



**THE NEXUS BETWEEN
DRUGS AND CRIMES THAT
AFFECT THE ENVIRONMENT
AND CONVERGENT CRIME
IN THE AMAZON BASIN**

THE NEXUS BETWEEN DRUGS AND CRIMES THAT AFFECT THE ENVIRONMENT AND CONVERGENT CRIME IN THE AMAZON BASIN

KEY FINDINGS

- › Illicit drug trafficking is exacerbating and amplifying an array of other criminal economies in the Amazon Basin, including illegal land occupation, illegal logging, illegal mining, trafficking in wildlife and other crimes that affect the environment.
- › The direct impact of coca cultivation on deforestation is minimal but indirectly it can act as a catalyst for deforestation, although the deforestation observed in the Amazon Basin is largely driven by other factors. “Narco-deforestation” – the laundering of drug trafficking profits into land speculation, the agricultural sector, cattle ranching and related infrastructure – is posing a growing danger to the world’s largest rainforest.
- › Converging crimes such as protection and extortion rackets, money-laundering and corruption have turned tri-border areas in the Amazon Basin into violent hotspots, with diverse organized criminal groups simultaneously engaged in cocaine production and trafficking and natural resource exploitation.
- › Indigenous Peoples and other minorities are disproportionately affected by the criminal nexus in the Amazon Basin, as they suffer forcible displacement, mercury poisoning and other health-related impacts, increased exposure to violence and victimization and more.

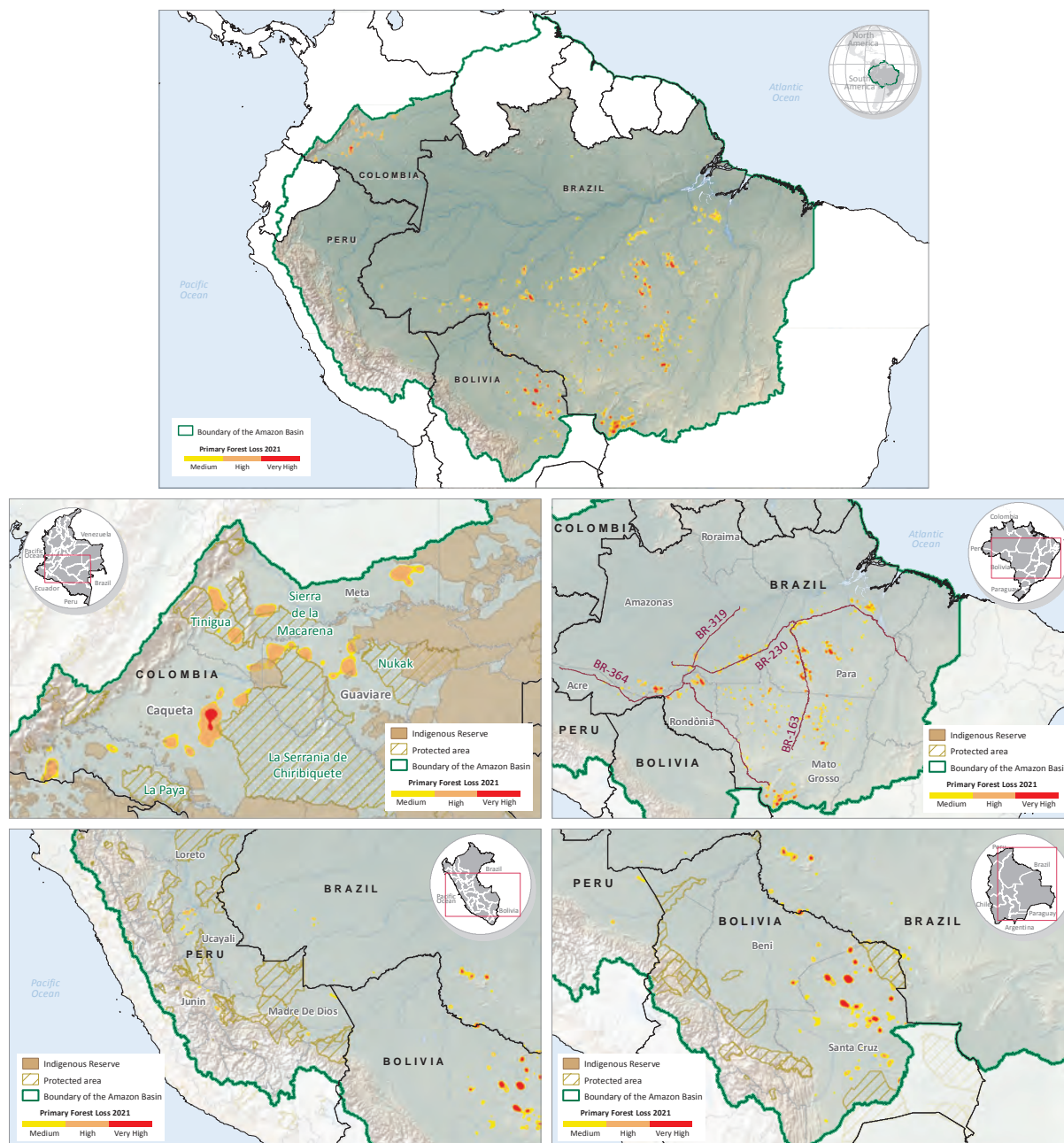
Introduction

Significant parts of the Amazon Basin are wracked by a complex ecosystem of drug crime, crime that affects the environment and convergent crime.¹ This chapter sheds light on this nexus, including the diverse impacts of drug-related activities where natural and human ecosystems are most at risk. Spanning eight South American countries and territories over 7 million square kilometres, the Amazon Basin is the world’s largest rainforest.^{2,3} It is also threatened by deforestation and degradation, virtually all of it illegal.⁴ The countries hosting the largest share of the Amazon Basin rainforest – Brazil (59 per cent), Peru (13 per cent), Plurinational State of Bolivia (8 per cent), and Colombia (7 per cent) – are particularly at risk of forest and biodiversity loss.

Although Ecuador, Guyana, Suriname, Venezuela (Bolivarian Republic of) and French Guiana are also part of the Amazon Basin and are affected by drug and related crime issues, this chapter focuses on the Amazon region covering Bolivia (Plurinational State of), Brazil, Colombia and Peru, countries that either host nearly all global illicit cultivation of coca leaf and cocaine manufacture or have high levels of cocaine trafficking.^{5,6,7} It is also in these four countries that UNODC has a stronger research capacity and could build on existing programmes.

This chapter builds on the *World Drug Report 2022*,⁸ which provided an overview of the possible environmental impacts of illicit drug cultivation and production on natural ecosystems and communities, while keeping the size of those effects in perspective relative to other human activities that cause environmental degradation. By focusing on one specific geographical region, it adds a comprehensive focus on the multi-layered relationships between drug production, trafficking and consumption on the one side, and crimes that affect the environment and convergent crime on the other.⁹

MAP 1 Amazon Basin deforestation hotspots, 2021



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: Base cartography of Colombia and internal administrative boundaries: Agustín Codazzi Geographic Institute - IGAC and the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021). Base Cartography of Brazil and internal administrative boundaries: Brazilian Institute of Geography and Statistics - IBGE and Geoportal Provita, 2023. Base cartography of Peru and internal administrative boundaries: Open Street Map and the National Geographic Institute, 2021 and Unique digital platform of the Peruvian State, 2023. Base Cartography of Bolivia and internal administrative boundaries: Geographic Server: Servidor Geográfico - GeoBolivia and United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2023. Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socio-environmental Information (RAISG, 2020). Forest cover loss: Global Forest Watch (GFW), 2021.

The relationships between drug-related crime, crimes that affect the environment, and convergent crime in the Amazon Basin are complex and evolving. Any assessment will be partial and non-exhaustive. This chapter offers a preliminary analysis of basic trends and patterns based on official data, site visits to selected countries, open sources and qualitative information collected through 25 interviews with experts from law enforcement authorities, the judiciary, environmental protection agencies, intergovernmental entities and civil society.

The chapter describes how the Amazon regions of Bolivia (Plurinational State of), Brazil, Colombia and Peru are at the intersection of multiple forms of organized crime that are accelerating environmental devastation, with severe implications for the security, health, livelihoods and well-being of the population across the region. A focus on the tri-State border between Brazil, Colombia and Peru provides an example of the convergence of drug trafficking and crimes that affect the environment and their impact on communities.

Drug cultivation and trafficking and crimes that affect the environment are surging in the Amazon Basin covered by the four countries analysed in this chapter, due in part to an abundance of natural resources alongside a limited State presence, persistent corruption and structural factors related to informality, inequality and unemployment. Drug trafficking constitutes just one of multiple criminal activities in which organized criminal groups are involved, together with land-grabbing, timber trafficking, illegal mining and trafficking of wildlife across the region. These organized criminal networks are not just exacerbating deforestation but are also accelerating convergent crime ranging from corruption, tax and financial crimes, to homicide, assault, sexual violence, exploitation of workers and minors, and the victimization of those defending the environment, including Indigenous Peoples.

The illegal activity affecting the environment in the Amazon Basin is, however, not always directly connected to organized criminal groups. Often, illegal logging and mining are a result of either the corrupt award of licences and permits by elected public officials and senior bureaucrats,¹⁰ the falsification of the origin of wood or gold by buyers and sellers, or of less

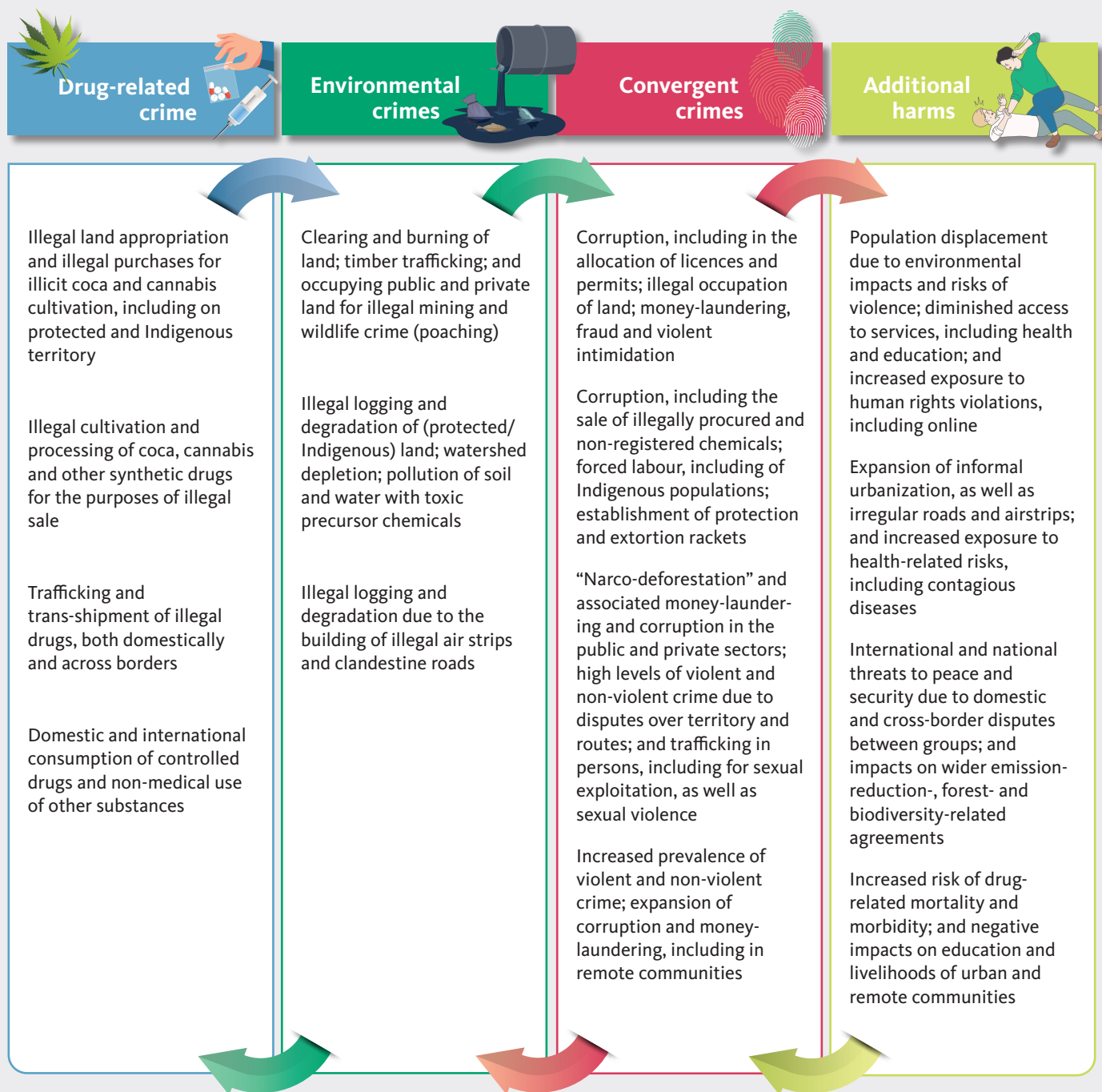
serious offences, related to occupying public land and selling property without proper documentation.¹¹ Nonetheless, the Amazon Basin is registering an increase in both organized and market-driven crime, with dangerous implications for global climate and biodiversity commitments. One reason for this is that cocaine production and trafficking are surging, in particular in the Amazonian departments of Caquetá, Guaviare, Meta, Putumayo and Vichada in Colombia.¹² Most of the coca cultivation in the Amazon Basin, however, is not taking place in Colombia but in Peru. Another reason for the surge is that organized criminal groups, which have traditionally focused on drug production and trafficking, are diversifying into highly profitable activities related to crimes that affect the environment.

Organized criminal groups involved in drug trafficking in Brazil, Colombia, Peru and, to a lesser extent, the Plurinational State of Bolivia are leveraging illegal and legal supply chains to expand their operations. There is growing evidence, for example, of drug traffickers financing and providing logistical support for illegal gold mining operations across the region, including on protected territories,¹³ expanding into illegal logging and trafficking in wildlife (including plants, insects and animals). Shipping vessels used to lawfully transport wood or minerals are also routinely loaded with cocaine concealed in consignments destined for foreign markets.^{14, 15, 16, 17} These kinds of illicit activity are frequently accompanied by convergent crime, ranging from bribery, extortion, fraud and money-laundering to homicide, violent assault, sexual violence and forced labour.¹⁸ Those most directly affected by these crimes are the poorest and most vulnerable communities in the Amazon, including Indigenous Peoples and those of African descent.

Conceptualizing drug-related crime, crimes affecting the environment and convergent crime

Large areas of the Amazon Basin are experiencing the convergence of multiple forms of criminality with severe implications for public security and sustainable development. Specifically, drug-related crimes can range from coca and cannabis cultivation to trafficking

CONCEPTUAL FRAMEWORK: CONCEPTUALIZING THE CRIME ECOSYSTEM



and possession. Crimes that affect the environment are also varied including land-grabbing, illegal logging, illegal mining and illicit activities related to farming and livestock rearing. Convergent crime refers to criminal activities that connect, overlap, enable and co-locate with drug-related crime and crimes that affect the environment, including corruption, money-laundering, fraud, extortion, violence and other forms of victimization.

Corruption facilitates the expansion of both drug-related crimes and crimes that affect the environment in the Amazon Basin. According to open sources and interviews with law enforcement officers, prosecutors and customs officials, and non-governmental organizations, the government agencies tasked with safeguarding and protecting the Amazon Basin and people who live there – from high-level decision makers to police, border agents, and permit and licensing authorities – are routinely exposed to corruption in its different forms, such as bribery, abuse of function and trading in influence.¹⁹ There are a multitude of ways that trafficked commodities – drugs, gold, soy, cattle, palm oil,²⁰ timber and wildlife – cross borders facilitated by the use of fraudulent permits, licences and related documents, the complicity of public officials and elaborate money-laundering schemes involving legitimate businesses.^{21, 22, 23, 24, 25}

A preliminary conceptual framework tracing the ways in which drug-related crimes interact with crimes that affect the environment and convergent crime, as well as highlighting wider impacts on society, offers a roadmap for diagnosing risks and formulating prevention strategies. Several features of this conceptual framework stand out. First, the process of producing, processing and trafficking, can have a direct and indirect impact on the environment, from selective illegal deforestation and degradation, which makes way for the cultivation and processing of drugs, to the pollution of the environment due to the burning of trees and use of precursor chemicals, as well as financial and land acquisition crimes associated with “narco-deforestation”.²⁶ Second, drug trafficking groups are diversifying into crimes that affect the environment by default and design, including illegal land occupation for industrial agricultural purposes, illegal logging, illegal mining, poaching and trafficking in wildlife as a way of generating and laundering illicit profits. Third,

drug trafficking undermines the rule of law and amplifies criminal economies that facilitate and incentivize the involvement of a wide range of individuals and actors involved in crimes that affect the environment.

Drugs and deforestation in the Amazon Basin

Concerns regarding drug production and trafficking in the Amazon Basin are hardly new and extend back at least four decades.^{27,28,29,30,31} From the 1990s onward, governments started explicitly linking the production of coca, and the trafficking of coca paste and cocaine, with the destruction of rainforests. The relationships between coca production and deforestation and degradation in the Amazon Basin are, however, not clear-cut. Indeed, the far more important drivers of forest clearance are crop and livestock production. Nevertheless, early studies tended to emphasize a direct link between the expansion of coca bush cultivation and corollary forest cover loss,^{32,33,34} and macro-socioeconomic and demographic analyses indicated that coca bush cultivation acted as an indirect driver of forest loss, mostly as a result of associated economic development.³⁵⁻

The direct impact of illicit coca cultivation on deforestation is limited

Although there are clear relationships between coca bush cultivation and some level of deforestation and environmental degradation, the scale of the direct impact is limited.^{36,37} The reverse is also true: despite more frequent clearing associated with illicit coca cultivation, areas *with* illicit coca cultivation can register less deforestation and smaller deforestation clusters than areas *without* coca cultivation.³⁸ Recent scientific studies suggest that the effects of illicit coca cultivation on deforestation varied between countries between 2010 and 2020, and the extent of forest loss was often highly locally specific.³⁹

Although drug markets have expanded in the Amazon Basin region overall, coca cultivation on its own is not explicitly correlated with large-scale deforestation.^{40, 41, 42, 43, 44, 45, 46} There are exceptions: for example, coca production in Colombia close to the border with the

TABLE 1 Drug cultivation and deforestation in the Amazon Basin

	Percentage of the Amazon Basin accounted for by each country	Percentage of the country that is in the Amazon Basin	Cumulative deforestation (2001–2021) in hectares	Proportion of national coca cultivation that is in the Amazon Basin
Brazil	58.8	58.9	Acre (969,100) Amapá (71,300) Amazonas (1,933,300) Maranhão (1,206,200) Mato Grosso (7,307,400) Pará (9,311,700) Rondônia (34,600,600) Roraima – (534,400) Tocantins (186,200)	
Colombia	7.1	42	(2000–2021) Caquetá (735,000) Meta (656,000) Guaviare (371,000) Putumayo (236,000)	20
Peru	12.8	60	Loreto (776,000) Ucayali (687,000) San Martín (648,000) Huánuco (418,000) Madre de Dios (301,000)	99
Bolivia (Plurinational State of)	7.7	43	Santa Cruz (4,500,000) Beni (1,000,000) La Paz (293,000) Cochabamba (256,000) Pando (237,000)	100

Sources: “Forest Monitoring, Land Use & Deforestation Trends,” Global Forest Watch, n.d.; “Connecting Space to Village: Geospatial Information for Improved Environmental Decision-Making in the Amazon,” SERVIR Amazonia, n.d.; “Datos cartográficos Visualización de información geoespacial sobre la Amazonía,” RAISG, n.d.; “Subregiones de la Amazonía Colombiana,” Instituto SINCHI, n.d.; coca cultivation surveys in Bolivia (Plurinational State of), Colombia and Peru; Instituto de Hidrología, Meteorología y Estudios Ambientales - IDEAM. Subdirección de Ecosistemas e Información Ambiental. Grupo de Bosques 2022. Proyecto Sistema de Monitoreo de Bosques y Carbono. Bogotá, D. C., Colombia; Instituto Nacional de Pesquisas Espaciais (INPE), Brazil, 2023.

Bolivarian Republic of Venezuela has been reported as a key factor driving deforestation there since 2016, including by forcibly requiring farmers to clear forests to make way for plantations.⁴⁷ Nonetheless, the actual *production* of coca leaf and *processing* into cocaine overall appear to have a comparatively limited direct effect on deforestation and degradation. There are, however, clear indirect effects generated by drug economies. Research has shown that the expansion of the agriculture frontier, cattle ranching, mining, roads, urban and energy development schemes, displacement and migration driven by the drug economy are potentially stronger covariates contributing to deforestation.⁴⁸

Drug cultivation and processing do generate environmental impacts. For example, the use and spread of toxic precursor chemicals, such as acetone and sulfuric acid, and gasoline can contaminate groundwater and

soil.⁴⁹ It takes more than 300 litres of gasoline to produce 1 kilogram of cocaine, with legacy impacts ranging from water pollution to soil degradation, which have implications for both animal and human health. Coca farmers also frequently use (illicitly sourced) chemical fertilizers and herbicides, which are leaching into rivers and disrupting local habitats and ecosystems.⁵⁰ The wider effects of the drug production processes in the Amazon Basin are still poorly researched and warrant further investigation.

Forced eradication can also trigger deforestation and environmental degradation since it can push illicit cultivation into new areas. Evidence however is only available in Colombia and, although a 2013 assessment suggested a positive correlation between eradication and shifting cultivation,⁵¹ a more recent study, from 2019, indicated that the effect on new coca cultivation

MAP 2 Coca cultivation area in Bolivia (Plurinational State of), Colombia and Peru, 2021



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: National monitoring systems supported by UNODC and the governments of Bolivia (Plurinational State of), Colombia and Peru. Boundary of the Amazon Basin, produced by the Amazon Network of Georeferenced Socioenvironmental Information (*Red Amazónica de Información Socioambiental Georreferenciada*) (RAISG, 2020)

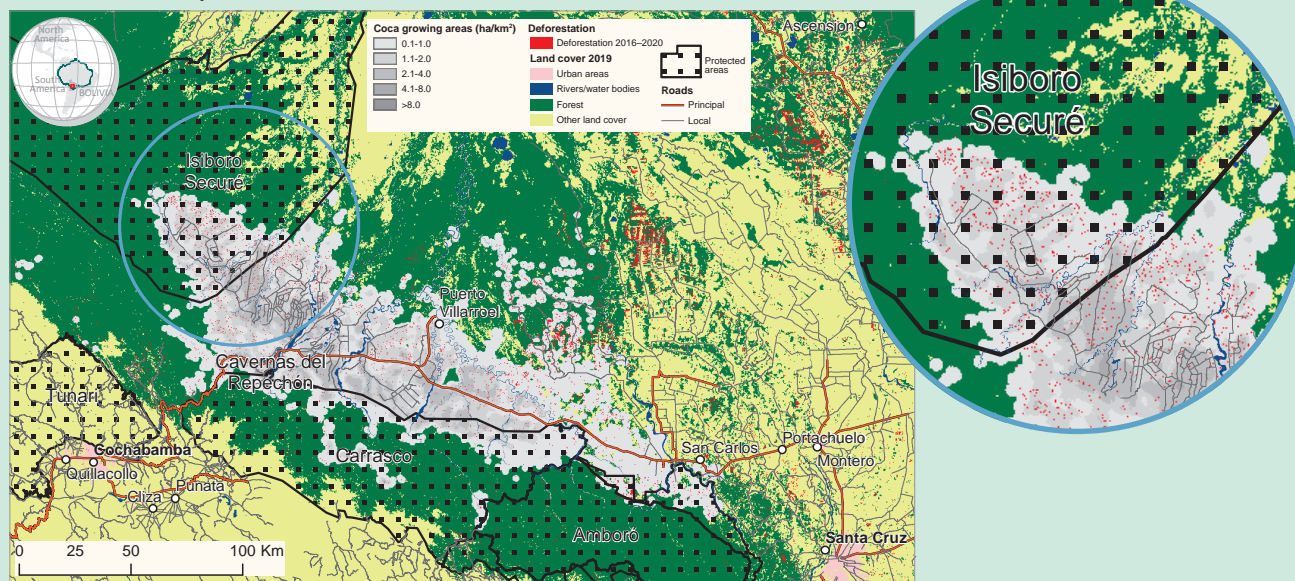
is either non-existent (in the case of manual eradication) or leads to a reduction of new coca cultivation in neighbouring areas as well (in the case of aerial spraying).⁵² Moreover, while some research has shown that aerial spraying can generate negative health effects on coca growing communities,^{53, 54} other research is not so conclusive about the size and scope of the impact on the environment of glyphosphate, spraying mixtures and the precision of spraying.⁵⁵ Forced eradication can also contribute to population displacement and voluntary migration, thus imposing new pressures on forested areas through urbanization and increasing deforestation and degradation.^{56, 57}

The indirect impact of the illicit coca economy on deforestation is more important

There is growing evidence of the indirect relationships between drug markets and deforestation. Specifically, drug trafficking and associated money-laundering tied to local extractive sectors are associated with the loss of forest cover.⁵⁸ Dubbed “narco-deforestation”, these activities include the reinvestment of drug trafficking proceeds into legal and illegal land acquisition, forest clearance, the creation of pasture for cattle, and other agricultural activities such as soy and palm plantations.⁵⁹ Alongside the recycling of profits into agricultural activities is the financing of accompanying infrastructure, ranging from landing strips to irregular roads, all of which affect the integrity of forests and

Most of the deforestation in Bolivia is not driven by coca cultivation but coca cultivation is driving deforestation into protected areas

Coca cultivation, protected areas and deforestation in the Plurinational State of Bolivia



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: UNODC Coca cultivation survey 2021; Internal administrative boundaries of Bolivia: United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2023. Protected areas: Servicio nacional de areas protegidas SERNAP. Deforestation data: RAISG 2021. Forest/land cover: Copernicus Global Land Service, 2019.

biodiversity. Such phenomena have been documented across Central America, in Guatemala, Honduras, and Nicaragua,^{60, 61} and regional authorities are opening an increasing number of investigations into similar crimes in the Amazon Basin.^{62, 63}

Drug trafficking organizations contribute to deforestation through other crimes that affect the environment

The expansion and diversification of drug trafficking organizations and other criminal groups into cattle ranching, selective logging, gold mining, real estate, and trafficking in wildlife are directly and indirectly contributing to a host of negative environmental impacts.^{64, 65, 66, 67, 68} For example, law enforcement officials, social scientists, journalists and environmental activists have detected instances of drug factions and criminal groups illegally purchasing land to support

illegal logging operations in Amazon Basin countries.⁶⁹

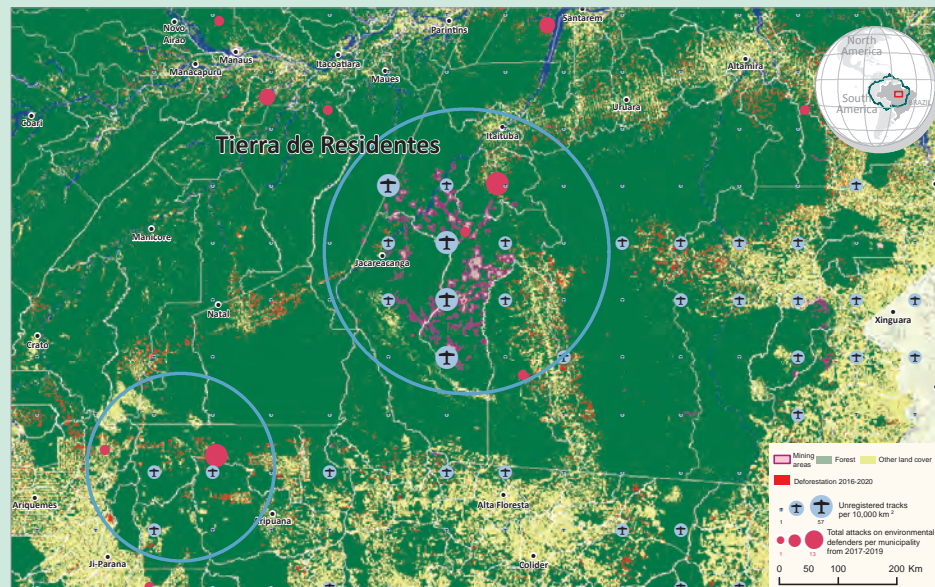
⁷⁰ Some have also observed the clearance of land to establish cannabis plantations in Pará State in Brazil.⁷¹

⁷² The scale of these latter activities is considerable: Federal and state police reportedly seized over two million marijuana plants between 2015 and 2020 in the Legal Amazon, over half of them in Pará.⁷³ A single intervention – Operation “Damned Harvest” in August 2020 – netted 200 tons (over 400,000 plants) of cannabis in Pará.⁷⁴

Not only can coca and cannabis plantations impose a strain on water resources (using twice as much water as alternative crops)^{75, 76} but their establishment and maintenance often generate wide-ranging negative social effects. When land is seized, purchased, cleared and cultivated by drug traffickers, this can trigger and exacerbate local tensions over land and property rights, especially if coca and cannabis growing occur on or

An example of crime convergence in the context of deforestation

Illegal mining, unregistered airstrips, attacks against environmental defenders and deforestation in Brazil



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: Base Cartography of Brazil and Administrative boundaries: Brazilian Institute of Geography and Statistics - IBGE and Geoportal Provia, 2023. Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2020). Forest/land cover: Copernicus Global Land Service, 2019. Attacks against environmental defenders: Tierra de Residentes, 2023. Mining and deforestation data: RAISG, 2020/2021. Unregistered tracks: plataforma.brasil.mapbiomas.org, 2023.

near Indigenous land. There are frequent media and non-governmental reports of disputes flaring up between drug trafficking groups and traditional communities, including an increase in assassinations, assassination attempts, death threats, and violent and non-violent protests.^{77, 78, 79, 80, 81} Across the Amazon Basin, violent disputes between local residents and drug traffickers are routinely reported, often a result of complaints over land speculation and illegal occupation.^{82, 83}

Drugs are trafficked along with timber products

Authorities in the Amazon Basin are particularly concerned by the fact that drug-trafficking groups are not only burning down and clearing tropical forests but also trafficking timber and illegally leveraging shipping and trading routes. These challenges are well known in Brazil and Peru, where drug traffickers have long exploited timber trafficking routes and disguised drug

shipments in legal and illegal lumber exports either via Pacific or Atlantic ports and onward to global markets.^{84, 85, 86, 87} In Colombia, drug traffickers also subcontract timber companies and smugglers who conceal drugs in the hulls of boats and transport them from ports, including via Brazil and Venezuela (Bolivarian Republic of), or from Guyana and Suriname.⁸⁸

Federal police in Brazil have observed a sharp increase in instances of drugs concealed in consignments of timber destined for foreign markets, in particular Western Europe. An estimated 16 major seizures of cocaine in Brazil were concealed in wood shipments between 2017 and 2021 alone.⁸⁹ For example, approximately 9 tons of drugs were intercepted from large timber consignments due to be shipped onward to Belgium,⁹⁰ France, Germany, Italy, Portugal, Slovenia and Spain. Drug seizures occur in ports in the Amazon, such as Vila do Conde, near Belém, but also far from the

Illegal gold mining in the Amazon Basin

Major sites of illegal gold mining in Bolivia (Plurinational State of), Brazil, Colombia and Peru



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: Amazon Network of Georeferenced Socioenvironmental Information, (RAISG, 2020); Insight Crime May 2021 and October 2022; and consultations with environmental and law enforcement specialists in Colombia, Ecuador and Peru.

Gold mines and presence of the criminal group *Primeiro Comando da Capital*



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

Note: the shaded area reflects approximately where the Criminal group *Primeiro Comando da Capital* (PCC) is operating within a larger area.

Sources: Boundary of the Amazon Basin: Amazon Network of Georeferenced Socioenvironmental Information, (RAISG, 2020); Mining deforestation alerts: Amazon Mining Watch; PCC presence based on reports from federal police and from local Indigenous Peoples.

A significant proportion of the gold produced in the Amazon Basin is illegal,^{a, b} and high prices during the coronavirus disease (COVID-19) pandemic have precipitated a veritable gold rush. In Brazil, tens of thousands of illegal miners operate in hundreds of illegal gold mining operations, with approximately half of the country's gold believed to be illicitly sourced.^{c, d} Studies have identified over 320 illegal mines, both active and inactive, in 2017 across the nine states making up the Legal Amazon.^{a, e, f} According to media reports, drug trafficking groups such as *Primeiro Comando da Capital* (PCC) have infiltrated multiple illegal mining operations, offering “protection”, extorting “taxes”, and controlling pits and dredging machinery.^{g, h}

Illegal gold mining is also widespread in other Amazon Basin countries. In Colombia, most illicit wildcat gold mining occurs outside the Amazon Basin; 70 of the 101 municipalities reporting illicit extraction of gold also allegedly registered coca cultivation.^{i, j} In the Colombian Amazon, illicit gold mining using wildcat machinery is less frequent than the exploitation of rivers with dredges, which is not comprehensively monitored; only 10 rivers have been monitored for evidence of gold exploitation, 9 of which were affected by dredging.^k Gold is the top export of the Plurinational State of Bolivia and the use of mercury is generating negative environmental impacts,^l including along the “golden route” that transects national parks and reserves in the Amazon Basin.^{m, n} In Peru, gold mining is one of many industries in which drug traffickers seek to launder their proceeds^o and the Superintendency of Banking, Insurance and Private Pension Funds of Peru has highlighted how drug traffickers have been financing gold mining – including dredgers, backhoes and other heavy machinery – in the departments of Madre de Dios and Puno.^p

Brazilian drug trafficking groups have expanded their interests in gold mining across borders. For example, since 2019, *Comando Vermelho* (CV) reportedly extended operations into Madre de Dios, Peru.^p According to media sources, a newly formed group, *Los Malditos del Comando Vermelho*, is also controlling drug trafficking routes that pass through the Valle de los Ríos Apurímac, Ene y Mantaro (VRAEM) and Puno.^q Peru ramped up anti-mining activities in VRAEM in 2019, including a notorious site in La Pampa, but activities increased on the Parímanu river in 2020 and 2021.^r Local authorities there

have noted an increase in mercury poisoning, as well as a sharp rise in armed robberies. Meanwhile, the ex-members of *Fuerzas Armadas Revolucionarias de Colombia* (ex-FARC) are also operating gold mining operations on both sides of the border between Colombia and the Bolivarian Republic of Venezuela.⁵

- ^a Melina Risso, Julia Sekula, Lycia Brasil, Peter Schmidt, Maria Eduarda Pessoa de Assis, “Illegal Gold That Undermines Forests and Lives in the Amazon,” Strategic Paper 53 (Igarapé Institute, April 8, 2021).
- ^b Bruno Venditti, “Illegal Gold Mining in Amazon Equivalent to Half of Brazil’s Production — Report,” Mining.com, July 7, 2022.
- ^c Bruno Manzolli et al., “The Prevalence of Illegal Gold Production in Brazil” (Centro de Sensoriamento Remoto, Laboratório de Gestão de Serviços Ambientais (UFMG), Instituto de Geociências (IGC), 2021).
- ^d Anthony Boadle, Lisandra Paraguassu, and Anthony Boadle, “Exclusive: Brazil Plans Legislation to Crack down on Laundering of Illegal Gold,” *Reuters*, February 16, 2023.
- ^e “Estudo denuncia epidemia de garimpos na Amazônia brasileira,” *Deutsche Welle*, December 10, 2018.
- ^f About half of the gold exported from the country between 2015 and 2021 appears to have some degree of illegality.
- ^g Reuters, “U.S. Treasury Eyes Brazil Drug Gang Ties to Illegal Amazon Gold Mines,” *Reuters*, August 17, 2022.
- ^h “Illegal Gold Miners Stalk Amazon as Authorities Look Away,” *BBC News*, June 23, 2021, sec. Latin America & Caribbean.
- ⁱ UNODC, “Methodological Proposal for the Estimation of Illicit Financial Flows Associated with Illicit Cocaine Markets and Illicit Gold Mining in Colombia,” 2021.
- ^j UNODC, “Survey of Territories Affected by Coca Cultivation, 2021,” 2021.
- ^k UNODC, “Alluvial Gold Exploitation in Colombia. Evidence from Remote Sensing as Dated 2021” (Bogota: UNODC-SIMCI, 2022).
- ^l Thomas Graham, “In Bolivia, Mercury Pollution Spreads Amid a Surge in Gold Mining,” *Yale Environment* 360, December 8, 2022.
- ^m Maxwell Radwin, “Shady Contracts, Backdoor Deals Spur Illegal Gold Mining in Bolivian Amazon,” *Mongabay*, November 8, 2022.
- ⁿ Eduardo Franco Berton, “Gold Rush in Bolivia Sparks Conflict between Miners and the Community,” *Mongabay*, October 28, 2016.
- ^o “On the Trail of Illicit Gold Proceeds: Strengthening the Fight against Illegal Mining Finances: Peru’s Case” (Washington D.C: Organization of American States (OAS), Department against Transnational Organized Crime (DTOC), November 2021).
- ^p Livia Wagner, “The Ecosystem of Illegal Gold Mining,” *Research Publications* 43 (October 1, 2021).
- ^q Manuel Calloquispe Flores, “‘Los malditos del Comando Vermelho’: así operaba la perversa organización criminal que era dirigida desde Brasil,” *El Comercio*, November 13, 2019.
- ^r “MAAP #137: Nuevo Foco de Minería Ilegal en la Amazonía Peruana: Río Pariamanu (Madre de Dios),” *MAAP*, May 4, 2021.
- ^s OECD, “Gold Flows from Venezuela: Supporting Due Diligence on the Production and Trade of Gold in Venezuela” (Paris: OECD, 2021).

Amazon, notably in north-eastern ports such as Natal (Rio Grande do Norte State), Pecém (Ceará State), Salvador (Bahia State), and Suape (Pernambuco State), as well as southern and south-eastern ports, such as Paranaguá (Paraná State), Itajaí, Navegantes and São Francisco do Sul (all in Santa Catarina State) and Santos (São Paulo State). Contraband is frequently concealed in shipments of logs, beams, pallets and laminate.^{91, 92}

Beyond deforestation: drug actors, crimes that affect the environment and convergent crime

Drug trafficking organizations have a significant role in perpetrating crimes that affect the environment with an impact that goes beyond deforestation. Several of the largest drug trafficking organizations in South America are involved in financing logging, mining, farming and cattle operations, providing protection services, extorting local workers and communities, and leveraging logistical capabilities and trafficking routes to move contraband and money-laundering proceeds. These activities are frequently accompanied by a host of convergent crimes, ranging from bribing politicians and law enforcement and port officials to perpetrating violence and trafficking in persons for sexual exploitation. Groups involved in both drug-related crime and crimes that affect the environment also regularly establish shell companies to facilitate money-laundering and other forms of fraud and evasion.^{93, 94}

Drug trafficking organizations are diversifying into new business lines, including land-grabbing, illegal logging,⁹⁵ trafficking of precious metals and minerals, illegal mining and trafficking of wildlife. They are doing so by leveraging their technical skills and networks for shipping drugs to foreign markets in order to traffic a diverse range of raw materials, ranging from illegal wood products to critical and precious minerals such as gold, but also coltan, corundum, graphite, manganese, microsilica and tungsten. Organized criminal groups are also transferring illicit proceeds into ostensibly legal businesses, including farming, ranching, and small and medium-sized businesses in and outside the Amazon Basin.

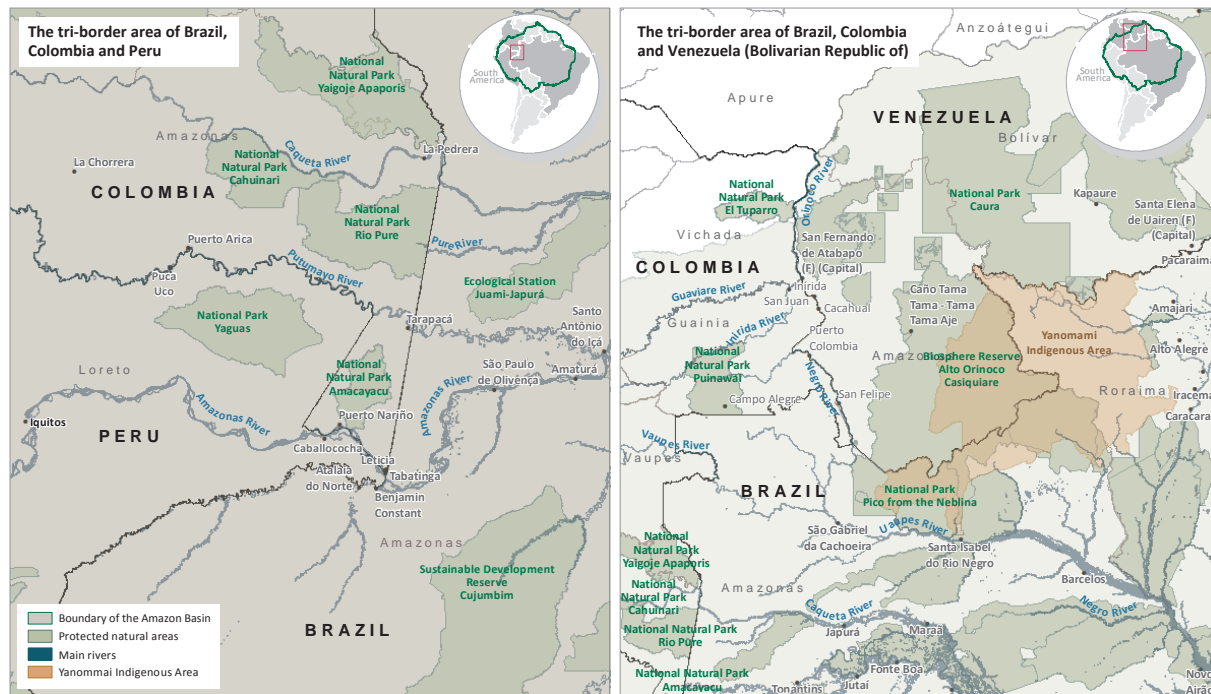
Examples of crime convergence in the tri-border areas

The Amazon Basin is home to several vast frontier regions where drug-related crime, crime that affects the environment and convergent crime are concentrated, benefiting from weak law enforcement, a rich ecosystem of criminal actors and a scarcity of meaningful economic alternatives. Border areas are often hotspots where primary forests are being cleared to make way for coca production, illegal logging and gold extraction which amplifies corruption, financial crimes and lethal and nonlethal violence. A notable high-risk area is where the frontiers of Brazil, Colombia and Peru converge, in particular their key rivers, namely the Caquetá, Putumayo and Amazon, facilitating the trafficking of timber, gold and drugs. Another high-risk zone extends across the northern border of Brazil with

Colombia and the Bolivarian Republic of Venezuela, which is 4,000 kilometres long and stretches from Cucui to Pacaraima.

Coca cultivation and processing has intensified in several Amazonian border areas where the presence of law enforcement officers is limited.^{96, 97, 98} An example of this is the Bajo Amazonas region in Loreto, Peru, where coca production has surged from 370 hectares in 2015 to over 6,470 hectares by 2021.⁹⁹ Raids in the Putumayo and Mariscal Ramon Castilla departments of Peru have yielded enormous quantities of gasoline, cement and calc-silicate, all indicators that coca is being both grown and processed there.^{100, 101} While the primary organized criminal groups in Peru are less widely known, a group calling itself *Clan Chuquizuta* is reportedly active near the Colombian border.¹⁰² Local authorities believe that traffickers in the region may

MAP 3 Tri-border areas in Colombia, Peru, Brazil and Venezuela (Bolivarian Republic of)



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Notes: Internal administrative boundaries of Brazil: the Brazilian Institute of Geography and Statistics. Internal administrative boundaries of Colombia: the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021). Internal administrative boundaries of Brazil: Geoportal Provita, 2023. Internal administrative boundaries of Colombia: the National Geographic Institute, 2021. Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2020). Protected areas of Brazil: Ministry of the Environment, 2023. Protected areas of Colombia: National Natural Parks, 2022. Protected areas of Venezuela: Geoportal Provita, 2023

Source: Igarape Institute and InSight Crime.

be acting as independent criminal contractors, providing services to Colombian and Brazilian criminal groups.¹⁰³

The tri-border areas are long-standing transit corridors for all manner of informal and illegal commodities. During the early 2000s, for example, media reports suggested that as much as 20 tons of cocaine a month was allegedly exported by FARC to high-level Brazilian traffickers.¹⁰⁴ More traditional drug trafficking groups scaled up their involvement in crimes that affect the environment during the 2010s. The dominant drug trafficking groups involved in crimes that affect the environment are from Brazil and Colombia. Among the most known in Colombia are the ex-FARC and *Ejército de Liberación Nacional* (ELN), as well as the FARC breakaway faction, *Los Comandos de la Frontera*.¹⁰⁵ Meanwhile PCC and CV of Brazil have long-established footholds in Colombia, Peru, and Venezuela (Bolivarian Republic of).^{106, 107}

The spread of criminal activity in border areas engenders a host of security and health risks while also entangling local populations in criminal enterprises. Poorer populations, in particular younger men without stable employment and lacking formal education, may succumb to recruitment by criminal groups or resort to growing coca, selling illegal timber or working on gold-dredgers, often colluding with criminal organizations. Men, women and youth with few alternative opportunities are often pulled into the crime vortex as prospectors, loggers, cooks, drivers or, in some cases, into forced sexual labour. Whether involved in crime or not, residents are routinely exposed to toxic residue from mining operations that poison local ecosystems, including food and water sources.^{108, 109, 110}

Among the most common forms of crime affecting the environment involving drug factions in tri-border areas is illegal mining, in particular of gold but increasingly also of other precious metals.¹¹¹ Owing to limited law enforcement measures, informal mining activities and associated businesses are proliferating in border areas such as Tarapacá in Colombia (on the tri-border with Brazil and Peru), many of them “taxed” by criminal groups. Drug factions and illegal mining operations frequently work with criminal brokers using fraudulent receipts to launder gold. These activities reportedly

intensified during the COVID-19 pandemic owing to significantly reduced military, police and environmental patrols across the region.¹¹²

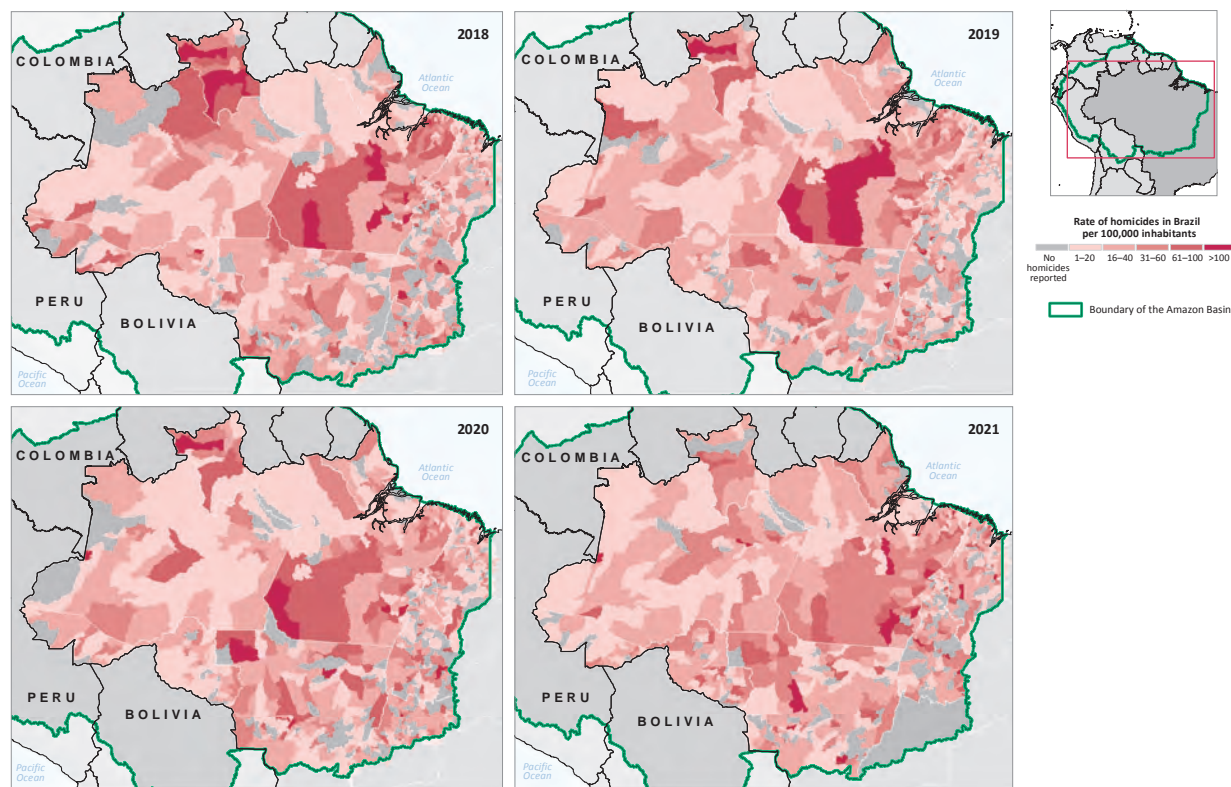
Another common form of crime that affects the environment in the tri-border areas of Brazil, Colombia and Peru is illegal logging. Illegal logging operations in Brazil, for example, are expanding from established areas in Brazil such as Mato Grosso, Pará and Rondônia to more remote regions of Acre, Roraima and Amazonas.¹¹³ The combination of abundant forest, cheap land and limited controls has given rise to an explosion in illicit deforestation. Timber harvesting in Peru is also targeting high-value hardwood species. Trees are cut down, transformed into planks and rapidly sold domestically and exported, despite export bans. The border areas serve a role in allowing the concealment of illegally procured timber. For example, the village of Islandia on the Yavarí River in Peru near the border with Brazil and Colombia serves as a major hub for timber trafficking and processing.¹¹⁴

Impacts on communities and Indigenous populations

Impact on health, violence and environment

In under-policed areas of the Amazon Basin where State presence and associated social services are limited, drug production, trafficking and consumption typically have a disproportionately high impact on vulnerable communities and the environment for each unit produced.^{115, 116, 117} One reason for this is that drug producers and traffickers have fewer constraints in place to minimize their environmental impacts. Another factor is that people who use drugs, as in other deprived urban and rural areas of South America, often have fewer options to access drug prevention and treatment services. In order to reduce the risk of disruption from security forces, drug groups often confine production and trafficking to more isolated, protected areas where many of these environmental impacts are hidden from public scrutiny. In Colombia, for example, nearly half of all illicit coca bush cultivation occurred in areas with special protection status in 2020,¹¹⁸ and

MAP 4 Mapping homicide rates in relevant states and municipalities of the Amazon Basin, Brazil, 2018–2020



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: Notes: Internal administrative boundaries: the Brazilian Institute of Geography and Statistics. Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2020). Homicide data: Ministry of Health - DATASUS.

in Brazil, cocaine trafficking occurs on the dozens of rivers and tributaries in the Legal Amazon, easily evading the modest police presence there.

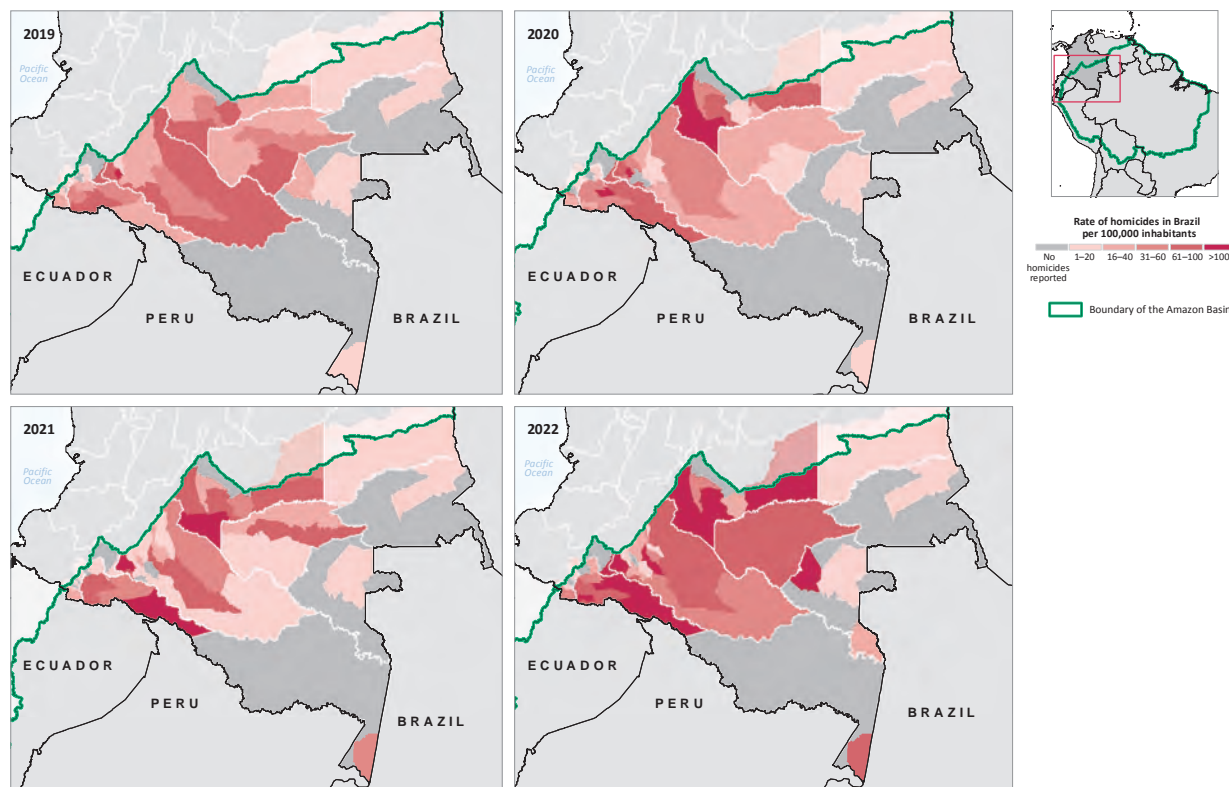
Many municipalities in the Amazon Basin register higher rates of criminal violence than the national average. This is due in part to violent competition between rival criminal factions competing for control over various facets of the production distribution, and retailing of drugs (and, increasingly, of other commodities). In 2021, for example, municipalities in the Brazilian Legal Amazon registered among the highest homicide rates in the country: a regional average of 29.6 homicides for every 100,000 people, compared with a national average of 23.9.¹¹⁹ The homicide rate in northern Brazil, home to seven of nine Legal Amazon states, increased

by 260 per cent between 1980 and 2019 at a time when large parts of southern Brazil registered significant declines in homicide rates. Municipalities reporting comparatively higher levels of deforestation also recorded above-average levels of violence and disputes over land and property.¹²⁰

Impact on Indigenous communities

Organized criminal groups are increasingly encroaching upon national and state parks, conservation and protected areas and Indigenous territories. The implications for local populations range from property disputes to periodic cooptation and recruitment into various facets of the illicit drug trade. The impacts can also be extremely violent. For example, Indigenous

MAP 5 Mapping homicide rates in relevant states and municipalities of the Amazon Basin – Colombia, 2019–2022



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: Internal administrative boundaries: the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021). Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socio-environmental Information (RAISG, 2020). Homicide data downloaded from the Colombian National Police.

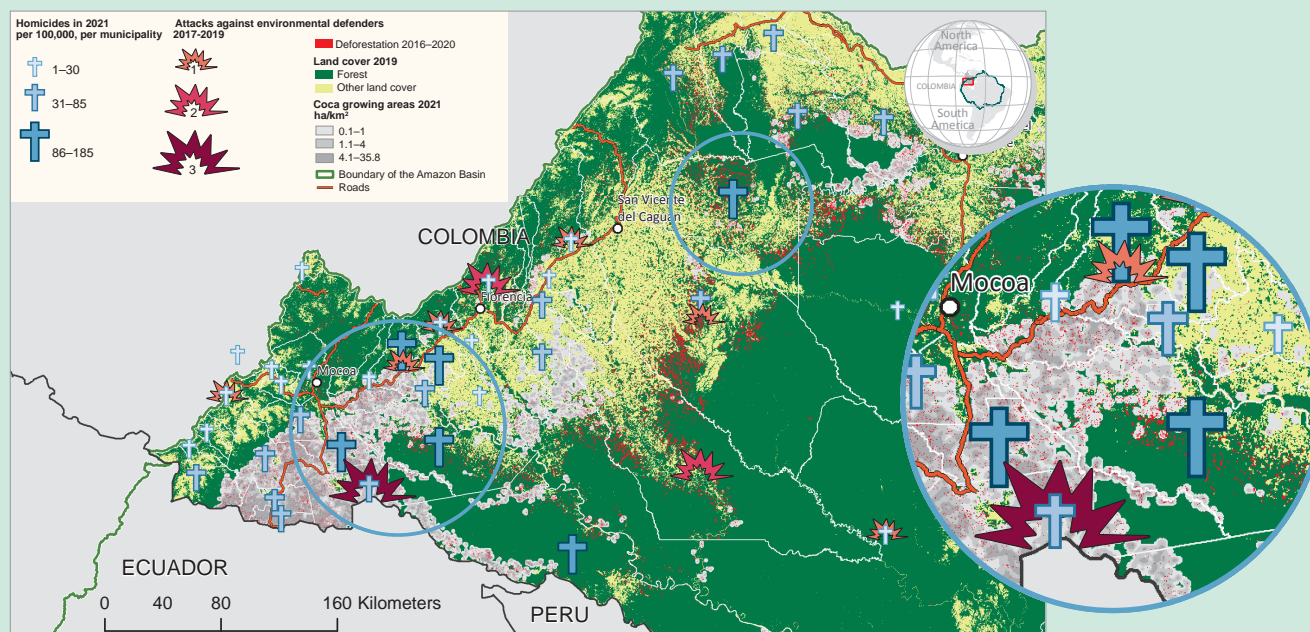
populations registered a more than 20 per cent increase in homicidal violence between 2009 and 2019 in Brazil.¹²¹ They also experienced a rapid increase in exploitation of their protected lands, in particular from land-grabbers, illegal loggers and *garimpeiros* (wildcat gold miners). In Brazil, mining on Indigenous lands expanded by 625 per cent between 2011 and 2021, with a particularly large increase since 2019.^{122, 123} The deforestation and environmental degradation generated by the extraction of gold and prolific use of mercury has had disastrous impacts on Indigenous territories.^{124, 125, 126} Illegal mining has further precipitated devastating outbreaks of disease and malnutrition in local communities.^{127, 128}

Members of the criminal group PCC are increasingly involved in aspects of mining operations in Yanomami in Brazil, the world's largest Indigenous territory and home to approximately 30,000 Indigenous People.^{129, 130, 131} Drug trafficking and sexual exploitation are also increasingly common,¹³² with PCC viewed as a key actor.^{133, 134, 135} The PCC is also suspected of being involved in providing protection, financing the extraction of gold and using the mines to launder drug profits.¹³⁶ The Urariocera river is a key corridor through Yanomami land that facilitates illegal mining, with organized criminal groups illegally “taxing” miners, store owners and local residents.

The expansion of illegal gold mining in and around Yanomami territory has had devastating health

Hot spots of violence, coca cultivation and deforestation: an example of uneven overlap

Coca cultivation, violence and deforestation in the eastern part of the Colombian Amazon



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: UNODC survey on coca cultivation 2021; Base cartography of Colombia and administrative boundaries: Agustin Codazzi Geographic Institute - IGAC and the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021). Limit of the Amazon Basin: the Amazon Network of Georeferenced Socioenvironmental Information and deforestation data (RAISG, 2020/2021). Attacks against environmental defenders: Tierra de residentes, 2023. Homicides: Policía Nacional de Colombia.

implications for local communities. A 2022 study determined that half the fish collected from the Mucujaí and Urariocoera rivers recorded unsafe levels of mercury, raising concerns about the well-being of local residents.¹³⁷ Moreover, with tens of thousands of miners flocking to the region, deforestation accelerated across large areas of the Yanomami land, almost doubling from approximately 1,200 hectares in 2018 to 3,300 in 2021, virtually all of it connected to illegal mining. Federal police have been leading operations since early 2023 and removed an estimated 25,000 illegal miners.¹³⁸

The Yanomami are hardly alone: illegal mining on Indigenous land in Brazil is estimated to have increased by almost 500 per cent between 2010 and 2020.¹³⁹ In the Yanomami and Mundurucu communities, for

example, between 50 and 90 per cent of the population suffer from mercury poisoning as a result of the use of mercury in nearby mining activities.¹⁴⁰ Meanwhile, in Peru, criminal groups are also involved in disputes with Indigenous populations alongside efforts to expand timber and gold extraction, with dangerously high levels of mercury poisoning also recorded.^{141, 142} In Colombia, media reports and research studies document how armed groups routinely target Indigenous and community leaders in the Amazon region.¹⁴³ Narco-penetration has also extended into trafficking in wildlife and illegal fisheries, as recent investigations into violence in the Vale do Javari in the State of Amazonas in Brazil attest.^{144, 145} According to police from the region, drug trafficking groups are also bartering in wildlife and commodities to transfer value between illicit economies.

Environmental impact: waste generated in the production of cocaine

The production of cocaine consists in essence of extracting the alkaloid found in the coca leaf and then refining and integrating the alkaloid into molecules that facilitate its absorption in the human body. The process of transforming coca leaf into cocaine through the solvent extraction method generates chemical waste. Indeed, coca bush growers use more agrochemicals in the cultivation of coca than of any other crop. In 2020, approximately 85 fertilizers, 62 herbicides and 100 pesticides were used in the illicit cultivation of coca crops in Colombia.³ Diversification in the use of agricultural inputs appears to be aimed at improving coca crop yields and profitability. Substances of environmental concern include herbicides that contain paraquat, glyphosate and 2,4-dichlorophenoxyacetic acid; insecticides containing methamidophos and monocrotophos; and fungicides such as mancozeb.

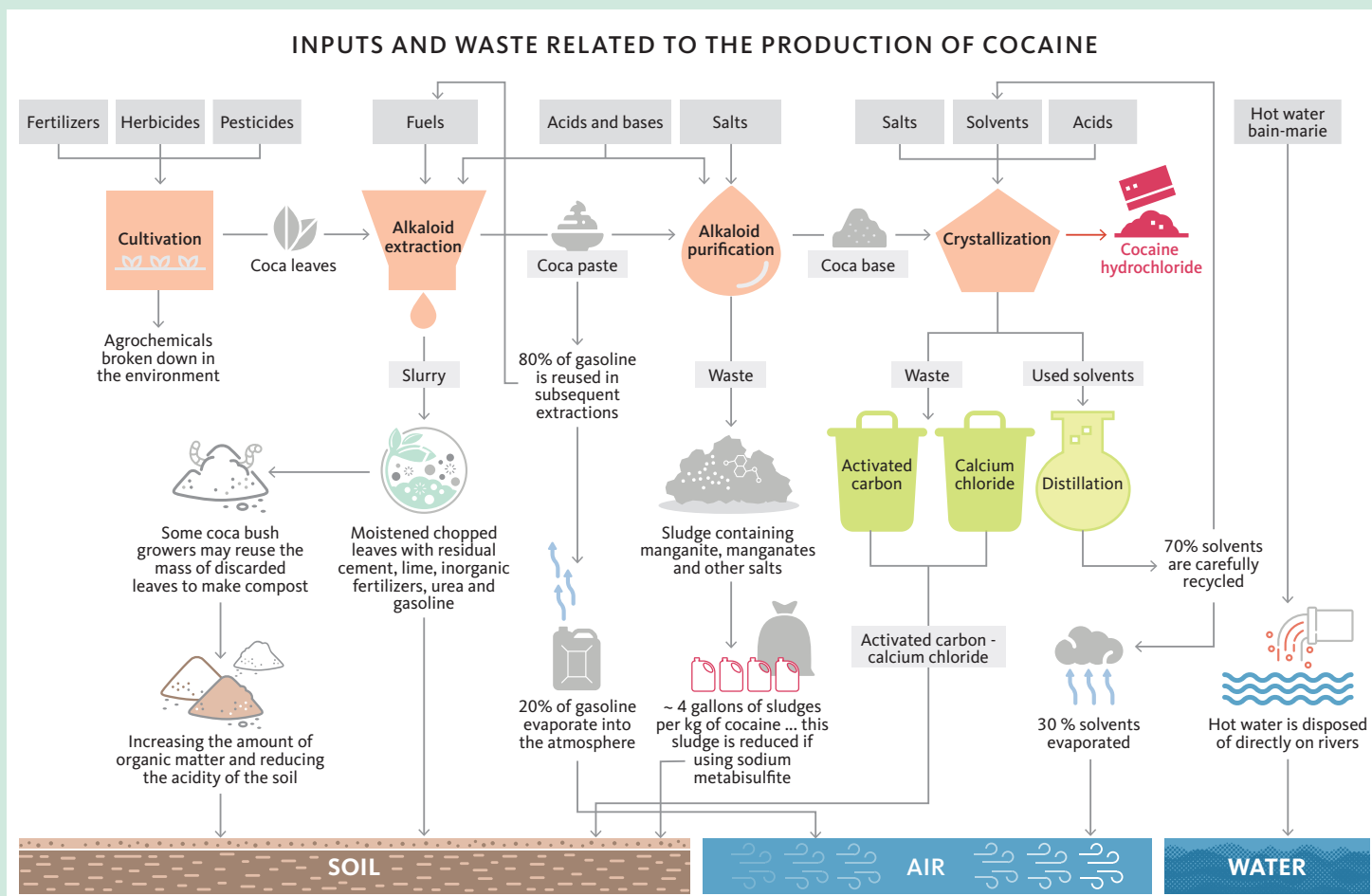
There are three main steps in cocaine production, which can be carried out in separate geographical areas including: extraction, refinement and crystallization.

Extraction – from coca leaf to PBC

The extraction phase involves separating out the cocaine alkaloid concentrated in the coca leaf. This is achieved by immersing leaves in fuel, mineral acids and alkaline substances, and results in the conversion to cocaine base paste. Typically, the percentage of cocaine alkaloid that is extracted from the leaf is 60–70 per cent. Given that the concentration of cocaine alkaloid in the coca leaf is just 0.2–0.8 per cent, approximately 99 per cent of the leaf mass that enters the extraction process is ultimately discarded. This explains why 700 kilograms of coca leaf are needed to produce a single kilogram of cocaine.

To process 700 kilograms of coca leaf, approximately 320 litres of gasoline are required.

The gasoline separates the organic elements from the physical structure of the coca leaf during the extraction phase, which generates approximately 260 litres of gasoline containing the cocaine



alkaloid and other organic substances that play no role in the final product, and waste material. Approximately 60 litres of gasoline evaporate into the atmosphere during this process or are absorbed into the moistened waste material.

The waste material is typically disposed of in cultivation areas without being treated and usually consists of chopped leaves with residual cement, lime, inorganic fertilizers, urea and gasoline. The limited amount of gasoline remaining on moistened leaves evaporates rapidly, generating infinite dilution.^b Some coca bush growers may reuse the mass of discarded leaves to make compost that will eventually be added to the coca crop, increasing the amount of organic matter and reducing the acidity of the soil, since the chemical substances used in the process are alkaline.

Sulfuric acid and water are then used to separate the cocaine alkaloid from the gasoline, and the acid becomes cocaine sulfate in solution. No waste is produced during this step of the process, since the gasoline (without the alkaloid) is reused in subsequent extractions. Subsequently, the cocaine sulfate is neutralized with an alkali in order to produce cocaine base paste (*pasta básica de cocaína* or PBC). The purity of the PBC produced at the end of the extraction phase typically varies between 50 and 65 per cent. In addition to cocaine, PBC contains other organic compounds such as tannins, fibers and other alkaloidal impurities, which are eliminated in the refining phase.

The refining or purification phase transforms PBC into cocaine base. This phase is usually carried out in concealed locations in the vicinity of coca bush cultivation or during the subsequent crystallization phase. Refining consists of eliminating organic impurities from PBC by means of chemical oxidation using potassium permanganate, which generates a sludge containing manganite, manganates and organic salts. In some laboratories where large quantities are processed, this sludge is reduced using sodium metabisulfite, making it easier to obtain cocaine base of a purity higher than 80 per cent. The remaining sludge is disposed of directly in the immediate environment.

Crystallization – from cocaine base to cocaine hydrochloride

The crystallization phase, which converts cocaine base to cocaine hydrochloride, generally occurs in isolated locations, often in forested areas that are difficult to access, where traffickers can more easily set up and maintain a clandestine laboratory. Proximity to a water source is fundamental, as crystallization laboratories require a large volume of water. In this phase, a type of *bain-marie* is used to heat the base, which is dissolved in organic solvents and has hydrochloric acid added to it. The hydrogen and the chlorine in the hydrochloric acid become integrated into the cocaine base, converting it into cocaine hydrochloride. Solvents are carefully recycled so that losses are kept to a minimum. During this step, waste that can harm the environment includes evaporative emissions. Accidents that may occur during this process can also generate environmental impacts.

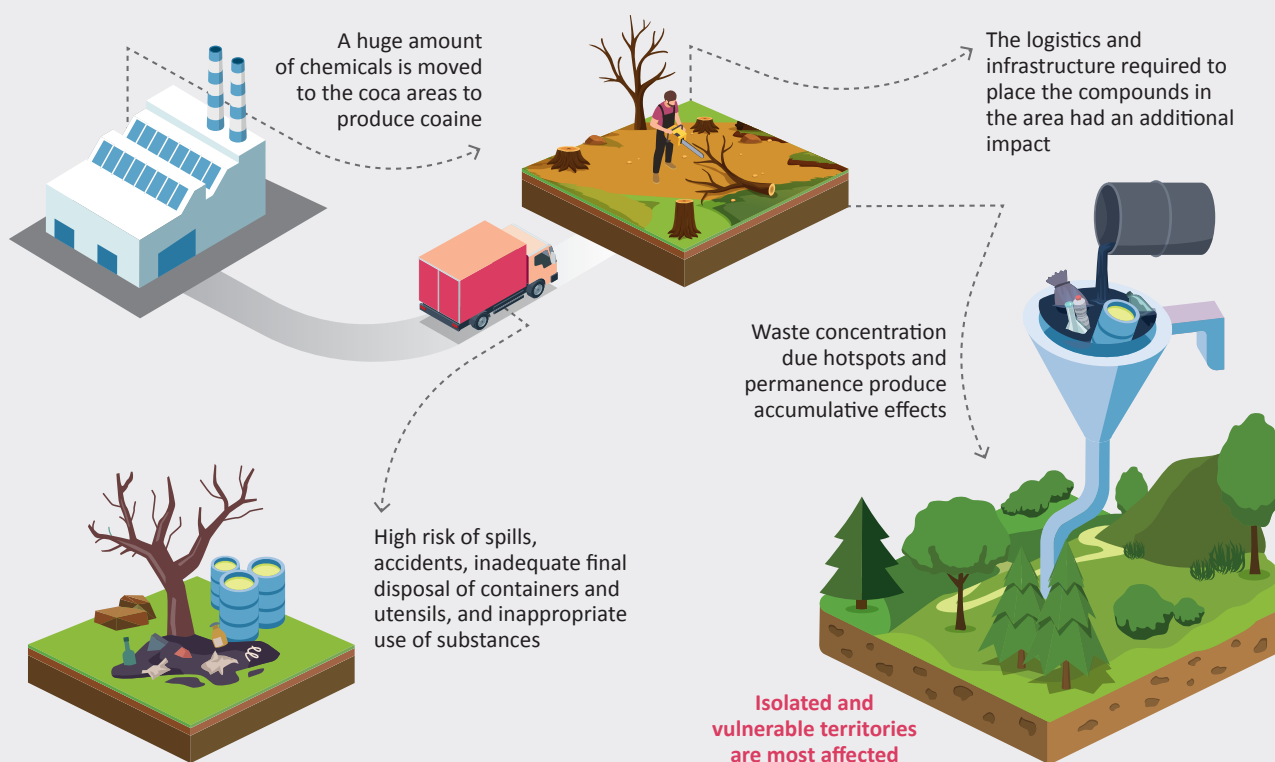
Processing cocaine: inputs and residuals estimations

	Input materials	Quantity of cocaine produced	Quantity of cocaine produced			Waste residuals	Quantity of cocaine produced			Affected areas	
			1 ton	Amazon Basin	Global		1 ton	Amazon Basin	Global		
				1,250 tons	2,304 tons			1,250 tons	2,304 tons		
Extraction phase	Coca leaves	metric tons	700	875,000	1,612,800	Moistened chopped coca leaves	ton	709	886,176	1,633,626	Residuals affecting mostly coca cultivation regions
	Gasoline	million of litres	0.34	423	779						
	Sulfuric acid	Litres	1.90	2,375	4,378	Evaporated gasoline	million of litres	0.07	85.4	156.4	
	Cement	Kilograms	61	75,875	139,853						
	Urea	Kilograms	6.40	8,000	14,746	Inorganic material	ton	67	84,688	155,038	
	Ammonia	Litres	1.20	1,500	2,765						
Refining phase	Potassium permanganate	Kilograms	0.20	250	461	Sludges	million of litres	0.016	20	37	
	Sulfuric acid (*)	Litres	0.90	1,125	2,074						
	Sodium hydroxide	Litres	0.20	250	461						
	Sodium metabisulfite (*)	Kilograms	0.20	250	461						
Crystallization phase	Solvents: Includes acetates (Ethyl, Butyl, n-propyl);	Litres	14	16,875	31,104	Evaporation of solvents	million of litres	0.004	5.1	9.3	Residuals affecting isolated and hidden forested laboratories zones
	Chloridric acid	Litres	0.20	250	461						
	Calcium chloride	Kilograms	1	1,250	2,304	Calcium chloride	ton	0.98	1,238	2,267	
	Cutting substances	Kilograms	0.20	250	461						
	Activated carbon	Kilograms	0.10	125	230	Activated carbon	Kilograms	100	126,400	231,400	

Sources: Government of Colombia and UNODC/SIMCI. Estimates based on the characterization of cocaine processing and subsequent validation.

Note: Quantities estimated on the basis of the solvent extraction method for processing coca leaves.

RISK FACTORS ASSOCIATED WITH COCAINE PRODUCTION WASTE



a Government of Colombia and UNODC / SIMCI (2021). Coca cultivation yield surveys in affected regions (2005-2021).

b “Infinite dilution” refers to a condition in which the concentration of the solute (gasoline) becomes zero. In this case, as the processing is done in open areas, the gasoline disperses rapidly in the air and the concentration of gasoline rapidly becomes zero.

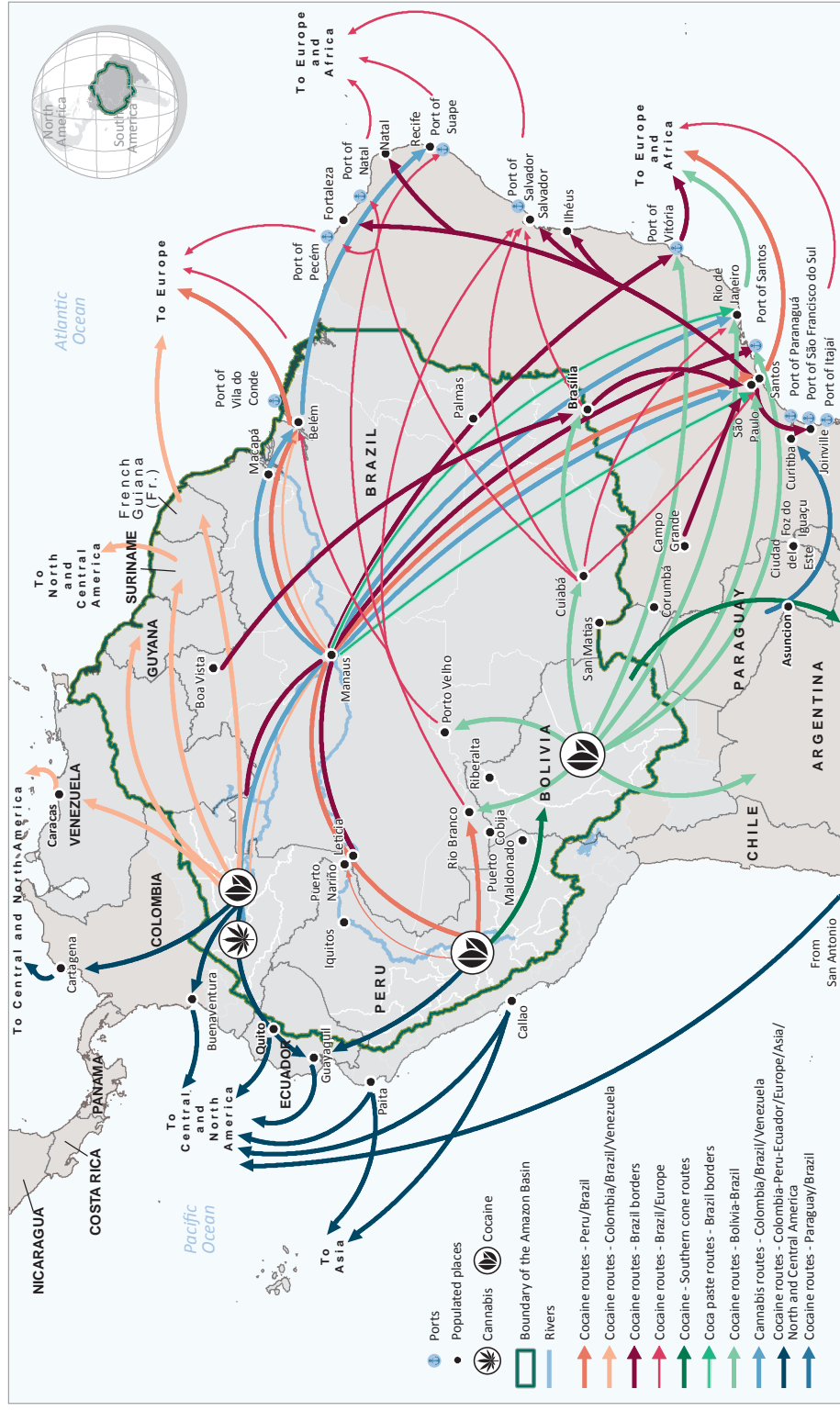
Drug trafficking routes

Although drugs and other contraband, such as illegally felled hardwoods, illicit gold and captured animals, are frequently transported by road and air, rivers are the central conduit for trans-shipment within countries and across borders. The sheer volume of commercial traffic across the Amazon Basin’s vast water network means that illicit products are easily concealed and often missed. Another factor is the weak regulation and monitoring of boats and shipping containers, including at public and private ports.¹⁴⁶

Seizure data and open-source reporting show that cocaine produced in Colombia is typically exported to

North America (and, to a lesser extent, Western Europe), either directly from ports on the Pacific or the Caribbean coasts or through Brazil and Venezuela (Bolivarian Republic of) northward toward the Caribbean and Central America. By contrast, Peru, and the Plurinational State of Bolivia, are considered the most common sources of cocaine for domestic markets in Brazil and Western Europe.¹⁴⁷ Drugs may be sent through Acre, Amazonas, Rondônia, Roraima, and Mato Grosso in Brazil before exiting through the north-eastern and south-eastern states on the Atlantic to Africa, Europe and beyond. Paraguay is a primary source of cannabis for Brazil and high-potency varieties are also trafficked from Colombia to Brazil, primarily for local consumption.¹⁴⁸

MAP 6 Selected drug trafficking routes in the Amazon Basin



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

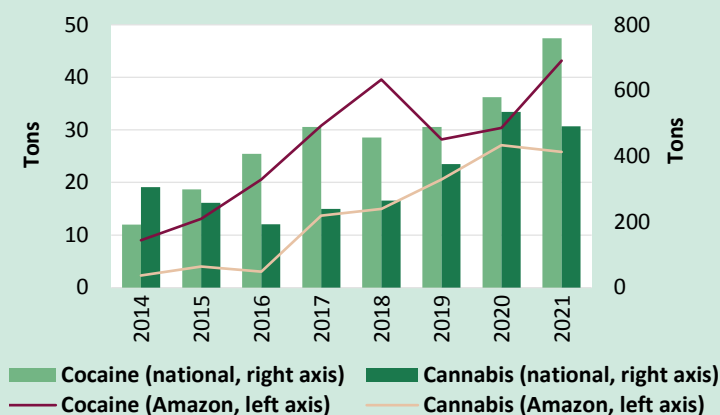
Notes: Internal administrative boundaries of Brazil: Geoportail Provia, 2023. Internal administrative boundaries of Colombia: the National Administrative Department of Statistics (DANE, 2021). Internal administrative boundaries of Peru: the National Geographic Institute, 2021. Internal administrative boundaries of Bolivia: United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2023. Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2020)

Source: UNODC elaboration based on several sources, including previous editions of *World Drug Report*, open sources, media reports, seizure data, interviews and multiple international and national publications.

Disaggregating drug seizures in the Amazon Basin

The scope and scale of reported drug seizures in the Amazon Basin vary considerably from country to country and year by year. Even so, a review of official data over the past decade from all four countries indicates that the frequency and volume of drug seizures in the Amazon region are increasing over time.

Cocaine and cannabis seizures in Amazon departments and at the national level, Colombia, 2014–2021



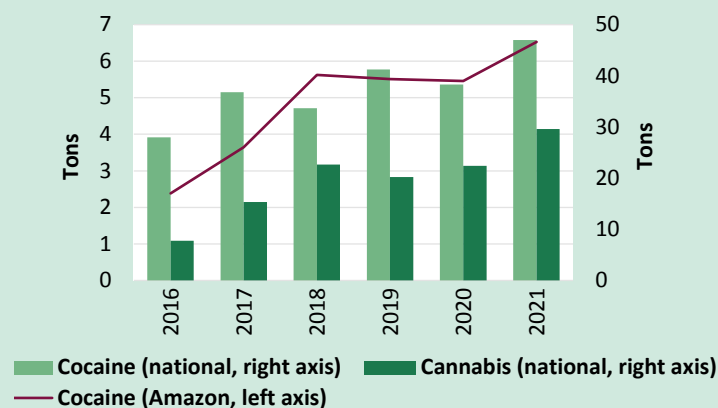
Sources: Amazon Basin calculations. Incautación de estupefacientes. Policía Nacional <https://www.policia.gov.co/grupo-informacion-criminalidad/resultados-operativos>; UNODC, responses to the annual report questionnaire.

In Colombia, for example, trends in cocaine and cannabis seizures in Amazon departments are broadly in line with national seizures between 2010 and 2022 but it should be noted that only a very modest share of all cocaine and cannabis seizures occur in Amazon departments: only between 1 and 5 per cent of all seizures of cocaine (including coca paste) in Colombia and an even smaller share of cannabis seizures between 2010 and 2022. A likely reason for this is that a modest share of Colombia's overall coca cultivation and cocaine production is located in departments in the Amazon Basin,^a with most product exiting ports in the Pacific, the Caribbean or through Brazil and Venezuela (Bolivarian Republic of).

Likewise, in Peru, a comparatively small share of cocaine was seized in Amazon departments between 2015 and 2021 compared with the overall national incidence of seizures. Unlike in Colombia, however, virtually all coca and cocaine cultivation and

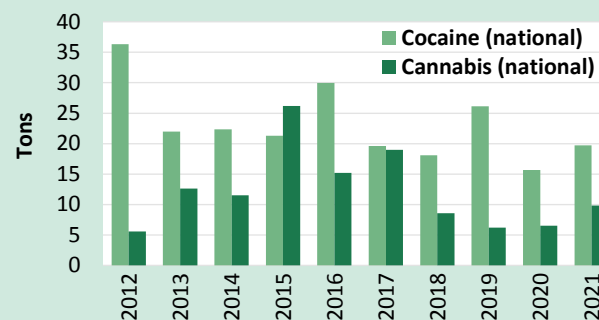
processing in Peru occurs in departments located in the Amazon Basin. Only a minor share of all seizures of cocaine occurred in departments straddling the Amazon. In the absence of publicly available disaggregated data on cannabis seizures, it is not possible to discern the share occurring in the Amazon region.

Cocaine seizures in Amazon departments; Cocaine and cannabis seizures at the national level, Peru, 2016–2021



Source: Peru (2023) El Instituto Nacional de Estadística e Informática (INEI) – Dirección Antidrogas de la Policía Nacional del Perú (DIRANDRO); UNODC, responses to the annual report questionnaire.

Cocaine and cannabis seizures in tons, Plurinational State of Bolivia, 2012–2021

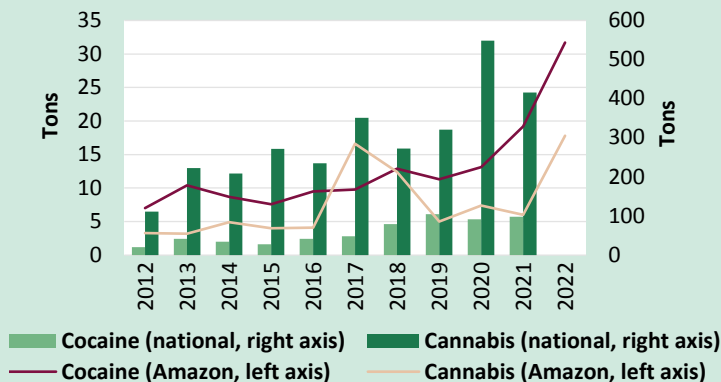


Source: UNODC, responses to the annual report questionnaire.

In the Plurinational State of Bolivia, cannabis seizures at the national level peaked in 2015 but national seizures of cocaine did not reveal a clear trend between 2012 and 2021. The Plurinational State of Bolivia seized 20 tons of cocaine and just under 10 tons



Cocaine seizures in the Legal Amazon and cocaine and cannabis seizures at the national level in tons, Brazil, 2012–2022



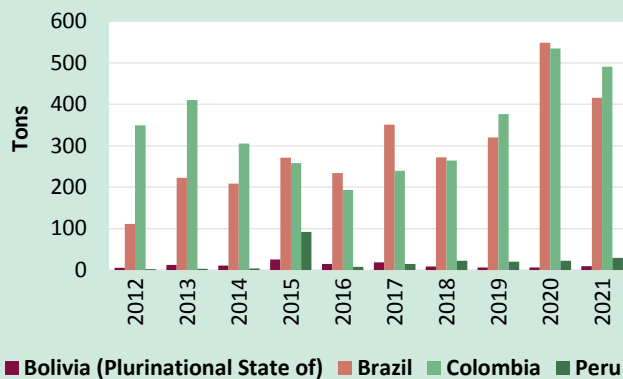
Source: Brazil (2022) Drogas apreendidas por UF – Série histórica de 1995 a 2022 (até junho). Diretoria de Investigação e Combate; UNODC, responses to the annual report questionnaire.

Note: seizures are sourced from Federal Police registers; the data from the states' civil police are not included.

of cannabis in 2021. As no official disaggregated data is available, the proportion of seizures occurring in the Amazon departments of the Plurinational State of Bolivia cannot be determined.

In contrast to the situation in Bolivia (Plurinational State of), Colombia and Peru, a significant share of the cocaine and cannabis seizures in Brazil between 2012 and 2022 were reported in the nine states that make up the country's Legal Amazon. Overall

Regional trends: national reported cocaine seizures in the four Amazon Basin countries, 2012–2021



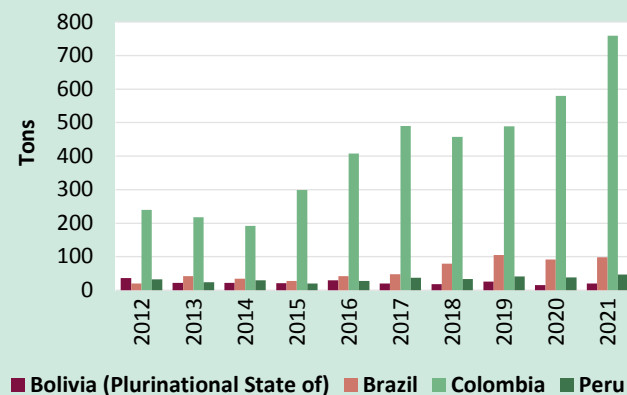
Source: UNODC, responses to the annual report questionnaire.

Note: Includes cocaine derivatives. In Brazil, seizures are sourced from Federal Police registers; the data from the states' civil police are not included.

levels of cocaine seizures in the Legal Amazon steadily increased between 2012 and 2022, reaching over 30 tons by 2022.

A review of national seizures of cocaine (including coca derivatives) across all four countries between 2010 and 2021 reveals a high degree of variation. On the one hand, total seizures of cocaine from Colombia rose gradually between 2012 and 2021, reaching over 750 tons in 2021. Meanwhile, cocaine seizures from Peru collapsed between 2012 and 2013, from just over 32 tons to approximately 24 tons, and increased again to almost 47 tons in 2021. Seizures from Brazil also ebbed and flowed, though have crept steadily upward from a low of 20 tons in 2012 to around 100 tons since 2019. Cocaine seizures in the Plurinational State of Bolivia steadily declined from a high of over 36 tons in 2012 to just under 20 tons in 2021.

Regional trends: national reported cannabis seizures in the four Amazon Basin countries, 2012–2021



Source: UNODC, responses to the annual report questionnaire.

Note: in Brazil, seizures are sourced from Federal Police registers; the data from the states' civil police are not included.

Regional trends in reported cannabis seizures between 2012 and 2021 appear more stable in comparison with seizures of cocaine and coca derivatives. For example, cannabis seizures in Colombia fluctuated from a low of 193 tons in 2016 to a high of 534 tons in 2020. Seizures in Brazil have likewise oscillated between a low of 111 tons in 2012 and a high of 548 tons in 2020. The most extreme variations occurred in Peru, from 3 tons in 2012 to 92 tons in 2015.

^a 20 per cent of illicit coca cultivation in Colombia is located in the Amazon Basin and 25 per cent of the cocaine produced in Colombia comes from the Amazon.

The high relevance of four countries in the Amazon Basin for global drug trafficking: trafficking routes of cocaine and cannabis departing from Brazil, Colombia, Peru and Bolivia (Plurinational State of)

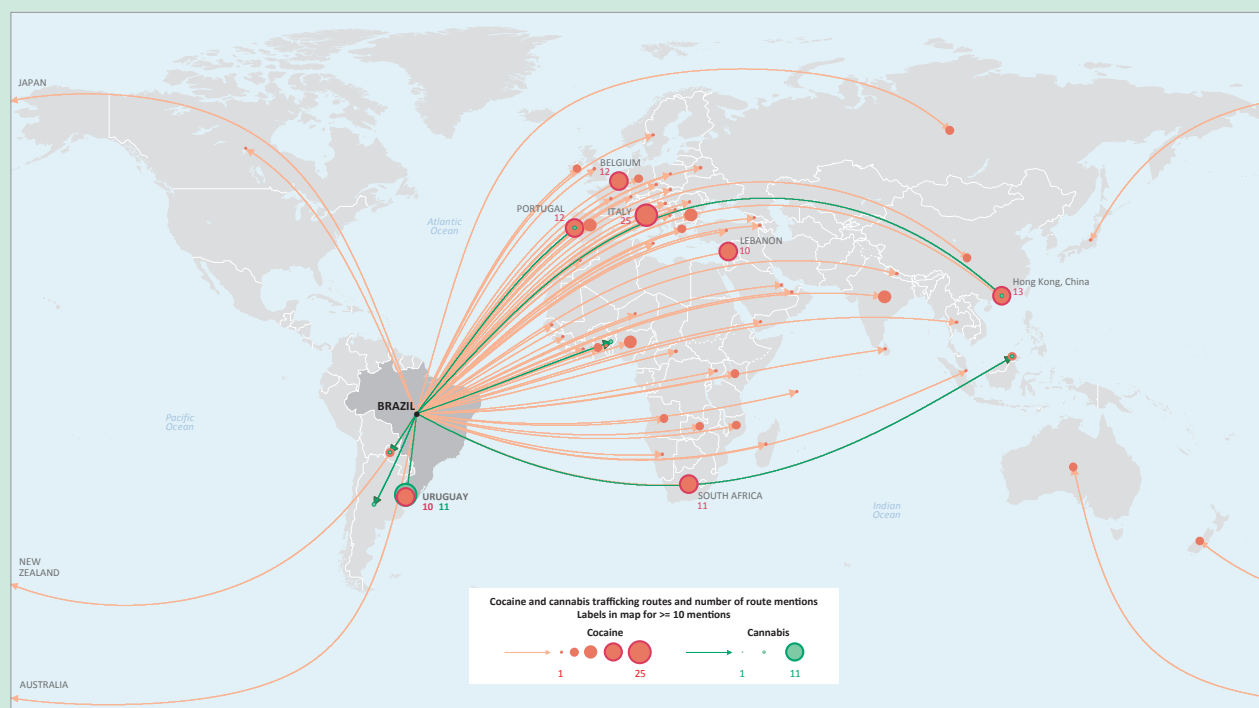
Cocaine (including cocaine-type drugs) produced and transiting through the four countries of the Amazon Basin is reaching global markets. A review of drug trafficking routes reported to UNODC between 2010 and 2021 provides insight into their scope and scale. In total, over 900 drug routes departing from the Amazon Basin countries of Colombia, Brazil, Peru and Bolivia (Plurinational State of) were reported during the reporting period.^a

Cocaine (including cocaine-type drug) trafficking transiting through and exiting from Brazil, including states in the Legal Amazon, has been reported to have reached 65 countries between 2011 and 2021, with primary destinations including Italy, Uruguay,

Hong Kong, China, Portugal, Belgium, South Africa, and Lebanon. Almost half (44 per cent) of all documented cocaine trafficking routes were destined for Western or Eastern Europe, and 23 per cent for Asia or Africa. Most of the cannabis-type drugs were destined for Uruguay or, to a lesser extent, Paraguay.

Cocaine from Colombia was reportedly shipped to at least 64 countries, with Ecuador, the Bolivarian Republic of Venezuela, Panama, Italy, Belgium, El Salvador, Spain, Mexico and the United States being among the top recipients. Approximately 52 per cent of recorded cocaine routes departing from Colombia were reported in the Americas and 35 per cent were reportedly

Reported cocaine and cannabis trafficking routes between Brazil and other countries and territories, 2010–2022



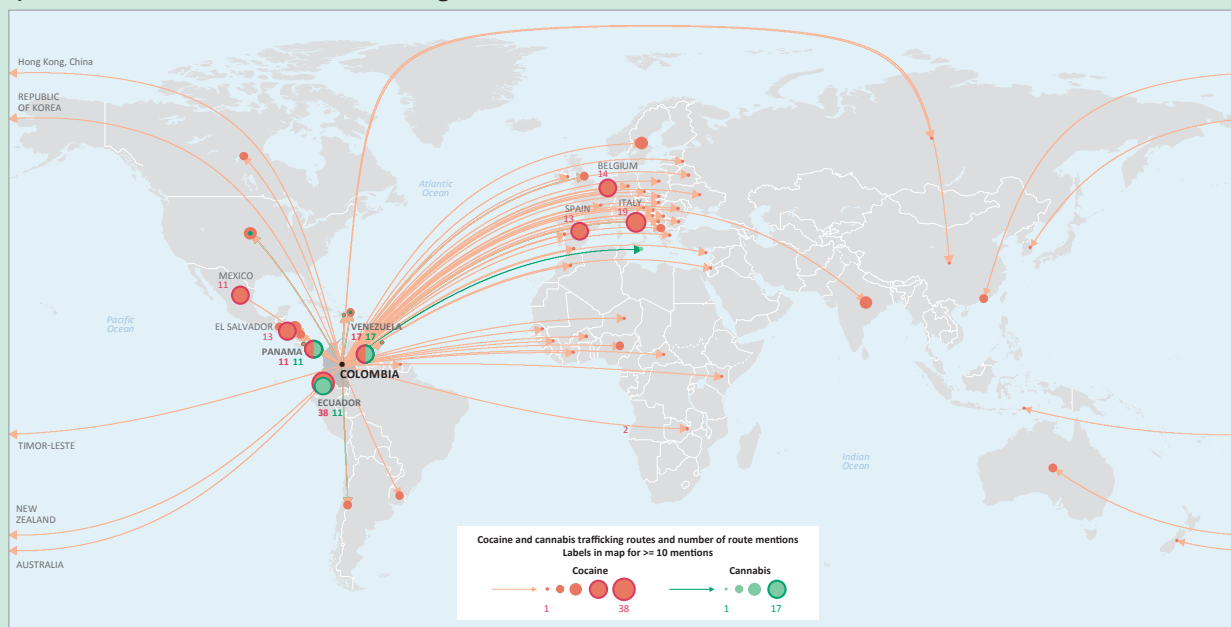
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Source: UNODC, responses to the annual report questionnaire.

Notes: Routes are based on reporting from destination or transit countries for cocaine and cannabis originating in or transiting Brazil. Cocaine seizures Brazil: Drogas apreendidas por UF - Série histórica de 1995 a 2022 (até junho). Diretoria de Investigação e Combate ao Crime Organizado - DICOR.



Reported cocaine and cannabis trafficking routes between Colombia and other countries and territories, 2010–2022

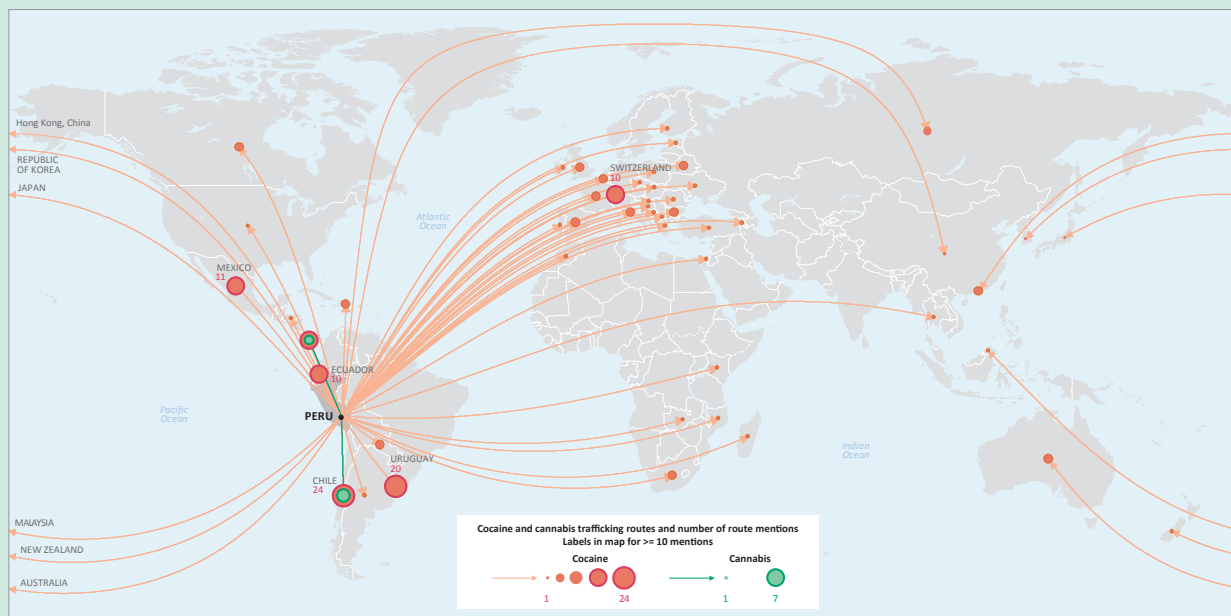


The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties

Notes: Routes are based on reporting from destination or transit countries for cocaine and cannabis originating in or transiting Colombia..

Source: UNODC, responses to the annual report questionnaire.

Reported cocaine and cannabis trafficking routes between Peru and other countries and territories, 2010–2022

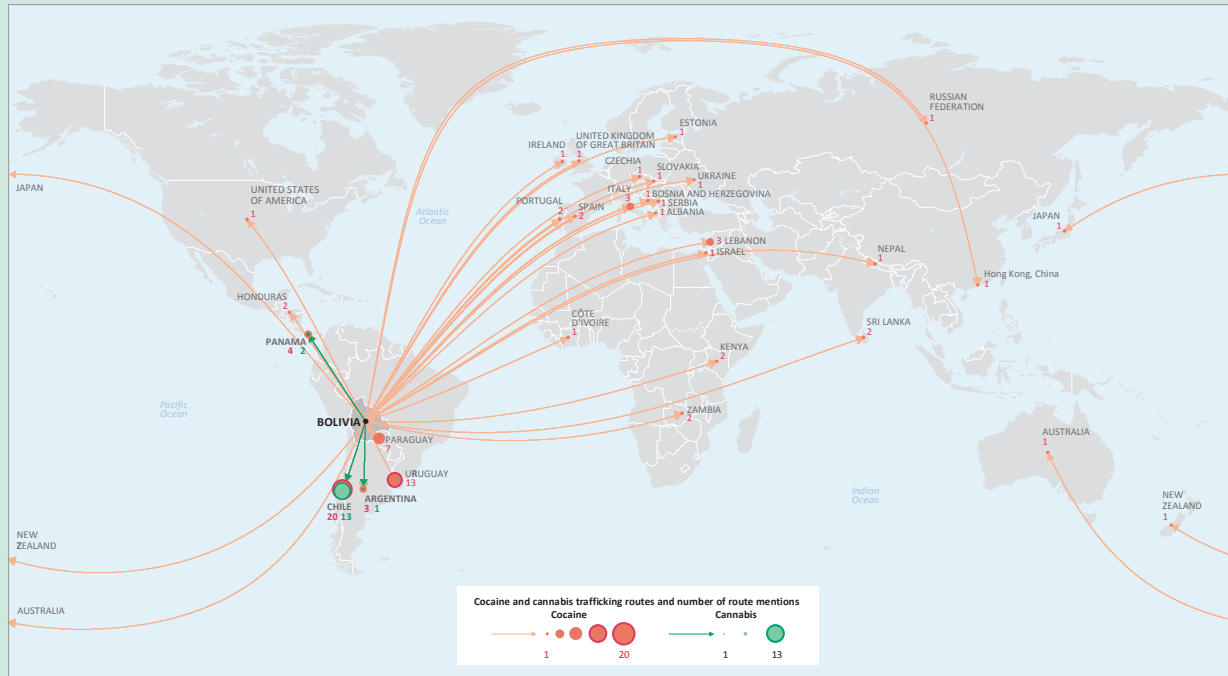


The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Note: Routes are based on reporting from destination or transit countries for cocaine and cannabis originating in or transiting Peru.

Source: UNODC, responses to the annual report questionnaire.

Reported cocaine and cannabis trafficking routes between the Plurinational State of Bolivia and other countries and territories, 2010–2022



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Note: Routes are based on reporting from destination or transit countries for cocaine and cannabis originating in or transiting the Plurinational State of Bolivia. The Plurinational State of Bolivia notes that the cannabis trafficking route to Panama does not exist or is not recognized since it does not have any case reports from the Plurinational State of Bolivia to Panama, and since, due to its geographical location, the Plurinational State of Bolivia is a transit country for cannabis.

Source: UNODC, responses to the annual report questionnaire.

directed to Western and Eastern Europe. By comparison, 54 reported cannabis routes departing from Colombia primarily supplied the Bolivarian Republic of Venezuela, Ecuador and Panama. Virtually all reported cannabis routes from Colombia were destined for markets in the Americas.

Cocaine from Peru was shipped to at least 51 countries, with the highest number of reported routes during the period of 2010–2021 being to Chile, Ecuador, Uruguay, Montenegro, Mexico, Panama and Switzerland. Almost half (47 per cent) of all cocaine trafficking routes departing from Peru were to countries in the Americas, and 35 per cent were to Europe. By comparison, there were just 11 mentions of routes from Peru to Chile and Panama, though this likely underrepresents the volume of cocaine from Peru transiting these countries.

Cocaine shipped from the Plurinational State of Bolivia was reported in 31 countries, including Chile, Uruguay, Paraguay, Panama, Argentina, as well as Italy and Lebanon. Approximately 60 per cent of all reported cocaine trafficking routes from the Plurinational State of Bolivia were reported as reaching countries in the Americas, as compared with 20 per cent to Europe and 11 per cent to Asia. Approximately 13 of cannabis trafficking routes were registered between the Plurinational State of Bolivia and Chile, compared with just 2 to Panama and 1 to Italy. Virtually all reported cannabis trafficking routes from the Plurinational State of Bolivia were limited to the Americas, in particular its South American neighbours.

^a Some routes reported by Member states may occur in a specific context and thus may not necessarily match other information on trafficking routes.

Structural enablers of drug-related crime, crimes that affect the environment, and convergent crime

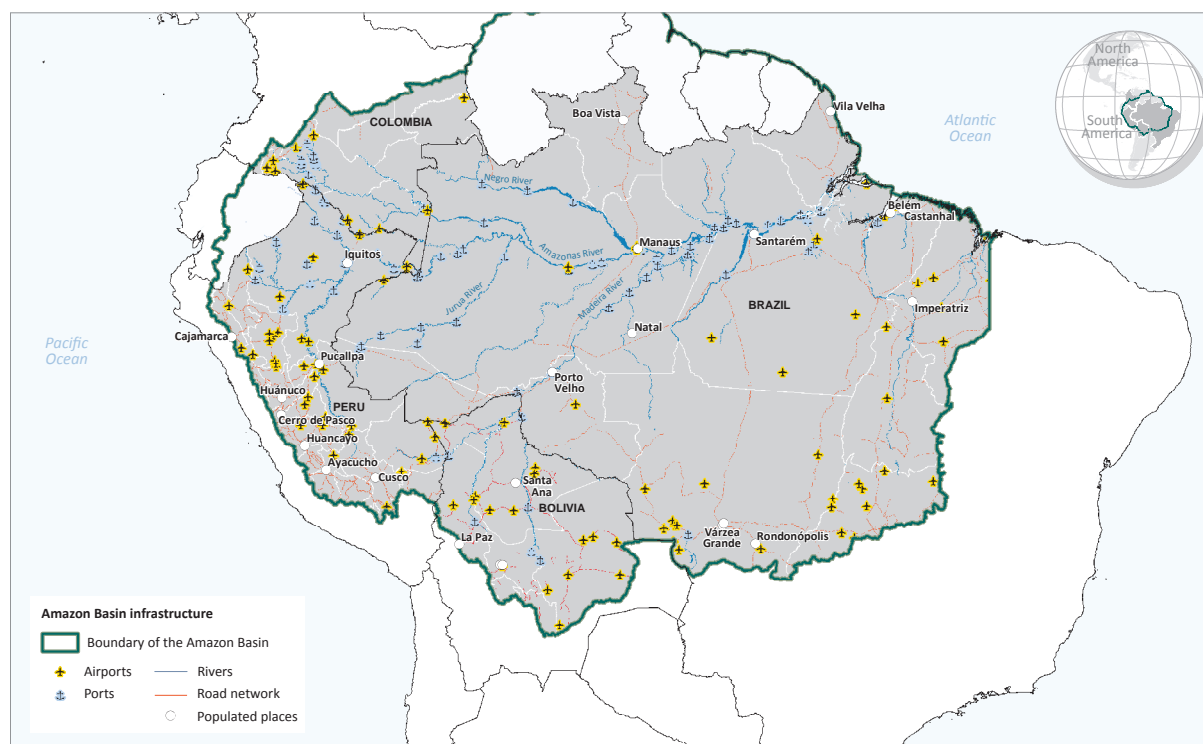
Infrastructure development has provided opportunities to expand drug trafficking and crimes affecting the environment

The expansion of organized crime in the Amazon Basin is not solely a consequence of trafficker preferences. Structural demographic changes and infrastructural expansion across the region have played a critical role in the spread of drug trafficking, crime that affects the environment and convergent crime.^{149, 150} Areas where

measures were introduced to expand the agricultural frontier, and which were slated for road construction, agricultural, cattle, mining and urban development during the 1960s and 1970s, later emerged as deforestation and degradation hotspots. The same corridors designed to expand agricultural yields facilitated the penetration of the drug economy and crimes that affect the environment.¹⁵¹ Indeed, corruption often serves as a lubricant to facilitate the expansion of illegal crops and livestock and their processing and transportation. For example, federal, state and municipal public officials regularly disregard national and state regulations and approve road constructions in the interest of local ranchers and farmers, including coca growers. This can even happen in national and state parks and regions demarcated as protected areas or conservation units.¹⁵²

153

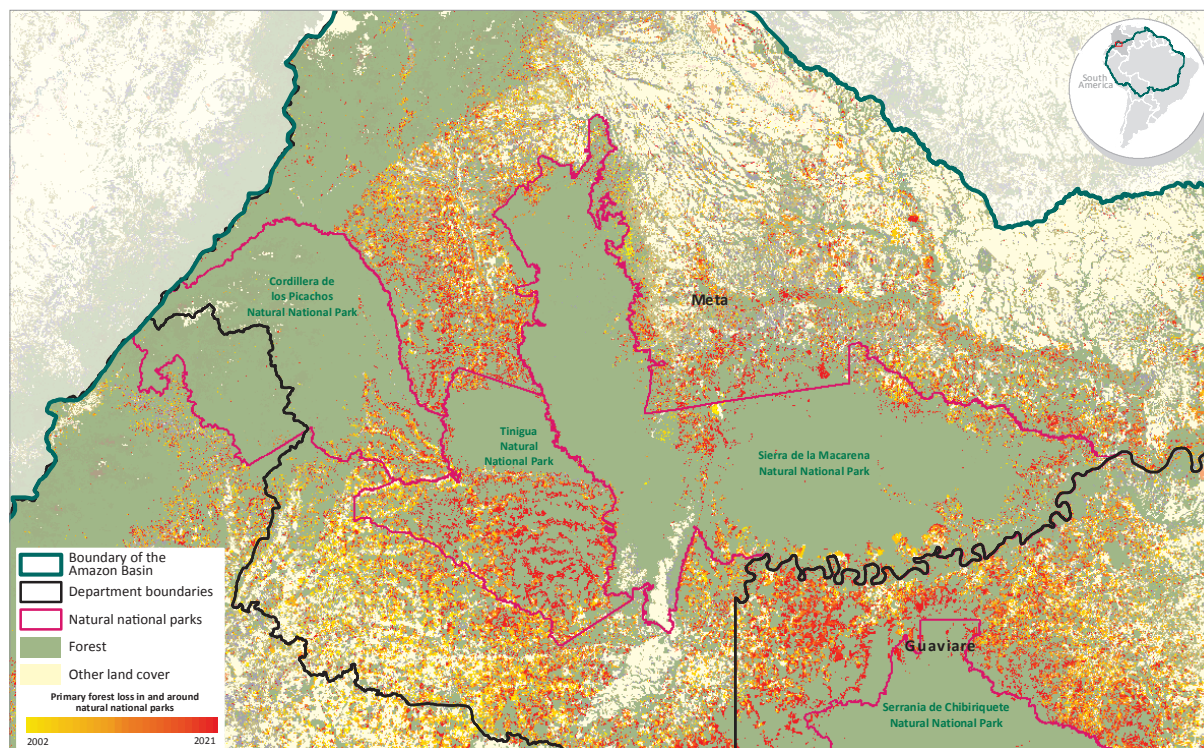
MAP 7 Amazon Basin infrastructure



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: Agustin Codazzi Geographic Institute (IGAC) and the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021); Brazilian Institute of Geography and Statistics (IBGE) and Geoportal ProVita, 2023; OpenStreetMap and the National Geographic Institute, 2021 and Unique Digital Platform of the Peruvian State, 2023; Geographic Server: Servidor Geográfico, GeoBolivia and United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2023; The Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2020).

MAP 8 Shrinkage of parks in Colombia, 2001–2021



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

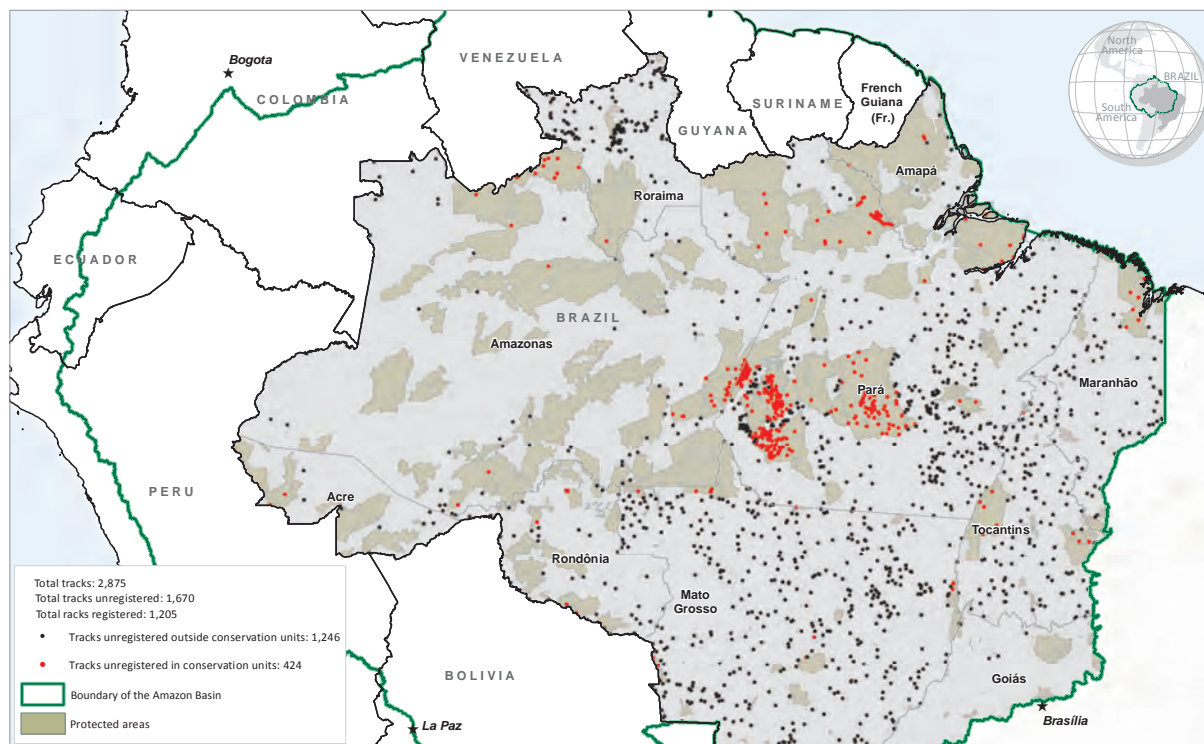
Source: Internal administrative boundaries of Colombia: the National Geostatistical Framework of the National Administrative Department of Statistics (DANE, 2021). Boundary of the Amazon Basin: the Amazon Network of Georeferenced Socio-environmental Information (RAISG, 2020). Protected areas of Colombia: National Natural Parks, 2022. Forest and forest loss: Global Land Analysis y Discovery, 2021 and the Amazon Network of Georeferenced Socio-environmental Information (RAISG, 2020).

Road infrastructure is not only used by drug traffickers to move illegal products but is also strongly linked with crimes that affect the environment across the Amazon Basin. According to recent studies, the vast majority of illegal deforestation in the Amazon appears to occur within approximately 5 kilometres of an official road.¹⁵⁴ Roads may increase fragmentation and generate “edge effects”, where areas of forest exposed to human clearance become more vulnerable to additional threats, including land-grabbing, illegal logging, illegal mining and trafficking in wildlife.^{155, 156} It is not only official roads that are destructive: for every kilometre of *legal* road there are an estimated 3 kilometres of *illegal* road that penetrate deep into the forests.¹⁵⁷

Clandestine airstrips constitute an infrastructure that facilitates long-distance trafficking

Illegal airstrips and runways are another common feature of the Amazon Basin.¹⁵⁸ Clandestine airstrips and unregistered aircraft are routinely intercepted and destroyed in Bolivia (Plurinational State of), Brazil,¹⁵⁹ Colombia and Peru.^{160, 161, 162, 163} As is the case with roads, there is a robust relationship between the presence of clandestine runways with forest clearance, illegal mining and drug trafficking,^{164, 165, 166} suggesting that these constitute an important infrastructure to facilitate long-distance trafficking of drugs and other illegally sourced commodities. Airstrips have long been used by farmers when spraying pesticides and surveying crops. In recent decades, however, these airstrips

MAP 9 Clandestine airstrips, Brazil, 2023



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: Unregistered airstrips: plataforma.brasil.mapbiomas.org, 2023. Protected areas of Brazil: Ministry of the Environment, 2023. Unregistered airstrips: MapBiomas Brazil. "Plataforma - Pistas de Pouso Na Amazônia Brasileira", March 2023. Protected areas of Brazil: Ministry of the Environment, 2023.

have also facilitated the movement of fuel, food and personnel for mining operations, including clandestine ones, and the movement of drugs and other contraband within and across borders.^{167, 168}

In order to track overflights and disrupt criminal activities such as drug and timber trafficking, Brazil established a major radar constellation called the Integrated System for the Vigilance of the Amazon (SIVAM) in the 1990s.¹⁶⁹ Brazil, Colombia and Peru have also expanded remote sensing monitoring and intelligence-sharing to detect the location of illegal runways and track small planes.^{170, 171} With the advent of accessible new technologies, non-governmental organizations have also expanded their surveillance activities. For example, a 2023 study determined that approximately 58 per cent of the 2,986 private airstrips identified in the Brazilian Amazon do not appear in

official records. A further 28 per cent are purportedly built on environmental and Indigenous territories, most of the latter located in the Yanomami land (75), Raposa Serra do Sol (58), Kayapó (26), Mundurukú (21) and Xingu National Park (21).^{172, 173}

Waterways are important natural corridors for trafficking

Notwithstanding the critical role of roads and airstrips in enabling criminal markets in the Amazon Basin, it is the region's more than 1,100 rivers and tributaries that play a dominant role as vectors of drug trafficking and crimes that affect the environment. Most of the illegal trafficking of commodities occurs using waterways and ports, including for the transportation and exportation of cocaine and cannabis, rare hardwood, illegally extracted gold, and endangered plants,

animals and insects. Brazil is estimated to have as many as 60,000 kilometres of inland waterways, with just 13,000 kilometres regularly used, and very few of them subject to any routine monitoring from air or land.¹⁷⁴ The abundance of rivers, vessels and ports coupled with extremely limited oversight means that products are comparatively easily concealed and transported between countries and routed onward to global markets.^{175, 176, 177, 178}

Given the wider economic dependence of residents on rivers for all manner of transportation and commerce, seasonality shapes the ebb and flow of drug trafficking and other illegal activities in the Amazon Basin. The Federal and state police of Brazil claim that criminal groups organize their operations in relation to the rainy season.¹⁷⁹ For example, when water levels are high, traffickers typically take advantage of labyrinthine river networks, making it more difficult for police and environmental authorities to monitor and

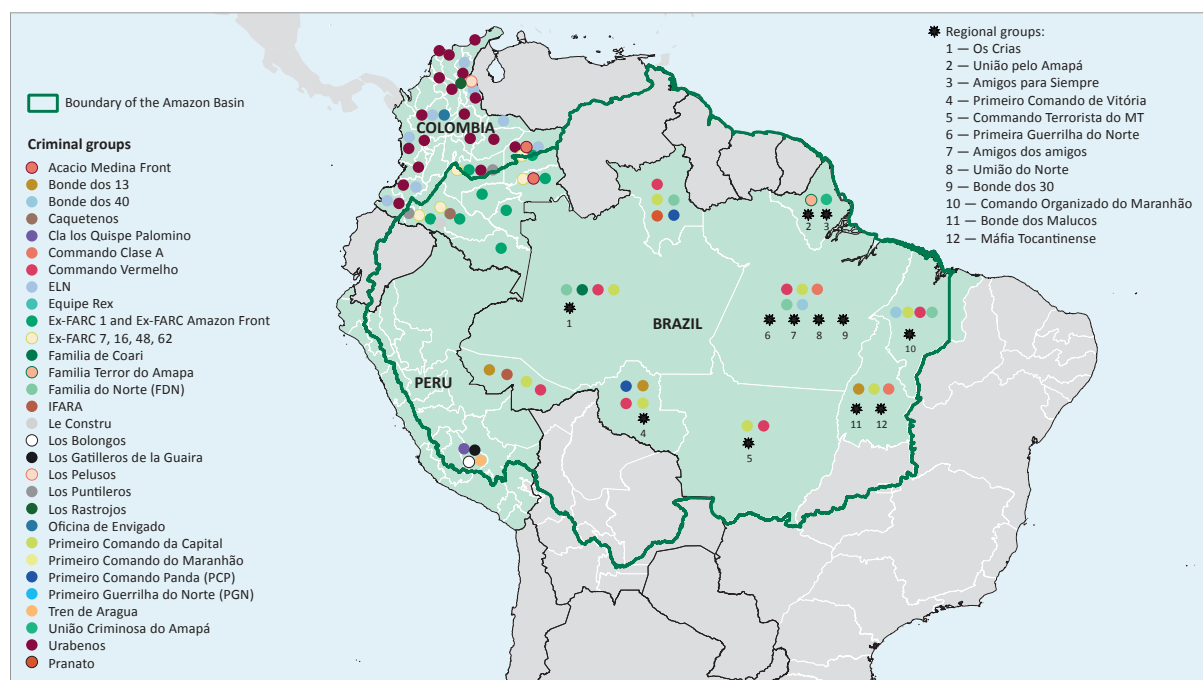
respond to their activities. The wet season falls between November and March producing as much as 1.8 to 3 meters of rainfall.¹⁸⁰ In some cases during dry seasons, drug traffickers and other smugglers may delay transporting their cargo, keeping their product in warehouses in neighbouring countries until water levels rise.¹⁸¹

Criminal actors

A multitude of actors involved

There is a constellation of common actors spanning the supply chains of drug-related crime, crimes that affect the environment and convergence crime. Alongside drug traffickers, organized criminal groups and other criminal and militia actors, there is an array of political and economic backers who facilitate and finance illegal activities. Also involved are brokers, fixers and shipping agents, who are responsible for

MAP 10 Transnational ecosystem of drug trafficking groups in the Amazon Basin



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Sources: *Cartografias das violências na região amazônica* (Fórum Brasileiro de Segurança Pública, 2021); InSight Crime (2022); and Amazon Network of Georeferenced Socioenvironmental Information (RAISG, 2022).

ensuring that illicit commodities reach their intended destination. On the frontline, there are local populations, often poor and lacking alternative opportunities for livelihoods, who are recruited voluntarily, or forced, to work in unhealthy and dangerous conditions, extracting trees, mining rivers and poaching endangered species.

The criminal markets are deeply connected to both formal and informal economies, including companies and individuals who provide services for the extraction and processing of illegal goods. Such individuals include merchants who source precursor chemicals, fuel, food, caterers, drivers, pilots and sex workers for criminal actors operating in remote frontier and forested areas. Given the many connections between drug trafficking and crimes that affect the environment, these actors also frequently make use of shared transportation routes and hubs, including rivers and ports, highways and irregular roads, and official and clandestine runways.

Some drug trafficking organizations that have operated in traditional coca-growing areas of Bolivia (the Plurinational State of), Colombia and Peru have opened new sections of the Amazon rainforest for coca and cannabis cultivation. As a means of expanding revenue and laundering profits, these groups frequently diversify into a range of legal and illegal activities. In some cases, their operations may be directly and indirectly facilitated by local communities because they generate employment opportunities.

Mapping drug trafficking organizations

A constellation of drug factions and criminal groups are both colluding and competing across the Amazon Basin. Many of the largest and most established drug trafficking organizations in the region – including PCC and CV of Brazil and factions of FARC – have influence across most of the countries and territories that make up the Amazon Basin. Some of them oversee vast transnational operations spanning multiple countries in the Americas and Europe.¹⁸² Powerful drug factions are particularly active in the region's triple border area where Brazil, Colombia and Peru meet, including in and around cities such as Leticia in Colombia, Tabatinga in Brazil, and Santa Rosa de Yavarí in Peru. Given

the central role in cocaine production and the abundance of exploitable natural resources of the Amazon Basin region, the region has probably among the densest concentration of organized crime groups on earth.

The dominant drug trafficking organizations in Brazil have deepened their presence in the Legal Amazon in recent years. CV and PCC have expanded from their strongholds in Rio de Janeiro and São Paulo, respectively, after several leaders were relocated to Federal and state prisons in the region. Over time, CV and PCC spread to cities, towns and the countryside of the states of Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará, Rondônia, Roraima and Tocantins.¹⁸³ They have aligned with a significant number of local drug trafficking organizations and criminal factions and have expanded their transnational operations, collaborating with partners in Colombia, Peru and Venezuela (Bolivarian Republic of). A former ally of CV, the *Familia do Norte* (FDN) once held sway over the Solimões river route that enabled the transportation of drugs from Colombia and Peru to Manaus in Brazil, though the group has been severely weakened.¹⁸⁴

Although they periodically fight among themselves, there is often pragmatic cooperation between Colombian, Peruvian and Brazilian drug factions regarding cross-border dealings.¹⁸⁵ For example, FARC and its dissident factions have long traded with Brazilian groups such as PCC, CV and FDN.^{186, 187} Less widely known Colombian drug trafficking organizations such as *Los Comandos de la Frontera* and *Carolina Ramirez* also trade in drugs with criminal groups in neighbouring countries.^{188, 189} These same groups often compete bitterly, however, for control over routes. For example, rival drug trafficking organizations frequently contest control over movements up and down the Caquetá and Putumayo rivers.^{190, 191} PCC and CV and their partners routinely clash over drug routes, with outbreaks of violence often occurring in prisons and jails.^{192, 193, 194, 195, 196} By contrast, Peruvian criminal groups, which often comprise clans or families across the VRAEM, appear to have reached an uneasy equilibrium in the interests of preserving business continuity, although overall levels of homicide and violent crime in areas where trafficking occurs, which were historically low, are rising.^{197, 198, 199}

Notes and references

- 1 Convergent crime refers to criminal activities that connect, overlap, enable and co-locate with drug-related crime and crimes that affect the environment including corruption, money-laundering, fraud, extortion, violence and other forms of victimization.
- 2 The Amazon Basin is the largest watershed on earth and includes over 40 per cent of the South American continent. The term has several distinct and overlapping geopolitical, geographic, geopolitical, biological and hydrological definitions.
- 3 James Albert, Carina Hoorn, Yadvinder Malhi, Oliver Phillips, Andrea C. Encalada, Hans ter Steege, John Melack, Susan Trumbore, and Susanna Hecht, Mariana Varese, Marielos Peña-Claros and Fernando A. Roca, "The Multiple Viewpoints for the Amazon: Geographic Limits and Meanings, Science Panel for the Amazon" (Science Panel for the Amazon, September 2021).
- 4 David M. Lapola et al., "The Drivers and Impacts of Amazon Forest Degradation," *Science* 379, no. 6630 (January 27, 2023): eabp8622.
- 5 UNODC, *Global Report on Cocaine 2023 – Local Dynamics, Global Challenges* (United Nations publications, 2023).
- 6 UNODC, "UNODC and Censipam to Formalise Partnership to Combat Drug Cultivation in the Amazon," September 4, 2019.
- 7 Proinde, "Proinde Circular 04-05-2021: Drug Smuggling on Bulk Carriers out of Brazil on the Rise," May 4, 2021.
- 8 UNODC, *World Drug Report 2022, Booklet 5, Drugs and the Environment* (United Nations publication, 2022).
- 9 The chapter is informed by a literature review and interviews with representatives of government, international agencies and civil society groups, and subject matter experts (for more details see the methodological annex).
- 10 See for example the case of the Superior Court of Justice of Lima, "File No. 00591-2017, 23 December 2019", available at <http://www.keenamazon.net/Documents/Press-Release/Nota-de-Prensa-001-2020-KENE/Nota-de-Prensa-001-2020-KENE.pdf>.
- 11 For more details on the role of corruption see the forthcoming UNODC publication "Rooting out corruption: an introduction to addressing corruption fuelling forest loss".
- 12 UNODC, *Global Report on Cocaine 2023 – Local Dynamics, Global Challenges*.
- 13 Victoria Bechara, "Fações criminosas levam o terror para dentro da Terra Indígena Yanomami," VEJA, May 19, 2023.
- 14 A recent assessment in Brazil by Agencia Publica identified 16 seizures of cocaine between 2017 and 2021, with approximately 9 tons of drugs hidden in timber shipments.
- 15 Ciro Barros, "A íntima relação entre cocaína e madeira ilegal na Amazônia," *Agência Pública*, August 16, 2021.
- 16 Ciro Barros, "The Intimate Relationship Between Cocaine and Illegal Timber in Brazil's Amazon," *InSight Crime*, October 14, 2021.
- 17 "Madeiros Peruanos Multados Nos EUA Exportam Madeira Da Amazônia Para América Latina," *Agência Pública*, May 31, 2021.
- 18 Waisbich, L, Risso, M, Husek, T. and L. Brasil, "The Ecosystem of Environmental Crime in the Amazon," Strategic Paper 55 (Igarapé Institute, April 13, 2022).
- 19 Interview #1, interview by UNODC, March 2023; Interview #2, interview by UNODC, March 2023; Interview #3, interview by UNODC, March 2023; Interview #5, interview by UNODC, March 2023; Interview #7, interview by UNODC, March 2023; Interview #8, interview by UNODC, March 2023; Interview #9, interview by UNODC, March 2023; Interview #10, interview by UNODC, March 2023; Interview #11, interview by UNODC, March 2023.
- 20 Proetica, "The Business of Deforestation," 2021.
- 21 Katie Jones, "Organized Crime and the Environment in Latin America: A Fatal Encounter," *InSight Crime*, March 3, 2021.
- 22 James Bargent, "Timber Laundering in Peru: The Mafia Within," *InSight Crime*, May 10, 2019.
- 23 Oscar Castilla, Nelly Luna Amancio, and Fabiola Torres Lopez, "The Companies Accused of Buying Latin America's Illegal Gold," *InSight Crime*, August 4, 2015.
- 24 Oscar Castilla, Nelly Luna Amancio, and Fabiola Torres Lopez, "Tracing Latin America's Illegal Gold to the US," *InSight Crime*, August 5, 2015.
- 25 Seth Robbins, "Peru Targets Multinationals Linked to Sale of Illegal Gold," *InSight Crime*, April 10, 2019.
- 26 Kendra McSweeney et al., "Drug Policy as Conservation Policy: Narco-Deforestation," *Science* 343, no. 6170 (January 31, 2014): 489–90.
- 27 Marlise Simons, "Cocaine Industry Has Spread to the Amazon Basin," *The New York Times*, May 27, 1984.
- 28 James Brooke, "Brazil's Amazon Basin Becomes Cocaine Highway," *The New York Times*, April 14, 1991.
- 29 Alonso Soto, "Deep in the Jungle, Brazil Struggles to Battle Drug Trade," *Reuters*, January 20, 2017.
- 30 René Mora, "Cocaine Production Driving Deforestation into Colombian National Park," Mongabay, January 7, 2021.
- 31 Davalos et al., "Forests, Coca, and Conflict."
- 32 Liliana M. Dávalos et al., "Forests and Drugs: Coca-Driven Deforestation in Tropical Biodiversity Hotspots," *Environmental Science & Technology* 45, no. 4 (February 15, 2011): 1219–27.
- 33 Ana María Sánchez-Cuervo and T. Mitchell Aide, "Consequences of the Armed Conflict, Forced Human Displacement, and Land Abandonment on Forest Cover Change in Colombia: A Multi-Scaled Analysis," *Ecosystems* 16, no. 6 (September 2013): 1052–70.
- 34 T. Mitchell Aide et al., "Deforestation and Reforestation of Latin America and the Caribbean (2001-2010)," *Biotropica* 45, no. 2 (March 2013): 262–71.
- 35 See UNODC (2022) World Drug Report 2022, Booklet 5, Box on "New findings on deforestation in the western Amazon region" for a review of the literature.
- 36 UNODC, *World Drug Report 2022, Booklet 5, Drugs and the Environment*, 5.
- 37 Maria Chadid et al., "A Bayesian Spatial Model Highlights Distinct Dynamics in Deforestation from Coca and Pastures in an Andean Biodiversity Hotspot," *Forests* 6, no. 12 (October 30, 2015): 3828–46.
- 38 Liliana M. Davalos, and Nicholas, R. Magliocca, "Western Amazon Deforestation Analyses" (study commissioned for the UNODC World Drug Report 2022, June 2022).

- 39 Ibid.
- 40 Ibid.
- 41 Eleonora Davalos, "New Answers to an Old Problem: Social Investment and Coca Crops in Colombia," *International Journal of Drug Policy* 31 (May 2016): 121–30.
- 42 Dávalos et al., "Forests and Drugs."
- 43 Liliana M. Dávalos, Karina M. Sanchez, and Dolores Armenteras, "Deforestation and Coca Cultivation Rooted in Twentieth-Century Development Projects," *BioScience* 66, no. 11 (November 1, 2016): 974–82.
- 44 Dolores Armenteras, Nelly Rodríguez, and Javier Retana, "Landscape Dynamics in Northwestern Amazonia: An Assessment of Pastures, Fire and Illicit Crops as Drivers of Tropical Deforestation," ed. Dorian Q. Fuller, *PLoS ONE* 8, no. 1 (January 30, 2013).
- 45 Sánchez-Cuervo and Aide, "Consequences of the Armed Conflict, Forced Human Displacement, and Land Abandonment on Forest Cover Change in Colombia."
- 46 Mendoza Romero, Dario, Fergusson Talero, Leopoldo, and Vargas, Juan F., "The environmental impact of civil conflict : the deforestation effect of paramilitary expansion in Colombia," 2014.
- 47 René Mora, "Cocaine Production Driving Deforestation into Colombian National Park."
- 48 Paulo J. Murillo-Sandoval et al., "The Post-Conflict Expansion of Coca Farming and Illicit Cattle Ranching in Colombia," *Scientific Reports* 13, no. 1 (February 3, 2023): 1965.
- 49 UNODC, *World Drug Report 2014, Chapter 2, Precursor Control* (United Nations publication, 2014).
- 50 María Alejandra Vélez, Camilo Erasso, "Los cultivos de coca causan deforestación en Colombia?" (Bogotá: Centro de Estudios sobre Seguridad y Drogas (CESED), March 30, 2020).
- 51 Alexander Rincón-Ruiz and Giorgos Kallis, "Caught in the Middle, Colombia's War on Drugs and Its Effects on Forest and People," *Geoforum* 46 (May 1, 2013): 60–78.
- 52 Eleonora Davalos and Leonardo Fabio Morales, "Is There a Balloon Effect? Coca Crops and Forced Eradication in Colombia," *SSRN Electronic Journal* EAFIT No. 19-08 2019 (2019).
- 53 Adriana Camacho and Daniel Mejía, "The Health Consequences of Aerial Spraying Illicit Crops: The Case of Colombia," *Journal of Health Economics* 54 (July 2017): 147–60.
- 54 César Paz-y-Miño et al., "Evaluation of DNA Damage in an Ecuadorian Population Exposed to Glyphosate," *Genetics and Molecular Biology* 30, no. 2 (March 2007): 456–60, <https://doi.org/10.1590/S1415-47572007000300026>.
- 55 See UNODC, *World Drugs Report 2022: Booklet 5* (United Nations Publications, 2022).
- 56 D. S. Salisbury and C. Fagan, "Coca and Conservation: Cultivation, Eradication, and Trafficking in the Amazon Borderlands," *GeoJournal* 78, no. 1 (February 2013): 41–60.
- 57 Sánchez-Cuervo and Aide, "Consequences of the Armed Conflict, Forced Human Displacement, and Land Abandonment on Forest Cover Change in Colombia."
- 58 Brian Clark Howard, "Drug Trafficking Poses Surprising Threats to Rain Forests, Scientists Find," *National Geographic*, January 30, 2014.
- 59 Steven E Sesnie et al., "A Spatio-Temporal Analysis of Forest Loss Related to Cocaine Trafficking in Central America," *Environmental Research Letters* 12, no. 5 (May 1, 2017): 054015.
- 60 Kendra McSweeney et al., "Drug Policy as Conservation Policy: Narco-Deforestation," *Science* 343, no. 6170 (January 31, 2014): 489–90.
- 61 Sesnie et al., "A Spatio-Temporal Analysis of Forest Loss Related to Cocaine Trafficking in Central America."
- 62 Waisbich, L, Risso, M, Husek, T. and L. Brasil, "The Ecosystem of Environmental Crime in the Amazon," Strategic Paper 55 (Igarapé Institute, April 13, 2022) and
- 63 Igarapé Institute, "Follow the Money: Connecting Anti-Money Laundering Systems to Disrupt Environmental Crime in the Amazon," Strategic Paper 60 (Igarapé Institute, April 2023).
- 64 Igarapé Institute and *InSight Crime*, "The Roots of Environmental Crime in the Peruvian Amazon," June 2, 2022.
- 65 Igarapé Institute and *InSight Crime*, "The Roots of Environmental Crime in the Colombian Amazon," September 1, 2021.
- 66 Igarapé Institute and *InSight Crime*, "Stolen Amazon: The Roots of Environmental Crime in Five Countries – Bolivia, Ecuador, Guyana, Suriname and Venezuela," November 9, 2022.
- 67 Jennifer A. Devine et al., "Narco-Degradation: Cocaine Trafficking's Environmental Impacts in Central America's Protected Areas," *World Development* 144 (August 2021): 105474.
- 68 Sean Mowbray, "All Coked up: The Global Environmental Impacts of Cocaine," Mongabay, April 4, 2022.
- 69 Interview #2; Interview #5; Interview #11; Interview #12, interview by UNODC, March 2023; Interview #16, interview by UNODC, March 2023.
- 70 Fórum Brasileiro de Segurança Pública, *Cartografias das violências na região amazônica*.
- 71 Interview #13, interview by UNODC, March 2023; Interview #14, interview by UNODC, March 2023.
- 72 Rafael Andrade, "Narcotrafficking in Brazil Speeds Up Amazon Rainforest Destruction and Increases Violence," *Diálogo Américas*, January 31, 2022.
- 73 "Operação 'Colheita Maldita II' Apreende Quase 200 Toneladas de Maconha No Nordeste Do Pará," *Globo.Com*, August 17, 2020.
- 74 Ibid.
- 75 Zhonghua Zheng, Kelsey Fiddes, and Liangcheng Yang, "A Narrative Review on Environmental Impacts of Cannabis Cultivation," *Journal of Cannabis Research* 3, no. 1 (December 2021): 35.
- 76 UNODC, "Andean Report, Part 2: Environmental Effects of Illicit Drug Cultivation and Processing," 2006.
- 77 Dan Collins, "Peru Drug Traffickers Ramp up Violence against Indigenous Groups," *Context*, June 28, 2022.
- 78 "Comunidade de Ribeirinhos Em Igarapé-Miri é Atacada Por Piratas," *Globo.Com*, January 4, 2021.
- 79 "Drug Trafficking in Colombia Undermines the Foundations of Indigenous Autonomy - IWGIA - International Work Group for Indigenous Affairs," IWGIA, May 2, 2022.

- 80 Beatriz Caiuby Labate and Thiago Rodrigues, "The Impacts of the Drug War on Indigenous Peoples in Latin America: An Overview," *Journal of Psychedelic Studies* 7, no. 1 (April 27, 2023): 48–57.
- 81 UNOHCHR, "Colombia: Urgent Government Action Needed as Rising Violence in Rural Areas Gravely Impacts Human Rights – UN Report," July 26, 2022.
- 82 See, for example, data on community disputes produced by Tierra de Resistentes (www.tierraresistentes.com/en/dado), ACLED (www.acleddata.com/curated-data-files) and the Comissao Pastoral da Terra (www.cptnacional.org.br).
- 83 Andre Cabette Fabio, "Death and Deforestation: Cocaine Trade Adds to Amazon's Woes," August 29, 2022.
- 84 Igarapé Insitute and *InSight Crime*, "The Roots of Environmental Crime in the Peruvian Amazon."
- 85 Elyssa Pachico, "Drug Traffickers Take Note of Peru's Illegal Timber Trade," *InSight Crime*, April 17, 2012.
- 86 Gabrielle Gorder, "Two Coca Regions in Peru, One Cocaine Shipment to Europe," *InSight Crime*, July 5, 2022.
- 87 Yvette Sierra Praeli, "Indigenous Community in Peru Losing Forests to Timber, Drug, Land Trafficking," Mongabay, November 21, 2022.
- 88 Casey W. Wilander, "Illicit Confluences: The Intersection of Cocaine and Illicit Timber in the Amazon," *Small Wars Journal*, October 16, 2017.
- 89 Agência Pública, a fact checking organization, conducted a study based on news published both in the press and on official government websites. See C. Barros, "A íntima relação entre cocaína e madeira ilegal na Amazônia," *Agência Pública*, August 16, 2021.
- 90 Operation Schelde sought to investigate who was responsible for a shipment in 2019 of 250 kilograms of cocaine sent to Belgium and concealed within a shipment of illegal timber.
- 91 Interview #4, interview by UNODC, March 2023.
- 92 Barros, "A íntima relação entre cocaína e madeira ilegal na Amazônia."
- 93 Waisbich, L, Husek, T. and V. Santos, "Connecting the Dots: Territories and Trajectories of Environmental Crime in the Brazilian Amazon and Beyond," Strategic Paper 57 (Igarapé Institute, July 20, 2022).
- 94 Fórum Brasileiro de Segurança Pública, *Cartografias das violências na região amazônica* (Fórum Brasileiro de Segurança Pública, 2021).
- 95 Ciro Barros, "The Intimate Relationship Between Cocaine and Illegal Timber in Brazil's Amazon."
- 96 UNODC, *Estado Plurinacional de Bolivia: Monitoreo de Cultivos de Coca 2021* (La Paz: United Nations publication, 2022).
- 97 UNODC Colombia, Sistema Integrado de Monitoreo de Cultivos Ilícitos (SIMCI), and Gobierno de Colombia, "Colombia: Monitoreo de Territorios Afectados por Cultivos Ilícitos 2021" (Bogotá: UNODC-SIMCI, October 2022).
- 98 UNODC, *Perú: Monitoreo de Cultivos de Coca 2017* (Lima: United Nations publication, 2018).
- 99 Peruvian Drug Observatory and Anti-Drug Information System (SISCOD), "Reporte N. 07 - Superficie Cultivada Con Arbusto de Hoja de Coca Monitoreada En 2021" (Sistema de Información de Lucha contra las Drogas (SISCOD), September 2022).
- 100 Seizures have been reported in 2020 on the Orosa river, near Leticia and on the Atacuri river in 2021, near the border between Colombia and Peru. Interview #6.
- 101 Fernando Peña Murillo et al., "Situación del narcotráfico y amenazas a la seguridad en el valle del Río Putumayo," *Revista Cuadernos de Trabajo*, no. 21 (February 28, 2023): 166–99.
- 102 "Desvertebrada organización delincuencial 'los caquetaños,'" Policía Nacional de Colombia, April 23, 2018.
- 103 Juan Carlos Aristizabal González, "Crimen Organizado Transnacional en la Triple Frontera entre Brasil, Colombia y Perú," Centro de Estudios Estratégicos del Ejército del Perú (CEEPEP), November 17, 2022.
- 104 Phil Stewart, "Brazil's Top Drug Lord Captured," News24, April 22, 2001.
- 105 InSight Crime, "Border Command," *InSight Crime*, July 9, 2021.
- 106 Bryan Harris, "How Brazil's Largest Crime Syndicate Built a Global Drug Empire," *Financial Times*, February 28, 2022.
- 107 Gabriel Stargardt, "Special Report: Brazil's Gangs Emerge as Major Cocaine Exporters, Flooding Europe with White Powder | Reuters," *Reuters*, March 12, 2020.
- 108 A 2018 study detected high concentrations of mercury in the Tarapacá communities. At least 9 of the 10 communities under review reported double the level of contamination considered safe by the World Health Organization.
- 109 Gladys Inés Cardona et al., "Highly Mercury-Resistant Strains from Different Colombian Amazon Ecosystems Affected by Artisanal Gold Mining Activities," *Applied Microbiology and Biotechnology* 106, no. 7 (April 2022): 2775–93.
- 110 Peruvian Drug Observatory and Anti-Drug Information System (SISCOD), "Reporte N. 07 - Superficie Cultivada Con Arbusto de Hoja de Coca Monitoreada En 2021."
- 111 UNODC, "Colombia Explotación de Oro de Aluvión, Evidencias a Partir de Percepción Remota 2021," June 2022.
- 112 Terrence McCoy and Heloísa Traiano, "In the Amazon, the Coronavirus Fuels an Illegal Gold Rush - and an Environmental Crisis," *Washington Post*, September 7, 2020.
- 113 Interview #3; Interview #5; Interview #6.
- 114 Igarapé Institute and *InSight Crime*, "The Roots of Environmental Crime in the Peruvian Amazon."
- 115 Raquel Silva Do Nascimento et al., "Hepatitis E Virus in People Who Use Crack-Cocaine: A Cross-Sectional Study in a Remote Region of Northern Brazil," *Viruses* 13, no. 5 (May 17, 2021): 926.
- 116 Lia Osorio Machado, "The Eastern Amazon Basin and the Coca-Cocaine Complex," *International Social Science Journal* 53, no. 169 (September 2001): 387–95.
- 117 Theodore MacDonald Jr., "From Coca to Cocaine in Indigenous Amazonia," *Cultural Survival*, February 19, 2010.
- 118 UNODC, "Integrated System for the Monitoring of Illicit Crops (SIMCI), Survey of Territories Affected by Illicit Crops 2020" (Bogotá: UNODC-SIMCI, 2021).
- 119 Fórum Brasileiro de Segurança Pública, *Cartografias das violências na região amazônica*.
- 120 Ibid.
- 121 Ibid.

- 122 Mapbiomas Brasil, “Projeto MapBiomas – Mapa de Pistas de Pousos da Amazônia.”
- 123 “Clandestine Airstrips and Airstrips Dataset.”
- 124 “Study Shows That Indigenous in the Amazon Have Their Health Affected by Mercury,” Fiocruz, December 2, 2020.
- 125 Paulo Cesar Basta et al., “Mercury Exposure in Mundurucu Indigenous Communities from Brazilian Amazon: Methodological Background and an Overview of the Principal Results,” *International Journal of Environmental Research and Public Health* 18, no. 17 (1 September, 2021): 9222.
- 126 Fredy Vergara-Murillo et al., “Adverse Health Effects and Mercury Exposure in a Colombian Artisanal and Small-Scale Gold Mining Community,” *Toxics* 10, no. 12 (25 November, 2022): 723.
- 127 Mac Margolis and Robert Muggah, “To Stop Amazon Plunder, Brazil Must Change Hearts and Minds,” *The Washington Post*, 7 February, 2023.
- 128 “Mercury Exposure of Women in Four Latin American Gold Mining Countries” (International Pollutants Elimination Network (IPEN), June 2021).
- 129 The Treasury of the United States of America has singled out the ties between PCC and wildcat gold miners in the Amazon. See Lisandra Paraguassu, “Brazil, U.S. to Cooperate against Illegal Timber Exports from the Amazon.”
- 130 Hutukara Associação Yanomami, “Yanomami Under Attack - Illegal Mining on Yanomami Indigenous Land,” April 2022.
- 131 Amazônia Real, “Garimpeiros ligados ao PCC atacam aldeia Yanomami,” Amazônia Real, 11 May, 2021.
- 132 Vienicius Madureira, “Report: Illegal Mining Threatens Brazil’s Yanomami Tribe,” OCCR, 27 April, 2022.
- 133 “Garimpo, Prostituição e Pistas: Como Agem PCC e CV Na Terra Yanomami,” UOL Notícias, May 16, 2023.
- 134 Rafael Moro Martins, “‘Narcogarimpo’ desafia o governo no território Yanomami,” SUMAÚMA, May 16, 2023.
- 135 Victoria Bechara, “Fações criminosas levam o terror para dentro da Terra Indígena Yanomami!”
- 136 Clara Britto, “PCC Approaches Miners to Launder Money,” Amazônia Real, 4 July, 2021.
- 137 Ana Claudia Santiago de Vasconcellos et al., “Health Risk Assessment Attributed to Consumption of Fish Contaminated with Mercury in the Rio Branco Basin, Roraima, Amazon, Brazil,” *Toxics* 10, no. 9 (31 August, 2022): 516.
- 138 Tom Phillips, “Brazil’s Battle to Reclaim Yanomami Lands from Illegal Miners Turns Deadly,” *The Guardian*, May 1, 2023.
- 139 Mapbiomas Brasil, “Área Ocupada Pela Mineração No Brasil Cresce Mais de 6 Vezes Entre 1985 e 2020,” n.d., accessed 20 April, 2023.
- 140 “Study Shows That Indigenous in the Amazon Have Their Health Affected by Mercury.”
- 141 Warren Cornwall, “Illegal Gold Mines Flood Amazon Forests with Toxic Mercury,” *Science.org*, 28 January, 2023.
- 142 Maria Fernanda Ramirez, “Drug Traffickers in Fresh Round of Violence Against Peru’s Indigenous Communities,” *InSight Crime*, 11 July, 2022.
- 143 “Colombia’s Indigenous Nomads Displaced by Violence,” *France 24*, 16 December, 2021.
- 144 Tom Phillips, “Brazilian Police Name Alleged ‘Mastermind’ behind Murders of Dom Phillips and Bruno Pereira,” *The Guardian*, 23 January, 2023.
- 145 Daan van Uhm, Nigel South, and Tanya Wyatt, “Connections between Trades and Trafficking in Wildlife and Drugs,” *Trends in Organized Crime* 24, no. 4 (December 2021): 425–46.
- 146 Interview #15, interview by UNODC, December 2022.
- 147 UNODC, Global Report on Cocaine 2023: Local Dynamics, Global Challenges (United Nations publications, 2023).
- 148 Interview #21, interview by UNODC, January 2023.
- 149 Oscar Arcila Niño, *La Amazonia Colombiana Urbanizada: Un Análisis de Sus Asentamientos Humanos*, 1a ed (Bogotá, D.C., Colombia: Instituto Amazónico de Investigaciones Científicas Sinchi, 2011).
- 150 Elisabeth Veyrunes, “Las amenazas percibidas para la Amazonía: un estado del arte en términos de seguridad ambiental” (Bogotá: Editorial Universidad del Rosario, 2008).
- 151 Allison Jackson, “Brazil Highways Drive Amazon Development—and Destruction,” *Phys.Org*, October 8, 2019.
- 152 See for example the case 01556-2016-94-2111-JR-PE-02 from Peru in which the illegal approval of a road construction in a national park affected not only the biodiversity but promoted other illicit activities, such as drug trafficking and illicit coca cultivation.
- 153 “Puno: Sentencian a exalcalde distrital que autorizó construcción de vía ilegal en el Parque Nacional Bahuja Sonene,” Plataforma digital única del Estado Peruano, October 20, 2021.
- 154 In Colombia, for example, approximately half of all deforestation is within one kilometre of road, according to the Foundation for Conservation and Sustainable Development, which has been tracking road development in the Amazon since 2017. See Christopher P. Barber et al., “Roads, Deforestation, and the Mitigating Effect of Protected Areas in the Amazon,” *Biological Conservation* 177 (September 2014): 203–9.
- 155 Santiago Luque Pérez, “Illegal Roads Pierce Indigenous Reserve, National Parks in Colombian Amazon,” Mongabay, December 20, 2021.
- 156 Tom Phillips Revealed: Brazil Goldminers Carve Illegal ‘Road to Chaos’ out of Amazon Reserve,” *The Guardian*, December 12, 2022, sec. Environment.
- 157 Barber et al., “Roads, Deforestation, and the Mitigating Effect of Protected Areas in the Amazon.”
- 158 “Gold Mine Detector and Map,” Jupyter Notebook (2021; Earthrise, April 11, 2023), <https://github.com/earthrise-media/mining-detector>.
- 159 The National Secretariat on Drugs and Assets Management in Brazil has a policy whereby 40 per cent of the resources obtained through the sale of assets of economic value seized as a result of crimes related to drug trafficking, as well as any activity associated to the manufacture and distribution of drugs, can return to the police who seized the assets, like aircrafts, helicopters, and others, through projects and subsidies for their strengthening. In this context, this policy works as an incentive to the police to prioritize patrimonial investigations targeting criminal organizations, aiming at their economic demobilization, in addition to strengthening local police. Source: official communication from Brazil, May 2023.
- 160 The aviation authority of Brazil, ANAC, and Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA)

- seized 66 aircraft suspected of being used in illegal mining and destroyed 59 landing strips and helipads in 2021 alone. See Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), “Ibama Embarga 59 Pistas de Pousos Clandestinas Que Atendem Garimpo Na Terra Indígena Yanomami,” September 9, 2021.
- 161 Agence France Presse, “Police Destroy Illegal Airstrip Used by Drug Traffickers In Amazon,” *Barron's*, November 23, 2022.
- 162 “Drug Trafficking in Colombia,” *Colombia Reports*, 12 January, 2023.
- 163 “El 84% de Pistas Destruídas a Narcos Operaba En Beni y Santa Cruz; Tarija Es Otra Ruta,” *El Deber*, January 10, 2022.
- 164 Jelter Meers, Hyury Potter, and Kuek Ser Kuang Keng, “Investigating Rainforest Destruction: Finding Illegal Airstrips with the Help of Machine Learning,” Pulitzer Center, October 12, 2022.
- 165 Manuela Andreoni et al., “The Illegal Airstrips Bringing Toxic Mining to Brazil’s Indigenous Land,” *The New York Times*, August 2, 2022, sec. World.
- 166 Rafael Andrade, “Narcotrafficking in Brazil Speeds Up Amazon Rainforest Destruction and Increases Violence.”
- 167 Interview #2; Interview #17, interview by UNODC, March 2023; Interview #18, interview by UNODC, March 2023; Interview #19, interview by UNODC, March 2023.
- 168 Scott Mistler-Ferguson, “Small Aircraft Feed Illegal Mining Operations in Brazil’s Amazon,” *InSight Crime*, October 6, 2021.
- 169 “Brazil Developing Grand Radar System to Monitor Amazon Forests,” CNN, October 18, 2000. See also SIVAM (2023) <https://sirius.decea.mil.br/en/sivam-sistema-de-vigilancia-da-amazonia/>.
- 170 “Brazil and Colombia Expand Cooperative Security Efforts in Amazon Border Region,” DefesaNet, May 30, 2016.
- 171 Hyury Potter, “Deforestation Runways: The Expansion of Illegal Mining in the Amazon,” Pulitzer Center, September 20, 2021.
- 172 Mapbiomas Brasil, “Projeto MapBiomas – Mapa de Pistas de Pousos Da Amazonia” (Mapbiomas Brasil, January 30, 2023).
- 173 “Clandestine Airstrips and Airstrips Dataset,” Jupyter Notebook (2021; Earthrise, April 11, 2023), available at <https://github.com/earthrise-media/mining-detector#clandestine-airstrips-and-airstrips-dataset>.
- 174 See Worldwide Inland Navigation Network, <https://www.wwinn.org/brazil-inland-waterways>.
- 175 Forest Trends, “Timber Legality Risk Dashboard: Brazil,” July 2021.
- 176 Lisandra Paraguassu, “Brazil, U.S. to Cooperate against Illegal Timber Exports from the Amazon,” *Reuters*, June 11, 2022.
- 177 Forest Trends, “Timber Legality Risk Dashboard: Colombia,” July 2021.
- 178 Forest Trends, “Timber Legality Risk Dashboard: Peru,” September 2021.
- 179 Interview #20, interview by UNODC, December 2022.
- 180 Centro de Previsão de Tempo e Estudos Climáticos (CPTEC/INPE), “Clima Da Amazônia,” n.d., accessed April 18, 2023.
- 181 The increase in reported drug seizures during the latter stages of the dry season could indicate the build-up of trafficking of cocaine and cannabis herb, as criminal organizations expect rivers to start flowing closer to the start of the rainy season. Source: Interview #21.
- 182 UNODC and CoE Brazil, “Brazil in the Regional and Transatlantic Cocaine Supply Chain: The Impact of COVID-19,” Cocaine Insights 4 (Vienna: UNODC, July 2022).
- 183 According to *Cartografias das violências na região amazônica*, (Fórum Brasileiro de Segurança Pública, 2021), the key groups in Acre are PCC, *Irmandade, Força Activa e Responsabilidade Acreana* (IFARA), *Bonde dos 13* (B13) and CV. In Amazonas, the core groups include CV, PCC and *Família do Coari*. In Amapá, groups include *União Criminosa do Amapá* (UCA), *Família Terror do Amapá* (FTA) and PCC. Mato Grosso is home to CV, PCC and B13. Maranhão is also home to PCC, CV, *Bonde do 40* (B40) and *Primeiro Comando do Maranhão* (PCM). CV operates in Belem and PCC operates in remote areas of Para, alongside CCA, B40 and others. In Roraima, groups include CV, PCC and *Primeiro Comando Panda* (PCP). PCP and the CV are also active in Rondonia and the active groups in Tocantins are PCC, CCA and B13.
- 184 Interviews #3, #4 and #24.
- 185 According to interviewees in Brazil, there are comparatively few disputes between Brazilian, Colombian, and Peruvian groups regarding selling and shipping drugs. Producers and sellers of drugs will deal with multiple Brazilian purchasers.
- 186 “Fação do Amazonas tem ‘estreitas conexões’ com as Farc, afirma MPF,” *Globo.com*, January 4, 2017, sec. Política.
- 187 Rogério Jelmayer, Kejal Vyas, and Samantha Pearson, “PCC Recruta Membros Das Farc Na Colômbia Para o Tráfico de Drogas,” *Wall Street Journal*, January 31, 2017.
- 188 Interview #6, interview by UNODC, January 2023.
- 189 Michelle Carrere, “As Gangs Battle over Peru’s Drug Trafficking Routes, Communities and Forest Are at Risk,” Mongabay, November 8, 2022.
- 190 Interview #6.
- 191 Colombian Investigative Unit, “Peace Dissipates as the Cocaine War Intensifies in Putumayo,” *InSight Crime*, April 28, 2022.
- 192 Fórum Brasileiro de Segurança Pública, *Cartografias das violências na região amazônica*.
- 193 Benjamin Lessing and Graham Denyer Willis, “Legitimacy in Criminal Governance: Managing a Drug Empire from Behind Bars,” *American Political Science Review* 113, no. 2 (May 2019): 584–606.
- 194 Robert Muggah and Ilona Szabó de Carvalho, “Opinion: Brazil’s Deadly Prison System,” *The New York Times*, January 4, 2017, sec. Opinion.
- 195 Robert Muggah et al., “Q&A: Why Is Prison Violence So Bad in Brazil?,” *Americas Quarterly*, August 2, 2019.
- 196 Robert Muggah, “Opinion: Brazil’s Prison Massacres Send A Dire Message,” NPR, May 28, 2019.
- 197 Robert Muggah and Jeremy McDermott, “A Massive Drug Trade, and No Violence,” *The Atlantic*, April 24, 2013.
- 198 Dan Collins, “Peru Drug Traffickers Ramp up Violence against Indigenous Groups,” *Context*, June 28, 2022.
- 199 Angélica Durán-Martínez and Hillel David Soifer, “The Drug Trade and State Violence in Internal Conflicts: Evidence from Peru,” *Latin American Politics and Society* 63, no. 4 (November 2021): 96–123.

