 others provided by the Federal Police through the LAI were eliminated because it was not possible to find public information that would allow for further data collection and analysis, including the specific site of environmental crime, additional locations and suspicions arising from criminal investigations.

Next, the research team has built for each operation a list of locations cited in public sources and qualified them as either the main locus of the environmental crime or additional locus of both environmental and converging crimes investigated. The mapping of additional locations was based on public reports about ongoing police investigations, as well as the list of municipalities where the Federal Police carried out searches and seizures in the operations. This set of locations sheds light on the trajectories and networks in the ecosystem of environmental crime in the Amazon.

To illustrate the territorial distribution of Federal Police operations in the Amazon, the Igarapé team created a **geospatial representation** of the phenomenon with ArcGis mapping software. This analysis shows how various illegal or tainted with illegality economies are distributed across territories – states, municipalities and other categories of territories in the Amazon (including protected areas, such as Conservation Units and Indigenous Lands). The maps herein are useful for analysis, but they must be viewed with caution as the points shown on the maps are an inaccurate approximation, given that the information about police actions and the territories linked to the investigations varied widely. Furthermore, the coordinates plotted on the maps for the locus of environmental crime is intended to identify a specific protected area or municipality and not necessarily the exact coordinates of the crime. The research team also performed **network analyses** using Gephi software to visualize the relationships between operations and municipalities for the different illegal or tainted with illegality economies under investigation by the Federal Police in the period studied. The network analyses in this study are less statistical analyses and more of an additional tool for data visualization.

In both cases, the Igarapé research team utilized the variable “focus of Federal Police operation,” among others, based on an analysis of every Federal Police action listed in terms of illegal or tainted with illegality economies targeted by the police (illegal deforestation, illegal logging, public land grabbing, agriculture with environmental liabilities, and illegal mining). This category served as the basis for much of the analysis in the first study, published in February 2022.

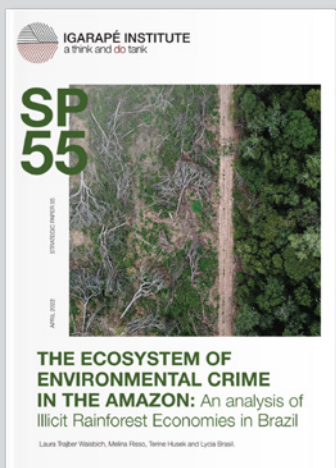
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63 For more information on the construction of the database, see Laura Trajber Waisbich, Melina Risso, Terine Husek and Lycia Brasil. [The Ecosystem of the Environmental Crime in the Amazon: an analysis of the Illicit Rainforest Economies in Brazil](#). Strategic Paper 55, Igarapé Institute, 2022.

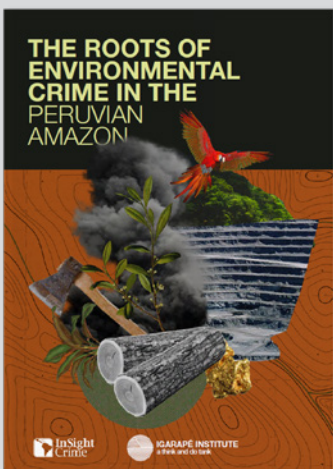
Further related to the variables, is worth mentioning that the categories of converging crimes adopted in this study (administrative-related crimes, financial and tax-related crimes, organized crime, violent crimes and trafficking crimes) are analytical categories rather than legal ones. For instance, for violent crimes we have included criminal offenses against a person (such as homicides, assaults and threats). We have also included under “violent crimes” the illegal possession of guns, ammunitions and explosives by actors involved in illicit economic activities in the Amazon.

As noted in the first study in this series, the analyses based on the Igarapé Institute’s database of Federal Police Operations targeting the environmental crime ecosystem in the Amazon are part of an effort to explain the phenomenon based on limited public information available. It is, therefore, an approximation with inherent limitations, rather than a comprehensive representation of reality. The Igarapé Institute will continue to work with government agencies to improve the management and availability of public information about the ecosystem of environmental crime in the Amazon.

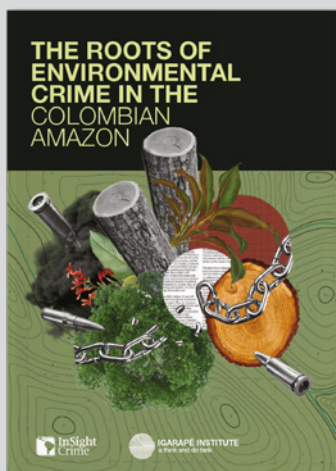
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