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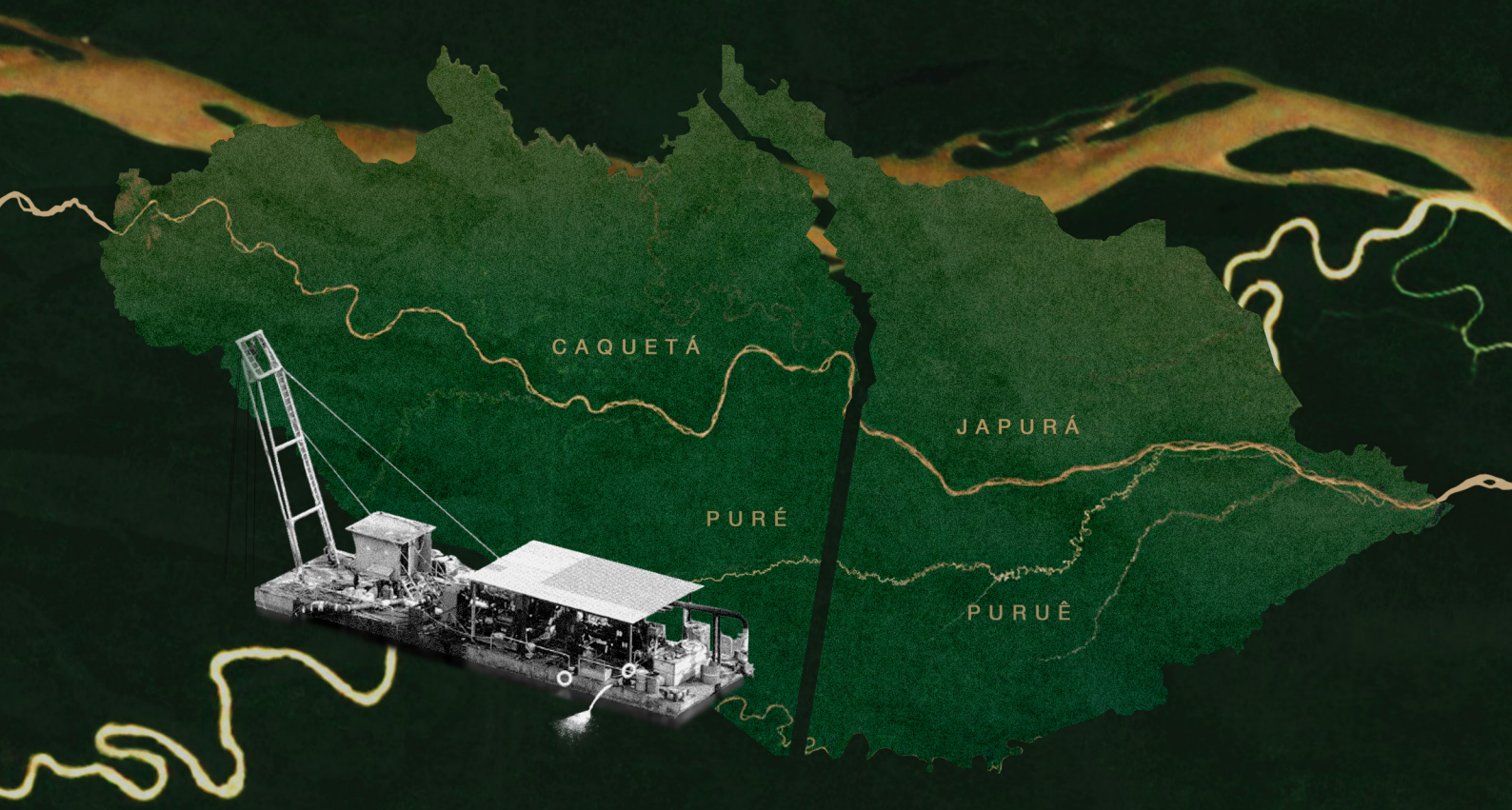

AMAZON CLIMATE SECURITY:

Challenges amid the Expansion of Illicit Economies and State Weakness in the Caquetá–Japurá and Puré–Puruê Corridor

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1. Introduction: The need to Ensure Climate Security in the Face of Illicit Economies and State Fragility

The transboundary region between the Caquetá–Japurá and Puré–Puruê rivers, stretching from southern Colombia to northern Brazil's Amazonas state, is one of the most well-preserved yet vulnerable ecological corridors in the Amazon. Home to extensive primary forests and Indigenous territories, this area is vital for climate regulation and maintaining biological connectivity between the Andes and the central Amazon basin. However, its geographic isolation, limited government presence, and the growth of illegal economies have made the region a center of socio-environmental degradation. In this landscape of interconnected rivers and porous borders, the intersection of illegal mining and drug trafficking leads to mercury contamination, speeds up deforestation, fuels armed violence, and severely harms Indigenous communities. The lack of integrated data and coordinated policies between Colombia and Brazil highlights the urgent need for empirical research and cross-border analysis. This study suggests viewing rivers and their networks as socio-environmental corridors — critical not only for the movement and exploitation linked to illegal economies but also for developing strategies to enhance environmental governance and climate security across this transnational basin.[1]

Produced jointly by the The Foundation for Conservation and Sustainable Development (FCDS) and the Igarapé Institute, this report shows how illegal gold mining and drug trafficking affect ecosystems, local communities, and climate resilience in one of the most remote cross-border regions of the Amazon, between Colombia and Brazil. Over the past decade, research on the Amazon — and its severe forms of violence and complex insecurity — has grown considerably.[2] Studies agree that informality, fragmented transport networks, high impunity levels, and limited government presence create ideal conditions for illicit economies, including illegal mining and logging, which worsen environmental damage and insecurity.[3] Although there is consensus that the Amazon region and its resources are subject to constant dispute, there is still a lack of studies adopting a transboundary perspective and offering equally integrated solutions to tackle both the legal and illegal economies fueling deforestation and violence in the area.

The proposed study addresses two major gaps. First, it examines a specific border area managed by a river-basin system and a patchwork of distinct territorial structures, where the transboundary riverine axis becomes essential to understanding social, environmental, and criminal dynamics. Second, it offers new evidence on the convergence of illicit economies, environmental crimes, and governance challenges. Border regions are known hotspots for the growth of organized crime, yet most research has concentrated on the borders of Central and North America.[4] Civil society organizations working in the Amazon have explored the links between deforestation and violence. However, there is still a lack of studies offering actionable evidence to inform public policies and interventions aimed at reducing violence, strengthening governance, and curbing organized crime.

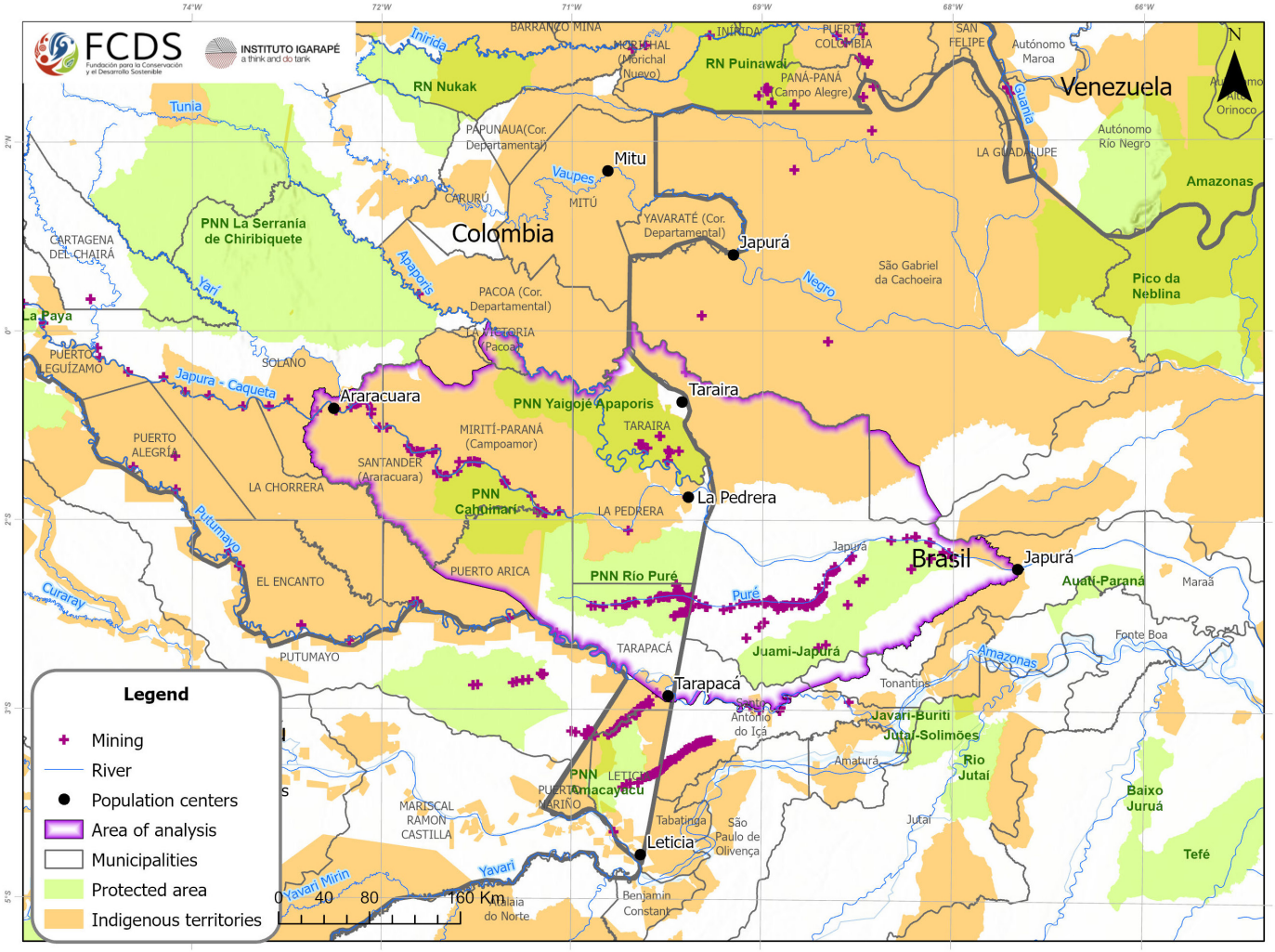
To bridge these two gaps — of information and of responses regarding which solutions to adopt — this study offers an innovative perspective centered on the Caquetá–Japurá and Puré–Puruê circuit. It incorporates new data on the dynamics of illegal mining and drug trafficking, as well as their impacts, such as mercury pollution, deforestation, and various forms of victimization and violence, in one of the least studied Amazonian border areas. It also proposes concrete strategies to strengthen regional cooperation and climate security. The approach combines spatial analysis, field data, and institutional mapping within the circuit.

“The study’s approach combines spatial analysis, field data, and institutional mapping in the Caquetá–Japurá and Puré–Puruê circuit”

2. Socio-environmental and Institutional Context of the Caquetá–Japurá and Puré–Puruê Circuit

The territorial focus of this study lies along the Amazonian border between Colombia and Brazil, centered around the basins of the Caquetá–Japurá and Puré–Puruê rivers. (Figure 1).[5] It is one of the planet's most isolated, biodiverse, and best-conserved regions, dominated by continuous rainforests, Indigenous territories, and protected natural areas. With limited roads and mobility based on rivers and seasonal floodplains, daily life depends on these waterways and is organized around small, scattered settlements. Within this context of inaccessibility and weak state presence, with limited access to public services and education, the territory becomes especially vulnerable to the expansion of organized crime, illegal mining, and drug trafficking, which exploit its mineral availability, institutional fragility, and porous borders. Despite its protected status, this transboundary corridor is increasingly affected by extractive and exchange dynamics that exert growing pressure on its ecosystems and communities.

Figure 1. Area of study and influence



Source: Boundaries of Protected Areas and Indigenous Lands: Amazonian Network of Georeferenced Socio-Environmental Information (RAISG) platform, as of May 2025. Mining refers to the locations where mining dredges were identified, based on data available from RAISG (downloaded in May 2025) and updated with field data and secondary sources by FCDS in September 2025.

The area of influence is not defined by a fixed boundary but as a dynamic river system that extends both upstream and downstream. It integrates the Caquetá–Japurá and Puré–Puruê circuits through a network of streams and *igarapés*[6] that connect key settlements and support the ecological and cultural life of the territory. These waterways link broader areas such as Taraira in the north and Tarapacá in the south, forming routes for river and air transport. From the Andean headwaters of the Caquetá, the rivers connect regions of cattle ranching, smuggling, and drug trafficking in the Colombian departments of Caquetá and Putumayo to their middle and lower courses in Brazil, where they flow toward the Solimões River, passing through Maraã and Tefé.[7]

2.1. Protected Areas

The Caquetá–Japurá and Puré–Puruê circuit forms a transboundary conservation corridor that integrates natural parks and Indigenous territories of high ecological and cultural value. On the Colombian side, the Río Puré National Natural Park, created to protect the Yurí–Passé peoples living in voluntary isolation,[8] stands out, together with the Cahuinarí and Yaigojé–Apaporis National Parks. Several Indigenous reserves near the border, such as Curare–Los Ingleses, Camaritagua, Puerto Córdoba, Comeyafú, and Miritíi–Paraná, are part of a broader Indigenous territorial framework represented by the Bajo Río Caquetá–Amazonas Indigenous Territorial Entities, CIMTAR, Miritíi–Paraná, and *PANI*, which bring together communities and traditional authorities.

On the Brazilian side, the Juami–Japurá Ecological Station (*Estação Ecológica Juami–Japurá*, ESEC) serves as the main protected area, complemented by the Indigenous Lands (TIs) surrounding the town of Japurá and its tributaries: TI Paraná do Boá–Boá, TI Uneiuxi, TI Mapará, and TI Rio Apaporis — the latter adjoining the Comeyafú Indigenous Reserve in Colombia. Other TIs extend farther north and west of the municipality.[9] Among these areas, a wide protection gap persists in the intermediate stretch of the Japurá River and in the Puré River basin, where the coverage of conservation areas is discontinuous or nonexistent. This zone corresponds to a large block of pubic forestlands without formal designation — that is, Undesignated Public Lands (UPL), according to the typology established by the Brazilian Forest Service (SFB). This gap facilitates the expansion of irregular mining, extractive, and logistical activities that exploit geographic isolation, river routes, and rudimentary airstrips across the transboundary corridor.[10]

2.2. Environmental Wealth and Hydrography

Covering approximately 289,000 km^2 (80% within Colombia), the Caquetá–Japurá basin forms a key hydrographic axis.[11] Its predominant ecosystem is tropical rainforest, hosting rich biodiversity that serves as a refuge for species such as large felines, including the jaguar (*Panthera onca*), whose wide distribution attests to the region's healthy conservation status.[12]

Originating in the Andes, the Caquetá River flows west to east through the Colombian departments of Cauca, Caquetá, Putumayo, and Amazonas, gathering waters from both the mountains and the forest before entering Brazil, where it becomes the Japurá River. There, it forms a navigable whitewater corridor connecting binational communities and ecosystems.

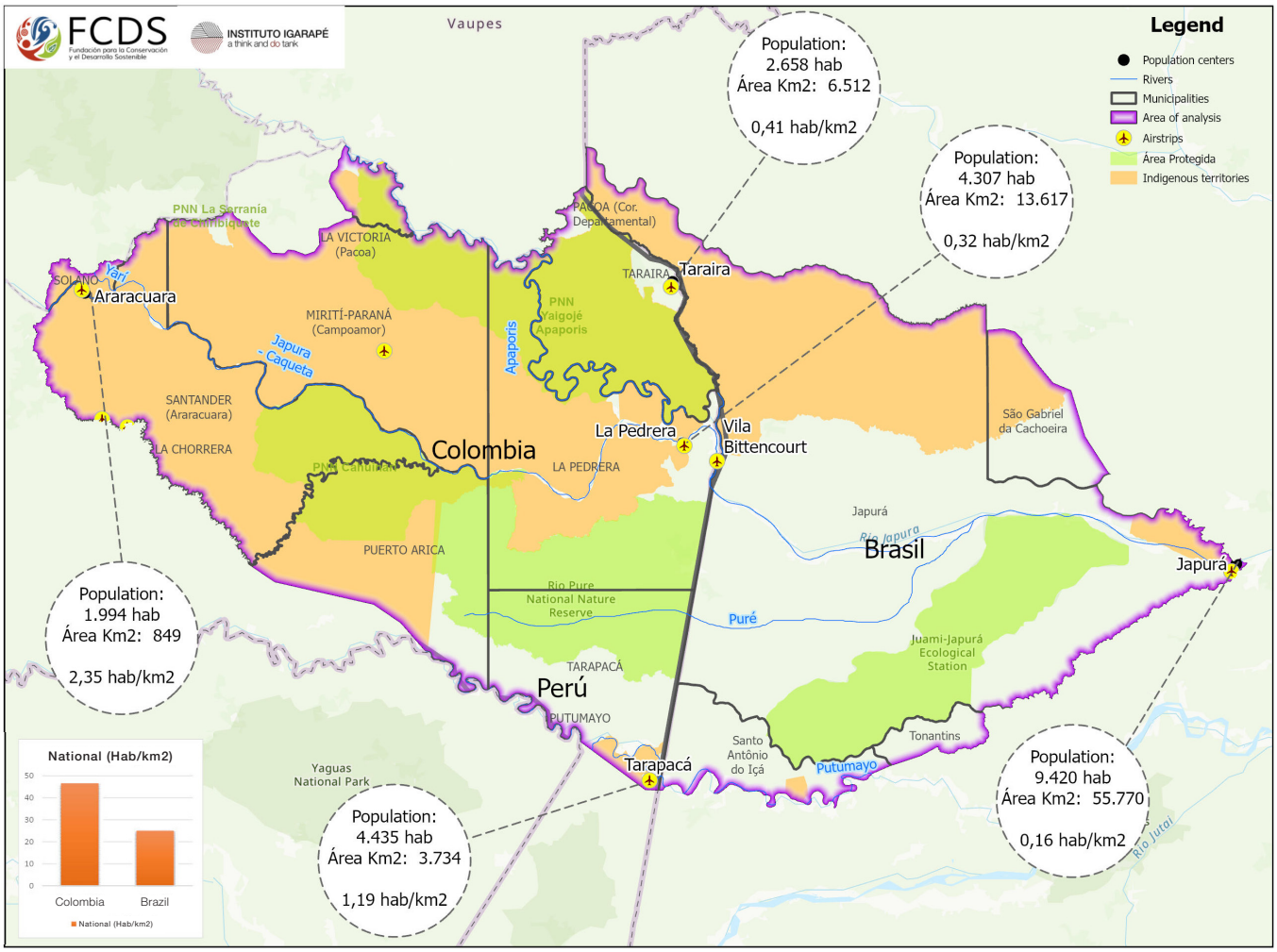
In contrast, the smaller, meandering Puré–Puruê River runs through protected forests from the Río Puré National Natural Park to its confluence with the Japurá in Brazil. Beyond these main axes, the basin is woven with a dense network of tributaries, such as the Juami, Maiuará, and Iuauí rivers in Brazil, and the Agua Negra, Agua Blanca, and Zumaeta streams, along with the Bernardo and Pupuña rivers in Colombia, as well as a complex web of caños (Colombia) and *igarapés* (Brazil). Together, these create a continuous hydrological system that provides binational ecological and river connectivity. The sustained forest cover, low fragmentation, and presence of

alluvial gold deposits in the middle and lower rivers explain both the area's high ecological importance and its vulnerability to illegal mining and mercury contamination.[3]

2.3. Geographic Isolation and Indigenous Settlement Patterns

The region is characterized by low population density and scattered isolated settlements built along rivers, which serve as the main routes for transportation and supply (Figure 2). On the Colombian side, Taraira (Vaupés), La Pedrera, Tarapacá, and Araracuara (Amazonas) are non-municipalized areas under departmental administration, accessible only by river or air. Together, they have small populations and record some of the lowest densities in the country, well below the national average of 46.5 inhabitants per km². These population centers have fluvial and aerial mobility to Leticia, Mitú, and Puerto Leguízamo, which act as regional exchange hubs. In Brazil, the municipality of Japurá has similar characteristics: it has the smallest population in the state of Amazonas and one of the lowest population densities in the country (25 inhabitants per km²).[13] Along the Japurá River lie small communities such as Serrinha, Itaboca, Mangueira, and Tamandaré, while the Puré River lacks permanent settlements, preserving its character as a continuous, scarcely accessible forest.[14]

Figure 2. Location of populated centers



Source: Population projections for 2025. National Administrative Department of Statistics (DANE), Colombia (2025). Proyecciones de población con la actualización post COVID-19 calculadas con base en los resultados del Censo Nacional de Población y Vivienda - CNPV- 2018; Brazilian Institute of Geography and Statistics - IBGE (2025). Cities and States

Across Colombia's main population centers, various riverine Indigenous communities are distributed, shaping the region's dispersed settlement pattern. Along the Caquetá River, notable communities include Camaritagua, Tanimuka, Yucuna, Mamuaya, and Bacurí, located near La Pedrera. On both sides of the border, these communities share languages, lifestyles, and subsistence strategies—fishing, hunting, gathering, and artisanal mining—and move along the rivers as if the territory were a continuous unit. On the Brazilian side, the villages are concentrated within the Paraná do Boá–Boá, Uneiuxi, and Mapará Indigenous Lands, farther from the border, while the village of São José do Apaporis lies in the border section. Despite the presence of indigenous people, no isolated villages are reported along the Puré River, which retains its character as a dense primary rainforest.

2.4. Socioeconomic Vulnerabilities

Demographically, the region is characterized by a high percentage of Indigenous people, which in Colombian areas greatly exceeds the national average, unlike the smaller Indigenous presence in the Brazilian municipality of Japurá. The population is mainly young, with many children and teenagers, and a slight male majority — traits that indicate natural population growth but also highlight important challenges in accessing education and social services. Socioeconomically, the analyzed territories exhibit high illiteracy rates, limited access to education, health and public services, and elevated levels of unmet basic needs and extreme poverty—far surpassing national averages. Taken together, these indicators reveal persistent structural vulnerability and a wide gap in living conditions between the two countries. Internet connectivity, however, has been boosted by the installation of *Starlink* antennas in some parts of the region (Table 1).[15]

"Taken together, the indicators reveal a persistent structural vulnerability and a significant gap in living conditions compared to both countries"

Table 1. Demographic and socioeconomic indicators

	Tarapacá	La Pedrera	Araracuara (Puerto Santander)	Taraira	Japurá	Colombia	Brazil
Proportion Indigenous Population	91%	89%	86%	74%	29%	**4.7%**	**0.83%**
Proportion Male	53%	51%	52%	51%	53%	**49%**	**48%**
Population Under 14 Years of Age	38%	35%	38%	40%	37%	**22%**	**19%**
Illiteracy	12.1%	12.5%	7.8%	15.2%	12.4%	**5.2%**	**7.0%**
Unmet Basic Needs (UBN) - Colombia	50.8%	78.8%	49.5%	78.9%	-	**14.3%**	**-**
Extreme Poverty (UBN) - Colombia[16]	15.9%	42.7%	11.5%	50.1%	-	**3.8%**	**-**
Poverty (CadÚnico) - Brazil	-	-	-	-	63.0%	**-**	**20.0%**

Source: Data retrieved in May 2025. National Administrative Department of Statistics (DANE), Colombia (2025). Proyecciones de Población (for sex, age, and ethnic composition); DANE (2018). Visor de Analfabetismo; DANE (2018). Censo Nacional de Población y Vivienda for NBI and poverty by unmet basic needs. For Brazil: Instituto Brasileiro de Geografía e Estatística (IBGE) (2022). Censo Demográfico 2022 (for sex, age, ethnic composition, and illiteracy); Unified Registry for Social Programs (CadÚnico) (2025). Painel de Monitoramento do Bolsa Família e Cadastro Único for poverty data.

2.5. Limited Infrastructure

Transport infrastructure is limited and relies almost entirely on the river network. There are no main roads or overland routes connecting population centers; access is only by river or air. The Caquetá–Japurá River is the primary route for transporting people and goods between La Pedrera, Vila Bittencourt, and Japurá, using small boats and lacking formal port facilities.[17] In contrast, the Puré River has no regular passenger navigation or commercial transport and is used only by small boats for occasional travel or exploration.

Rudimentary airstrips are found in La Pedrera, Tarapacá, Taraira, Vila Bittencourt, and Japurá. Some serve military or logistical roles, while others are runways connected to irregular air traffic, mainly in the Cabeça do Cachorro region (São Gabriel da Cachoeira) and in Vaupés to the north (See figure 3).[18] Financial and commercial infrastructure is nearly absent; however, local populations use digital payment systems (including PIX in Brazil), banking correspondents, mobile banking, or even gold exchanges in mining areas.[19]

2.6. Limited State Oversight

The presence of state control agencies is minimal and concentrated in major towns. The situation is further complicated by regulatory asymmetries between the two countries, which do not always define uniformly what is prohibited or permitted regarding natural resource exploitation and specific territorial arrangements, such as protected areas.[20] In Colombia, detachments of the National Army operate in La Pedrera, Tarapacá, and Taraira under the jurisdiction of the 26th Brigade (Leticia) and with support from the Southern Naval Force (Puerto Leguízamo).

However, their activities are limited to urban zones. In Brazil, border surveillance is handled by the 3rd Special Border Platoon (Pelotão Especial de Fronteira, PEF), based in Vila Bittencourt (Amazonas) and under the command of the 17th Jungle Infantry Battalion (Tefé), which is the only permanent military unit along this section of the border. The Puré River and large forested areas continue to lack consistent government presence or surveillance.

In fiscal, environmental, and customs matters, institutional presence is mostly symbolic. Colombia lacks migration or customs posts along this section of the border, and activities by Corpoamazonia or National Parks are infrequent: the “Puerto Franco” control post, situated on the Puré River, was destroyed by armed groups in 2020.[21] In Brazil, the environmental agencies Ibama and ICMBio conduct occasional missions from Tefé or São Gabriel da Cachoeira, without a permanent local base.

3. Illegal Mining and Drugs: Cross-Border Flows[22]

Despite its geographic isolation and environmental wealth, the border area between the Caquetá–Japurá and Puré–Puruê rivers is marked by a significant presence of illegal markets, primarily tied to gold extraction and drug trafficking. In this region, community, business, armed, and criminal actors coexist and engage in various forms of governance — from regulating daily life and providing goods and services to controlling complex cross-border networks that connect local labor and knowledge with international systems for mercury import, gold export, and drug trafficking.

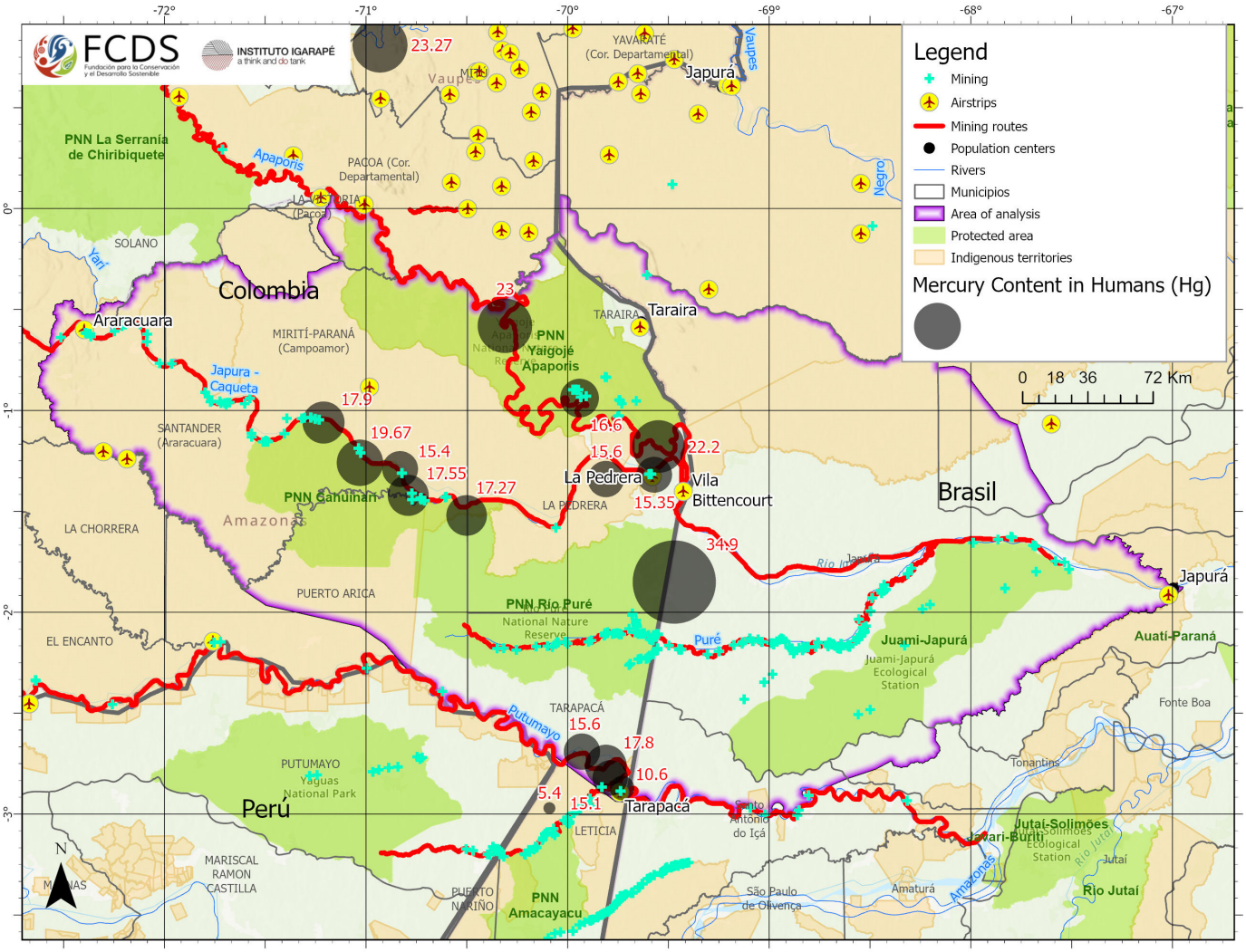
"Gold mining in the circuit takes place entirely illegally: as of October 2025, there were no registered mining titles or authorized concessions in either of the two countries"

3.1. Expansion of Illegal Gold Mining

Gold mining in this corridor occurs entirely outside the law: as of October 2025, when this report was written, no mining titles or authorized concessions were registered in either country.[23] Since 2020, there has been a rapid increase in irregular mining — that is, mining done without government approval.[24] Between 1999 and 2020, the average area occupied by wildcat mines in the Brazilian municipality of Japurá was just 0.15 km², but in 2021 it increased to 15.3 km², and in 2022–2023 it reached 57.4 km² dedicated to illegal extraction.[25]

This trend is also evident in Indigenous territories and protected areas on the Colombian side. In the Entidad Territorial Indígena (ETI) Bajo Río Caquetá — where no mining existed in 2020 — the affected area reached 0.09 km² of the ETI's total 10,000 km² in 2024. A similar pattern occurred in the ETI CIMTAR (Consejo Indígena Mayor de Tarapacá Amazonas), which had no prior records in 2023 but saw mining occupy 0.13 km² of its 8,790 km² territory in 2024.[26] Figure 3 provides an overview of the distribution of illegal mining across the territory.[27]

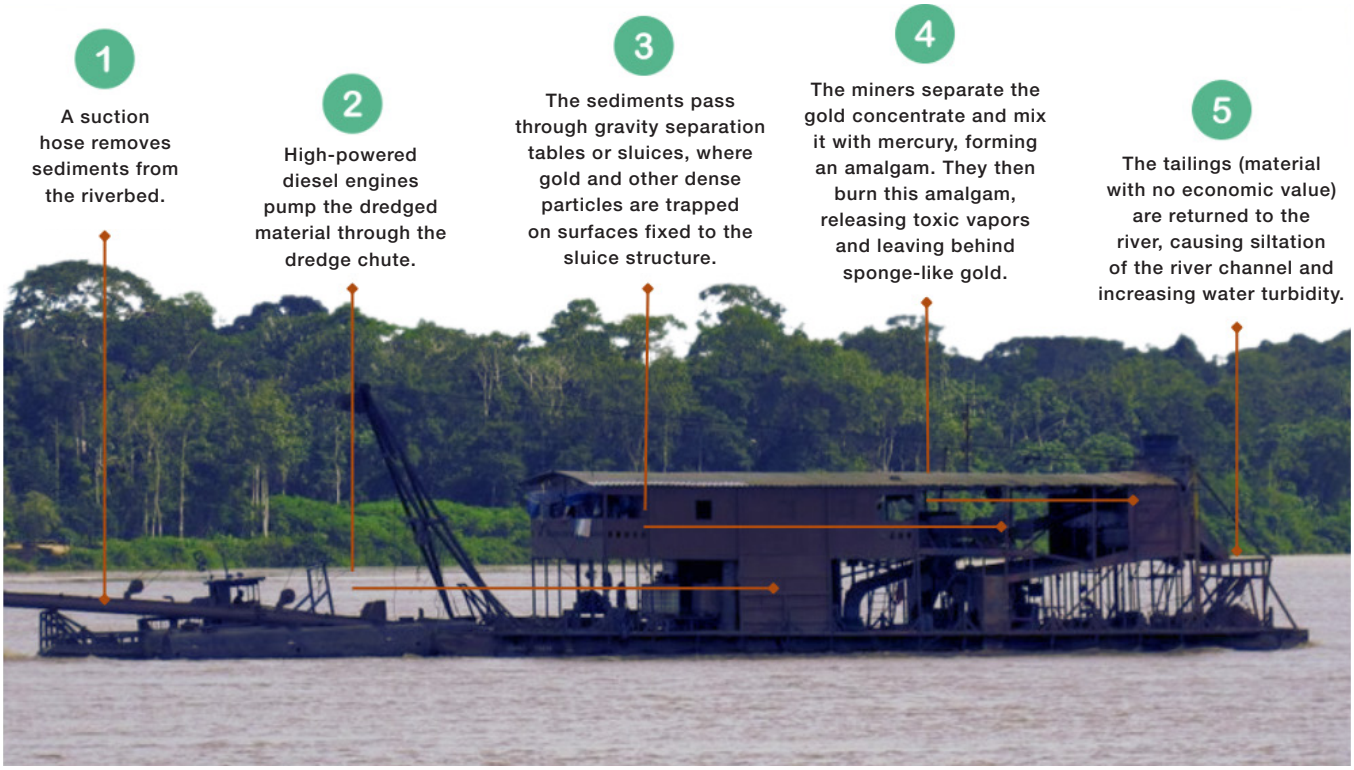
Figure 3. Distribution of illegal mining in the Caquetá–Japurá and Puré–Puruê circuit



Source: The mining route data refer to rivers where mining activity is present, based on information collected from the Red Amazónica de Información Socioambiental Georreferenciada (RAISG) platform (downloaded in May 2025). Regarding mining, the points indicate locations where mining dredges have been identified, as available in RAISG and updated with field data and secondary sources by FCDS as of September 2025. The airstrips refer to airfields mapped by Open Street Map (downloaded in May 2025).

In this circuit, gold is extracted directly from water bodies using rafts and river dredges supported by motor pumps, hoses, and makeshift wooden structures. The gold is amalgamated with mercury, a substance widely used by wildcat miners.[28] Neither Colombia nor Brazil produces mercury. Colombia prohibits its use in artisanal and small-scale mining (ASGM), while Brazil regulates it, though it is introduced into the region clandestinely through smuggling networks.[29] A single mining raft can extract around 40 grams of gold per day, roughly one kilogram per month.[30] Although precise figures are lacking, estimates suggest that artisanal miners use between 2 and 5 kilograms of mercury to obtain 1 kilogram of gold.[31]

Figure 4. Alluvial gold mining process



Source: Elaborated by Igarapé Institute.

Illegal mining value chain: In Colombia, the promotion and financing of illegal gold extraction are usually linked to armed groups that own heavy machinery and lease it to individuals or Indigenous communities, while also supplying inputs and fuel. These groups charge a percentage of production from the machine owners and indirectly participate in the gold value chain by controlling the work of miners operating on rivers without state authorization. The dissident factions and, formerly, the FARC, have financed themselves by extorting or taxing miners and gold traders to secure income and territorial control.[32] In this scheme, miners operating in Colombian territory must pay a share of their output — calculated by the amount of gold extracted by river dredges — to the armed or local actors who control the territory and the activity.[33]

Unlike the Colombian case, the actors financing illegal mining on the Brazilian side are mainly entrepreneurs and equipment owners who can cover the costs of workers operating aboard the dredges.[34] The dredges working on the Puruê River and the associated gold-extraction infrastructure are provided by businesspeople from neighboring municipalities, especially Japurá, Maraã, and Jutaí. These floating structures circulate along the Japurá and Jutaí rivers and may even reach the Juruá River. In the Brazilian part of the circuit, illegal gold extraction along the Japurá and its tributaries (particularly the Puruê and the Juami) takes place in temporary mining camps, where workers stay for a few days before returning to nearby towns.[35] A clear trend has emerged of moving dredges upstream to avoid state inspections in remote areas. When police operations are announced, miners working on rivers like the Puré shift to smaller tributaries or denser forest areas to

escape state intervention.[36] Reports indicate that the Comando Vermelho (Red Command, a criminal faction from Brazil) funds illegal extraction operations in these areas and, in some cases, purchases gold directly from the miners.

Once extraction ends, the gold is prepared for sale, transportation, or further processing. At this stage, local buyers step in, purchasing gold directly from mines or intermediaries, who then distribute it across various markets. In the Colombian part of the circuit, gold is shipped by air from La Pedrera (Amazonas) to Villavicencio, San José del Guaviare, and Bogotá. Armed groups transport gold using logistical networks already established for illicit drug trafficking.[37]

In Brazil, transport occurs by river and air. The river route passes through Japurá and continues toward Tefé and Manaus. Air transport may head to Porto Velho, about 833 km away (about 3h30min flight), or to Manaus, about 785 km away (about 3h15min flight).[38] Mayors, gold entrepreneurs, and financial intermediaries allegedly profit from illegal gold extraction along the Japurá River, while the involvement of corrupt military and inspection agents facilitates these illicit flows.[39]

In the Caquetá/Japurá circuit, gold is mainly bought in La Pedrera or Taraira (Vaupés), with price differences based on metal purity. In La Pedrera, the price per gram ranges from USD 50 to USD 60 (about 210,000–250,000 COP), while in Taraira, prices are higher, between USD 85 and USD 95 per gram (about 350,000–400,000 COP), according to May 2025 data. Other key sales locations include Leticia (Amazonas), Mitú (Vaupés), Villavicencio (Meta), San José del Guaviare (Guaviare), and Bogotá. On the Brazilian side, in the Japurá basin, the price per gram ranges between USD 90 and USD 98 (about BRL 510–570),[40] equivalent to the value reported in Taraira.

Market pressure and income generation: The sharp rise in gold prices has significantly increased the economic appeal of mining, especially in regions like the Amazon basin, where controls over the metal's origin are weak or nonexistent.[41] Between January 2015 and September 2025, the average monthly price of gold contracts on the London Metal Exchange rose by 269%.[42] This price surge has a dual effect:[43] on the one hand, it consolidates mining as a vehicle for money laundering from cocaine- and marijuana-based economies; on the other, it creates a profitable market for the local population, far exceeding the average income of Amazonian residents.[44]

Despite gold reaching record prices (USD 4,000 per troy ounce), most workers operating on the rafts, paid daily wages by mine owners or directly involved in extraction, live in a subsistence economy. Those who ultimately profit are the actors who control other parts of the chain, such as international trade, as well as armed and criminal groups that dominate territories, populations, and local economies, deciding, within their armed systems, how to distribute profits and violence to maintain these economies under their areas of control.

3.2. Drug markets in the Caquetá–Japurá and Puré–Puruê Corrridor

In recent years, the Amazon has shifted from being a fringe area[45] to a central corridor for drug trafficking, connecting networks that move cocaine[46] and marijuana along with other illegal economies. In the Brazilian Amazon, this network connects Andean drug production from Colombia, Peru, and Bolivia with Brazilian criminal groups and international markets via river corridors such as Caquetá–Japurá–Solimões, Putumayo–Içá, and Negro–Vaupés, which converge in Brazil's interior and then flow to external destinations.

Unlike other Amazonian regions with road access, this circuit mainly relies on river routes, which influence criminal logistics and limit the government's response capacity. The significance of this corridor increased after 2017, when the Japurá River became a key alternative route due to stricter enforcement along the Tabatinga–Solimões axis.[47]

The Caquetá River, which starts in Colombia's Macizo region (Cauca Department), has become a key route for moving high-potency marijuana (creepy and skunk[48]), mainly produced in Cauca, a major cannabis production hub in the country.[49] Since 2016, the Caquetá–Japurá river corridor has consolidated as a transboundary logistics system for marijuana trafficking.[50] According to official statements, "we know that this drug came from Cauca. It is transported overland to Caquetá and from there moved by the Orteguasa or Caguán rivers, which flow into the Caquetá. Then it is carried toward the Amazon, enters Brazil, and from there reaches the Atlantic Ocean bound for Europe," explained an army general involved in surveillance operations in August 2025.[51]

The passage into Brazil involves multiple routes that secure trafficking continuity across the border and the Amazon rainforest. One route is the direct corridor along the Japurá River, confirmed by marijuana seizures on the Brazilian side. Simultaneously, alternative routes use the Apaporis River, farther north, to bypass the military checkpoint at Vila Bittencourt — requiring the use of smaller streams and walking trails to reconnect with the Marié–Negro river system,[52] the main exit route toward Manaus and domestic and international markets.[53]

At the same time, aerial infrastructure strengthens this network: the airports of La Pedrera, Taraira, and Tarapacá, together with the Japurá–Porto Velho route and departures from São Gabriel da Cachoeira,[54] support a multimodal system serving both illegal economies, drug trafficking and gold smuggling.

Drug seizures in both countries confirm the scale and dynamics of drug trafficking in this circuit.[55] Since 2022, the Colombian Police have reported marijuana seizures in the municipalities of La Pedrera, Puerto Santander (Araracuara), Tarapacá, and Taraira, totaling more than 1.9 tons compared to only 3.5 kg of coca paste. The largest seizures were in Puerto Santander (Araracuara), with 1.67 tons, and in La Pedrera, with 255 kg, while Tarapacá and Taraira recorded smaller amounts. Although data exist from 2019 through August 2025, most records are concentrated between 2022 and 2023, highlighting the recent consolidation of this fluvial route as an active trafficking corridor into Brazil.

On the Brazilian side, the Amazonas State Secretariat of Public Security reported a total of 71 operations in Japurá between 2018 and June 2025, with 6.3 tons of *skunk* marijuana and 198 kg of cocaine seized. Activity peaked between 2021 and 2022, positioning Japurá as the border municipality with the highest volume of drug seizures during that period.

3.3. Actors Associated with Illegal Markets

Although there are various forms of decision-making over these territories and river basins, predominant control lies in the hands of illegal armed groups and criminal organizations. At times, this armed governance is imposed on local communities through subordination; in others, communities actively participate as actors within illicit economies.[56] In these regions, what is at stake is the legitimacy of official government, whose presence in the Amazon is nearly innocuous. Armed actors, as seen in the Colombian case, challenge this authority and take on state-like roles, building social bases loyal to their control systems. In doing so, they secure their long-term presence in the territory while extracting resources from it — and its inhabitants — to support their armed operations, financed through environmental exploitation.

Following the signing of the 2016 Peace Agreement with the FARC-EP in Colombia, the internal conflict and the armed actors who persist in violent confrontation have largely reconfigured themselves in the Colombian transboundary Amazon. The slow reaction of the Colombian State in reaching the territories vacated by the former FARC-EP created a window of opportunity for dissident factions of the guerrilla to rebuild armed orders and controls in regions of strategic interest for their renewed operations.[57] On the other side of the border, Brazil's Comando Vermelho (CV) withdrew northward into the Amazon starting in 2016, expanding along the Solimões, Japurá, and Negro rivers[58] and consolidating its hegemony by formalizing ties with the Frente Carolina Ramírez.[59] The main groups present in the area include:

- **FARC dissidences:** Before 2016, the FARC-EP controlled vast areas of the Amazon, regulating activities such as gold mining along the Caquetá and Puré rivers and expelling Brazilian miners.[60] After the Peace Agreement, several dissident factions emerged that now dispute territorial control: the Estado Mayor Central (EMC) led by Iván Mordisco; the Estado Mayor de Bloques y Frentes (EMBF) led by Calarcá Córdoba;[61] the Segunda Marquetalia (SM) under Iván Márquez; and the Coordinadora Nacional Ejército Bolivariano (CNEB) under Walter Mendoza, which brings together the Comandos de Frontera. In the Amazon, the Frente Carolina Ramírez of the Bloque Amazonas Manuel Marulanda (EMC) dominates gold mining and drug trafficking along the Caquetá–Japurá and Puré–Puruê axis, while the Bloque Jorge Suárez Briceño and the Columna Miller Perdomo (EMBF) extend their influence southward into Caquetá and the Brazilian border.

- **Comando Vermelho (CV):** Controls drug-trafficking corridors from Peru and Colombia and combines coercion with food, medicine, and money distribution, maintaining significant influence across the Amazon[62] and forging agreements with Colombian groups.

- **Riverine communities and river pirates:** Operate along the Solimões, Negro, and Japurá rivers, engaging in assaults on vessels, toll collection, and transport of illicit cargo. Their tactical role alternates between collaboration and competition with major factions, and they are responsible for river violence recorded in Japurá and Maraã.[63]

- **Other cross-border suppliers (Colombia–Peru):** The Comandos de la Frontera[64] and Peruvian clans act as logistical intermediaries along the Içá/Putumayo, Solimões, and Japurá corridors, providing crews, fuel, and boats for binational trafficking.

The armed regulations built around illicit economies in the Caquetá–Japurá and Puré–Puruê circuit mirror the dynamics of enclave economies, such as cocaine trafficking, characterized by violence and exploitative labor practices that primarily benefit those who control invested capital. These economies are defined by the appropriation of most of the wealth by actors external to the territory — those controlling inputs, machinery, or logistics — while excluding local communities from the bulk of the benefits generated.

On the Colombian side, dissident factions of the former FARC-EP guerrilla have taken advantage of weak state presence to control mining, organize labor, and expel Brazilian miners, who originally introduced gold mining into the Colombian Amazon.[65] These factions have inherited territorial governance structures and actively participate in gold extraction, concentrating capital. At the same time, miners face poverty, environmental degradation, and health damage due to mercury exposure, a topic that will be discussed further below.[66]

"Illicit economies are characterized by the appropriation of most of the wealth by actors external to the territory, who control inputs, machinery, or logistics, thereby excluding local communities from much of the benefits generated"

4. Traces of Gold and Drug Trafficking: Contamination, Threats, and Violence in Communities

4.1. Environmental Impacts: Deforestation and Pressure on Biodiversity

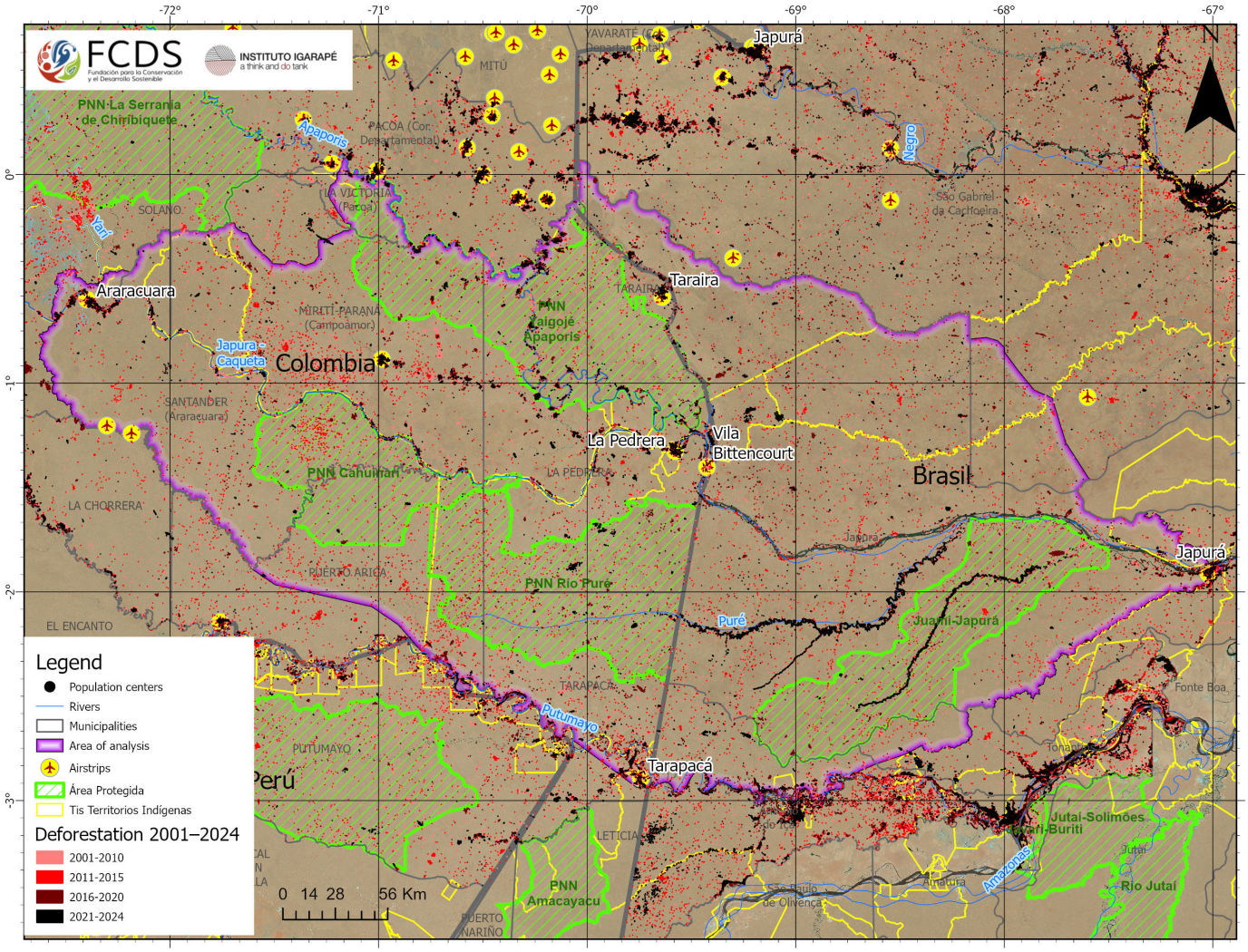
As illegal economies expand in the region, their environmental impacts become evident through rising deforestation, water basin pollution, and biodiversity loss. In the area analyzed, deforestation is closely linked to the expansion of illegal gold mining and the supporting infrastructure.[67] In addition to clearing forest cover in extraction zones to expose mineral deposits, this activity requires roads, airstrips, and worker accommodations, which significantly broaden the affected area beyond the mining site itself.

Since 2020, deforestation in the municipality of Japurá, on the Brazilian side of the border, has increased sharply due to the advance of illegal mining. While only 0.21 km² of forest loss was recorded in 2019, the figure rose to 6.99 km² in 2020 and 9.88 km² in 2021, peaking at 36.37 km² in 2022. Reductions were observed in 2023 and 2024.[68] Data on deforestation specifically attributed to illegal mining show that Japurá was the most affected municipality in the state of Amazonas in 2024, with 6.4 km² deforested for this reason, — a 66% decrease compared to 18.8 km² in 2023.[69] In the first half of 2025, Japurá ranked second among all municipalities in Brazil's Legal Amazon for the largest deforested area caused by illegal mining, with 1.4 km² between January and February and 2.8 km² between March and April, second only to Itaituba (Pará).[70]

In Colombian territory, deforestation increased significantly in 2016, reaching approximately 0.2 km², with 0.03 km² of forest lost in the municipality of La Pedrera. However, from 2016 to 2024, a total of 898 km² were deforested, including 168 km² in Miritíi Paraná and 147 km² in Araracuara. Reports and analyses by FCDS and the Amazon Conservation Association, monitoring mining activity in Río Puré National Natural Park (PNN Río Puré), used satellite imagery and low-altitude aerial photography to identify ongoing deforestation linked to mining along the Puré River. By the first half of 2025, active deforestation areas associated with mining along the Puré River had resulted in the loss of 0.65 km² of forest along the riverbank.

Figure 5 shows that forest loss in the region follows the course of several main rivers affected by illegal mining, particularly along the Puruê River (on the Brazilian side), the main hotspot of illegal mining in the study area, and along the Juami River, a tributary of the Japurá River located within the Juami–Japurá Ecological Station. In both cases, the critical deforestation points are recent, indicating that deforestation trends have effectively mirrored the expansion of illegal mining across the region.

Figure 5. Deforestation 2001–2024



Source: FCDS and Igarapé Institute. Deforestation visualization based on Global Forest Watch data (2025) Tree cover loss

Since 2003, records already indicated illegal alluvial gold mining along the Puré River and threats to Indigenous peoples living in voluntary isolation.[71] However, it was only from 2020 onward that the river was massively invaded by dredges. With the advance of illegal mining, estimates suggest that approximately 10 km² of forest[72] were destroyed along the river, with more than half occurring in 2022 alone.[73]

Within the Juami–Japurá Ecological Station, and specifically along the Juami River, satellite images reveal an increase in illegal gold mining starting in 2019, with numerous dredges and boats associated with this activity.[74] Between 2019 and 2022, mineral extraction along the Juami River caused the loss of more than 5.3 km² of forest[75] in this protected area of the Brazilian state of Amazonas. The Amazon Deforestation Calculation Program (PRODES)[76] system of Brazil's National Institute for Space Research (INPE) reported that deforestation within the ESEC Juami–Japurá peaked in 2023 at 6.8 km², preceded by 5.6 km² in 2022 and about 3 km² in 2021. In 2024, the figure dropped sharply to 0.5 km².

Beyond deforestation, mining activities also have severe impacts on the Amazonian environment. The region's ecological conditions favor the transformation of mercury used in mining into methylmercury—a highly toxic compound that bioaccumulates in organisms

and moves up the food chain. Mercury released by mining travels through the air, settles on vegetation and soil, and adheres to particles that are washed into rivers and streams, where it accumulates in bottom sediments and in fish that move through the basins and are later consumed by local communities.[77] In this way, mercury travels long distances, affecting not only communities near mining areas but also populations in distant towns and territories.[78] Environmental damage is not confined to the areas where dredges operate; it spreads silently and invisibly throughout the Amazon region.

In the Caquetá, Apaporis, Cotuhé, and Puré rivers,[79] studies have found that 37% of fish samples contained mercury concentrations above the Codex Alimentarius reference threshold established by the World Health Organization (WHO) for safe human consumption.[80] One of the sampled species, *tucunaré* (peacock bass), showed concentrations of 1.6 ppm in the Puré River and 4.7 ppm in the Caquetá River,[81] levels approximately 60% and 370% above the recommended limit, respectively.[82]

In summary, illegal wildcat mining is causing a dual environmental impact in the Amazon: accelerating deforestation and forest fragmentation, and contaminating rivers with mercury that disperses over long distances and bioaccumulates in aquatic fauna. This combination destroys habitats, disrupts the ecological balance of the basins, and increases pressure on biodiversity, weakening the resilience of the Amazon forest and compromising its capacity to sustain life and the environmental services on which communities and the region depend.

4.2. Public Health Impacts: Mercury Contamination among Local Populations

Methylmercury, the most toxic organic form of mercury, bioaccumulates in aquatic organisms and biomagnifies as it moves up the food chain,[83] reaching its highest concentrations in large carnivorous fish. This is particularly critical in the Amazon, where fish constitute the main source of protein in the diet of Indigenous communities.

In recent years, contamination by mercury has been documented not only in fish but also among people living in this region,[84] posing serious health risks to affected communities. For example, in the Caquetá, Cotuhé, and Apaporis river basins, a study[85] conducted with members of the PANI, CIMTAR, and ACIYA-ACITAVA communities found that the average levels of mercury detected in human hair samples exceeded the World Health Organization (WHO) reference threshold[86] in 94%, 93%, and 84% of cases, respectively, indicating high mercury exposure.

Studies also point out that these communities already exhibit signs and symptoms consistent with chronic mercury poisoning, whose medium- and long-term effects on health can be devastating. The most frequent consequences include neurological disorders, progressive damage to the central nervous system, loss of peripheral vision, motor, speech, and hearing difficulties, as well as muscle weakness, with a risk of death in the most severe cases.[87] The situation is even more critical among pregnant women, as mercury can cross the placental barrier, potentially causing severe neurological damage, fetal development disorders, and even DNA mutations.[88] A study conducted in the Yaigojé Apaporis National Natural Park found that 50% of women of reproductive age are at risk of giving birth to children with a reduction of up to four points in their IQ.[89]

Recent interviews with local communities[90] confirm that mercury contamination is an urgent concern, as there appear to be increasing cases of children born with physical malformations and intellectual disabilities. Added to this is the growing food insecurity resulting from mercury bioaccumulation in fish, which not only affects the diet of Amazonian populations but is also causing shifts in their cultural practices. Several studies have recommended restricting the consumption of carnivorous fish and even considering a reduction in breastfeeding as a preventive measure to protect children's health.[91] These recommendations illustrate how deeply the risks associated with contaminated fish consumption are transforming the livelihoods and ancestral subsistence practices of these communities.

4.3. Social, Economic and Cultural Impacts

The expansion of gold mining has transformed livelihoods along the Colombian–Brazilian Amazon border, displacing traditional activities with illicit economies dependent on gold and criminal networks.

Beyond its environmental impacts, illegal mining disrupts community and spiritual order, eroding social cohesion.[92] In the absence of viable options, young people, mostly men, often turn to mining or trafficking as their only source of income. The local saying "in La Pedrera there's no money, but never food shortage; in Taraira there's always money, but no food" captures the extractive paradox: where gold flows, prices increase, food becomes scarce, and agroforestry systems adapted to the characteristics of the Amazon region (chagras) vanish, creating a false sense of prosperity that sustains dependency and economic vulnerability.[93]

The predominantly male composition and the lack of job and educational opportunities make the wildcat mines a quick route to gain capital and status, though at the cost of greater exposure to recruitment and exploitation. In Colombia, Early Warning 022-21[94] denounces the use of Indigenous youth in mining-related work and drug transport in the territory. In Brazil, although there is no official evidence of forced recruitment in Japurá, an *Amazon Underworld* report recounts how, along the Caquetá–Japurá river border, Indigenous men have become involved in cross-border trafficking, many acknowledging that *"the only way out here is to carry drugs and marijuana."* This phrase summarizes how the same economic precarity that drives people toward gold also sustains their dependence on criminal economies.[95]

Women also play active roles in illegal mining fronts as cooks, assistants, or vendors, but they also provide sexual services within the extractive circuit. In this specific territory, "floating brothels, locally known as *love boats,*" have been identified along the Puré River,[96] where payments are made in gold, which is later converted to cash in Japurá or Tefé.[97]

These dynamics place women in highly vulnerable situations of sexual and gender-based violence in a context devoid of any state protection. This commodification of women's bodies within the extractive economy coexists with widespread rates of youth sexual violence, making Japurá one of the municipalities with the highest number of reported cases of sexual assault against children and adolescents in the state of Amazonas.[98] In Colombia, although documentation is more limited, Early Warning 002-21[99] warns of sexual exploitation cases linked to illegal mining along the Caquetá and Apaporis rivers, showing patterns similar to those observed on the Brazilian side.

Beyond their shared logistical control, the link between drug trafficking and the wildcat mines (*garimpo)* is evident in the demand for drugs inside mining camps[100] and in local micro-trafficking markets in extraction sites and populated centers. In Colombia, Early Warnings 022-21 and 017-23 from the Defensoría del Pueblo (Office of the Ombudsman of Colombia)[101] document that in areas such as La Pedrera, Taraira, and Puerto Santander (Araracuara), the dissident Frente Primero Carolina Ramírez has exercised violent social control over drug consumption — carrying out exemplary punishments against Indigenous youth accused of using psychoactive substances.

In Japurá and neighboring municipalities, reports show that the lack of anti-trafficking measures has led to a rise in the availability and consumption of drugs and alcohol in local communities,[102] resulting in substance abuse, increased cases of child prostitution, pedophilia, alcoholism, suicide, rape, teenage pregnancy, and domestic violence.[103] Interviews[104] also reveal that this dynamic has become part of miners' daily lives in Japurá, who, upon returning home after periods in mining sites, spend much of their earnings on alcohol and drugs.

Suicide has also been identified among Indigenous populations in the Amazon, reflecting deep emotional and social deterioration affecting communities in both Colombia and Brazil.[105] On the Colombian side, records reveal a critical situation: in Tarapacá, nine suicides were recorded compared to four homicides between 2020 and 2024, while in La Pedrera the ratio was two suicides for every homicide in 2023, showing that suicide has become a severe concern in these territories.[106] In contrast, Japurá, where about 29% of the population is Indigenous, with a more urban, mestizo profile, has suicide rates close to the national average (10 per 100,000 in 2023 compared to 8 nationwide). Further north, São Gabriel da Cachoeira, a border municipality with one of Brazil's highest proportions of Indigenous people, reports rates above 30 suicides per 100,000 inhabitants, four times the national average, indicating a shared pattern of vulnerability across Amazonian areas with strong Indigenous populations.[107]

Meanwhile, socio-environmental conflicts reflect the tensions between conservation, mining, and territorial rights. In the Mapari Indigenous Land, home to the Kaixana people (municipality of Japurá), illegal *garimpo*, logging, and predatory fishing have intensified since 2022, with threats to communities and the destruction of around 30 mining rafts by the Federal Police along the Puré and Joami rivers.[108] Although not directly linked to the Japurá–Puré circuit, the case of Yaigojé Apaporis National Park in Colombia, where a company sought to overturn its protected status to exploit gold,[109] and the 60 active mining processes in Indigenous territories of the Upper Rio Negro (Brazil)[110] reflect similar pressures on Indigenous lands in neighboring areas.

4.4. Escalation of Violence and Territorial Threats

The convergence of illicit gold and drug economies, combined with a weak state presence, results in threats, homicides, and violence against communities and environmental defenders. These dynamics vary on each side of the border: in Colombia, the main patterns involve persecution, displacement, and confinement linked to armed dissident groups, while in Brazil, violence is more widespread, related to garimpo, river piracy, and interpersonal conflict.

The patterns of violence identified in Japurá reflect the worsening security situation in the Brazilian Amazon.[111] Between 2020 and 2024, Japurá, with about 10,000 inhabitants, recorded 12 homicides and two deaths from police intervention,[112] reaching a rate of 66 per 100,000 inhabitants in 2021, one of the highest in the state and the country, according to the Brazilian Yearbook of Public Security, published by the Brazilian Forum on Public Security (FBSP).[113] Press reports that shed light on these homicides

reinforce the localized and brutal nature of violence along the Japurá River. Between 2020 and June 2025, of the 12 homicides recorded in Japurá, at least nine were directly related to dynamics of river piracy and *garimpo*, including the murder of three *garimpeiros* (wildcat miners) in 2021,[114] the lynching and burning of a suspected pirate in a case of vigilante justice in 2022,[115] as well as the discovery of two dismembered bodies in shallow graves;[116] a river robbery in 2023; the death of an alleged pirate in a confrontation with police in 2024,[117] and the killing of a merchant on the Puré River, who supplied *garimpeiros*, in 2025.[118] Cases linked to river piracy and *garimpo* also continue downstream, with additional incidents reported in the municipality of Maraã, 170 km below Japurá.[119] These episodes illustrate the violence carried out by local gangs and allied factions, alternating between piracy, armed protection of dredges used in illegal gold extraction, and microtrafficking.

Table 2. Intentional Lethal Violent Crime Rate, 2020–24. Japurá and Maraã

	2020	2021	2022	2023	2024
Japurá	0.0	66.6	43.7	21.6	0.0
Maraã	12.1	0.0	18.6	6.3	6.3
Amazonas	**27.2**	**40.2**	**36.5**	**33.2**	**27.4**
Brazil	**24.9**	**23.6**	**23.1**	**22.3**	**21.0**

Source: Amazonas State Department of Public Security. National Public Security Information System (SINESP) https://www.gov.br/mj/pt-br/assuntos/sua-seguranca/seguranca-publica/estatistica. Population: CGI Demográfico/RIPSA and CGIAE/SVSA/Ministry of Health.

In Colombia, there has been a sustained increase in risks in this territory since 2018, evolving from early warnings about post-peace-agreement circumstances to scenarios of structural territorial control.[120] Since 2021, violence patterns have shown a consolidation of illegal economic networks, greater armed presence, and increasing threats to communities (see table 3). This pattern is also reflected in the steady rise of homicide rates in the department of Amazonas since 2020, increasing from seven cases in 2019 to 24 in 2021, remaining above 20 through 2024 (rising from a rate of 15 to 30 per 100,000 inhabitants).[121]

Table 3. Summary of Early Warning Alerts from the Office of the Ombudsman: La Pedrera, Tarapacá, Araracuara, Taraira

Variable	Evolution 2018–2020	Evolution 2021–2025
Frequency of alerts	3 regional alerts including La Pedrera; initial post-agreement risks.	Sustained increase (≥6 alerts), focused on La Pedrera and Tarapacá.
Armed actors	*Autodefensas Gaitanistas de Colombia*, ELN, and early FARC dissidents.	Consolidation of Front 1 and expansion of cross-border gold–drug networks.
Types of violence	Threats, displacement, electoral coercion.	Recruitment, confinement, extortion, and armed social control.
Illegal economies	Drug trafficking and river smuggling.	Illegal mining, gold–drug nexus, and local economic coercion.
Affected populations	Afro and Indigenous communities; local authorities.	Indigenous peoples (*Yaigojé Apaporis*), women, youth, and community leaders.

Source: author's systematization based on Early Warning Alerts from the Office of the Ombudsman.

An analysis of disaggregated homicide records documents at least 21 cases between 2013 and 2024, with peaks in 2013–2016 and a resurgence between 2022 and 2024 — a trend consistent with the Early Warning Alerts issued since 2021, which already signaled increased risks in the region. Although the number of homicides is limited and does not allow precise differentiation among types of violence, Alerts 022-21, 017-23, and 001-25[122] indicate the coexistence of overlapping forms of everyday violence associated with alcohol and drug use, armed coercion, and social control,[123] leading to both lethal outcome, such as the murder of an Indigenous defender,[124] and non-lethal aggression, threats,[125] and forced displacement. While it is not possible to determine which type of violence predominates, sources agree that both coexist and reinforce each other, creating a scenario in which both internal conflict and the coercive presence of armed groups shape community life.

Table 4. Homicides identified in La Pedrera, Tarapacá, Araracuara, Taraira

Municipality / Departmental District	2013	2014	2015	2016	2017	2018	2022	2023	2024	Total
Araracuara	3	2	1	2	1					**9**
La Pedrera		2		1					2	**5**
Tarapacá			1			1		1	1	**4**
Taraira (Vaupés)			1				1	1		**3**
Total	**3**	**4**	**3**	**3**	**1**	**1**	**1**	**2**	**3**	**21**

Source: disaggregated data requested from the Colombian National Police.[126]

5. Conclusions and Strategies to Guarantee Climate Security and Basin Conservation in the Face of Illicit Economies

Illegal mining and drug trafficking have already left far-reaching consequences on the region. The recent expansion of these illicit economies demonstrates how quickly both human and climate security can be severely undermined. The proposals outlined below align with COP30's principles of inclusive climate action, sustainable financing, and nature-based solutions. They seek to enhance coordination, cooperation, and territorial control to counter non-state actors — often armed — who operate within illegal markets linked to mining, drug trafficking, and river smuggling, supported by local networks of pirates, miners, and corrupt law enforcement officials.

It is essential to reverse this trajectory before the damage becomes irreversible. Taking into account the region's environmental assets, the expansion of illicit economies, growing environmental degradation, and escalating violence, a set of recommendations is proposed for both public and private sectors. These recommendations aim to prevent and combat environmental crimes, foster ethical and sustainable supply chains that uphold human rights, and strengthen nature-based solutions — all while mitigating the impacts of climate change on peace and climate security in the region.

Enhance state surveillance and territorial control:

1. **Increase the number of police operations in the region, both at the national level and through coordinated, multinational efforts.**

- Given the Amazon's ecological, social, and cultural importance, and considering the expansion of illegal mining, its associated impacts, and the consequences of drug trafficking routes on local populations, countries must prioritize the region in their operational plans, strengthening control and expanding their territorial presence.
- Control and disruption of criminal activities can also be achieved through measures that weaken the operational capacity of criminal networks. Examples include the Conduct Adjustment Terms (TAC) promoted by Brazil's Federal Public Prosecutor's Office (MPF) in partnership with e-commerce companies to block illegal advertisements related to the sale of mercury, and the TAC signed with *Starlink*, which provides for the sharing of user data with the competent authorities (MPF or Federal Police) and the suspension of services for individuals involved in illegal mining activities.[127]

2. Enhance the quality of investigations by considering the broader ecosystem of environmental crime and interconnected offenses, thereby strengthening accountability and enabling action against criminal networks.

- Environmental crimes do not occur in isolation; they form part of a system of interconnected offenses spanning the entire supply chain, which must be investigated and prosecuted in an integrated manner. Expanding the scope of investigations to target and hold accountable all links in the criminal chain, particularly its financial infrastructure, is essential to effectively disrupt illicit organizations.
- The first step in enabling illicit activities such as the illegal extraction of gold and timber is the appropriation or invasion of public lands or protected areas by private actors, sometimes through threats and coercion against local communities. Therefore, authorities should focus on the state management of public lands, monitoring land records that appear to have been legitimately obtained — that is, through the 'laundering' of land — as well as extractive activities authorized on public lands.

3. Develop an integrated river monitoring system, both within and among border countries, to support coordinated strategies for the prevention, suppression, and control of illicit economic activities across river basins.

- Rivers play a vital role in the lives of local communities and in the functioning of illegal economies. Therefore, establishing a shared system for river monitoring and control is imperative. Such a system should integrate state presence in the territory with the use of remote sensing technologies, enhancing the capacity of States to exercise effective governance and control over their borders and Amazon basins.

Improve control of the gold supply chain and strengthen technical assistance to enable communities to engage in responsible mining practices that minimize environmental impacts:

4. Strengthen States' capacity to ensure gold traceability, encompassing both the documentary dimension (regulatory compliance) and the geochemical dimension (verifiable origin).

- To confront illegal mining, mechanisms for controlling the gold supply chain must be reinforced at every stage — from extraction to commercialization — requiring proof of compliance[128] for gold sales and establishing controls over the volumes traded.
- Both Brazil (with the Federal Police's Ouro Alvo program) and Colombia (with the Colombian Geological Service's Digital Footprint initiative) are developing technical capacities to determine the origin of gold through forensic geological analysis. In this context, it is crucial to coordinate these initiatives to establish a regional Amazonian gold traceability database. Such a mechanism would make it possible to verify the origin of extracted minerals, strengthen criminal accountability for illegal supply chains, and provide the private sector with reliable data to eliminate illicit gold from their supply chains.

5. Invest in the integrated implementation of mercury-free mining initiatives.

- Artisanal mining is a fundamental means of subsistence in the Amazon basin. Recognizing this, it is essential to invest in technical assistance to enable local communities to adopt sustainable practices and obtain international certifications, such as Fairmined.[129] Likewise, the expansion of innovative projects, aimed at eliminating mercury use in artisanal and small-scale mining,[130] should be encouraged. Such efforts can be supported by the public sector — through policies that promote research, capacity building, and technical

assistance — and by the private sector, through partnerships and mechanisms that foster a just transition toward sustainable production models.

Strengthen programs for alternative economic development:

6. **Promote technical assistance, and investment in community enterprises that develop sustainable and alternative solutions to illicit markets, supporting economic transition, diversification, and stable income generation.**

- Communities, local authorities, and research centers in the Amazon regions of Colombia and Brazil can collaborate to promote sustainable bio-enterprises based on Amazonian fruits, oils, medicinal plants, handicrafts, and community-based tourism.[131] Active community participation, along with local technical and financial support and scientific guidance from institutions such as Colombia's SINCHI Institute and Brazil's National Institute for Amazonian Research (INPA), is essential to developing inclusive and sustainable economic models that are compatible with forest conservation.
- These initiatives align with the national bioeconomy and green business frameworks of both countries. In Colombia, they correspond to the National Policy on Green Businesses and Bioeconomy, the Amazonian Business Program of the SINCHI Institute, and Corpoamazonia. In Brazil, they are consistent with the National Bioeconomy Strategy, the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm, 5th phase, 2023–2027), and the State Bioeconomy Plan of Amazonas (under public consultation as of October 2025). These frameworks establish the foundations for promoting sustainable economic diversification and forest conservation in the Legal Amazon.[132]

Invest in health programs, violence prevention initiatives for women and youth, and protective measures for victims:

7. **Establish direct investments in intersectoral physical and mental health programs aimed at mitigating the harms of excessive drug use within local communities.**

- Municipal health, social assistance, and education departments should lead the implementation of suicide prevention and substance use response measures,[133] including policies adapted to local needs. An example is the Municipal Suicide Prevention Plan in São Gabriel da Cachoeira, which addresses the high rates of homicide among indigenous youth in the municipality.[134]
- It is recommended that state agencies provide technical and financial support through bodies such as Brazil's State Council on Drug Policies (CONEN) and Colombia's Sectional Councils on Narcotics. Comprehensive care should be reinforced through the establishment of Centers for Access to Rights and Social Inclusion (CAIS) under Brazil's National Secretariat for Drug Policies (SENAD),[135] alongside coordinated efforts between Fluvial Basic Health Units and the *Consultório na Rua* program of the Brazilian Ministry of Health, which delivers mobile healthcare tailored to vulnerable communities. In Colombia, similar strategies could be implemented through the Fluvial Health Routes and Drug Addiction Care Centers (CAD), thereby strengthening mobile and community-based health services.[136]

8. Strengthen the presence and integration of agencies for reporting youth and women's violence, while promoting coordinated actions to prevent violence and protect victims.

- It is recommended to expand institutional services—from prevention to protection—against violence toward women and youth in remote areas by implementing mobile reporting points via boats and itinerant teams that integrate health, social assistance, and public security. These efforts should be coordinated with Guardianship Councils, Specialized Police Stations for Women (DEAM) in Brazil, and Family Commissariats in Colombia, alongside comprehensive care pathways for victims.[137]
- Justice, oversight, and rights protection institutions (such as the public prosecutors' offices, fiscalias, and public defenders in Brazil and Colombia) should conduct regular missions for monitoring, investigation, accountability; and legal assistance to victims should be provided, with priority given to mining areas affected by youth violence, violence against women, sexual exploitation, and illicit economies.
- In partnership with military units, social organizations, educators, and local leaders, state institutions operating in the Caquetá–Japurá corridor should promote continuous educational campaigns on women's rights and consent through community radio stations, schools, and churches. In addition, these schools and churches can serve as protected local hubs for implementing or strengthening anonymous reporting channels.

9. Guarantee funding for sustained programs for epidemiological and environmental monitoring in rivers to ensure the health of fish populations and riverdwellers, in ways that reflect local cultural and territorial specificities. These programs should strengthen local capacities for the diagnosis, treatment, and follow-up of mercury-related health impacts, with a differentiated approach.

- National and subnational public agencies should provide technical and financial support to Indigenous and traditional communities through State Secretariats and the Ministries of Health and Education, ensuring the strengthening of local capacities in health and nutrition.
- Community food governance structures on food security must be strengthened, taking into account fish species, consumption patterns, and local socioeconomic conditions. In Brazil, this work can be implemented through Multidisciplinary Indigenous Health Teams (EMSI), the Special Secretariat for Indigenous Health (SESAI), and the Indigenous Health Care Subsystem (SasiSUS), in coordination with the District Indigenous Health Councils (CONDISI).[138] In Colombia, it should be developed through the Indigenous System of Own and Intercultural Health (Sistema Indígena de Salud Propio e Intercultural - SISPI), in coordination with the Departmental Councils of Social Policy (CODEPOS) and community leaders, who can guide the population on safe fish consumption according to contamination levels by species and seasonal variations.[139]

Strengthening bilateral and multilateral cooperation between different actors:

10. **Advance the development of a minimum regulatory framework for mining in the Amazon region, enabling countries to coordinate efforts against illegal mining.**

- Amazonian countries have different definitions and regulations regarding permissible mining activities, which creates loopholes that criminal networks can exploit, thereby complicating the work of state authorities. Establishing shared minimum criteria for all stages of the gold supply chain would strengthen State oversight and regulatory control.
- Regional blocs and organizations, such as the Amazon Cooperation Treaty Organization (OTCA) and the Andean Community (CAN), can play a leading role in this regard, whether through the OTCA Public Security Commission or the CAN Illegal Mining Committee (CAMI).

11. **Encourage the use of legal cooperation tools, integration among authorities, and shared information systems in cross-border investigations, facilitating the identification of suspicious cases and the collection of evidence for criminal prosecution.**

- Colombia and Brazil have key bilateral instruments to address illicit economies in the Amazon.[140] The 2021 Police Cooperation Agreement and the Binational Border Commission (COMBIFRON)[141] enable joint operations, intelligence sharing, and coordination in response to crimes such as illegal mining and drug trafficking. In addition, the Joint Commission on Drugs and Related Crimes[142] serves as a specialized forum where both countries coordinate actions in border areas against drug trafficking, money laundering, and other associated crimes. However, these mechanisms remain underutilized. Their implementation needs to be strengthened with an Amazon-focused and climate-security perspective, incorporating specific protocols for environmental crimes, real-time intelligence mechanisms, and joint fluvial monitoring and gold traceability operations.[143]
- Promote the use of legal cooperation tools and strengthen cross-border networks among police and judicial authorities to facilitate the identification of suspicious cases and the collection of evidence. It is essential to consolidate and coordinate instruments such as the protocols of the Ibero-American Association of Public Prosecutors (AIAMP), the Asset Recovery Network of GAFILAT (RRAG), and the Egmont Group's mechanisms for cooperation among Financial Intelligence Units.
- Operationally, bodies such as Ameripol, the Jaguar Network, and the International Police Cooperation Center (CCPI) of the Brazilian Federal Police can strengthen joint actions and intelligence sharing. Likewise, regional platforms such as OTCA and CAN can facilitate political coordination and technical exchange among Amazonian countries.

12. Promoting cross-border studies is essential to address the circuits and dynamics of illicit economies and their territorial impacts, given both the vastness of the shared environment and the vulnerabilities arising from regulatory differences between countries.

- Agreements between universities sharing the Amazon basin, encouraging student exchanges, field research, and the creation of regional thematic research networks.
- Create observatories with permanent structures for data collection using standardized protocols on common issues, and develop integrated geospatial databases. These structures should have the participation of representatives from both sides of the border and be supported by regional universities and local organizations.
- Counterpart ministries of the countries — related to education and the promotion of science, integration and regional development, foreign relations, and others — should promote joint calls for research focused on cross-border studies.
- Regional blocs and organizations, such as the OTCA and CAN, can serve as diplomatic bridges among national authorities, facilitating the establishment of multilateral agreements for scientific cooperation and the management or co-financing of regional funds to promote cross-border research.

Recognition of the need and importance of addressing environmental crimes at the international level:

13. Recognize environmental crime as a global threat to the climate and the Amazon.

- Environmental crimes are now the third largest illegal economy in the world and are one of the main drivers of deforestation in the Amazon. For Amazonian countries to meet their emission reduction targets (NDC), it is essential to recognize the role of environmental crime in forest loss and implement effective measures to address it. This phenomenon also affects other tropical forest basins, and a joint approach to address it represents one of the key solutions to limit global warming.

Endnotes

1. In the glossary of the Foundation for Conservation and Sustainable Development (FCDS) and Igarapé Institute (2025), Amazonía en Disputa, "climate security" is defined as the concept that climate change does not directly cause violence but acts as a threat multiplier, intensifying preexisting pressures such as resource conflicts, natural disasters, and food insecurity by heightening socioeconomic stress and deepening inequalities.
2. For a bibliographic review on the topic, see Amazon Concertation (2025), Seguridad: una mirada multidimensional a la Amazonía contemporánea
3. Perez-Vincent, S. M. et al. (2024), The Costs of Crime and Violence: Expansion and Update of Estimates for Latin America and the Caribbean (IDB-MG-1244), Inter-American Development Bank; Igarapé Institute (2022), The ecosystem of environmental crime in the Amazon: an analysis of illicit rainforest economies in Brazil; and Muggah, R. & Margolis, M. (2022), An Ecosystem of Organized Crime Threatens the Amazon, and Global Climate Action, *Reuters*.
4. See also Igarapé Institute and InSight Crime (2023), Stolen Amazon: The Roots of Environmental Crime in the Tri-Border Region; McDougal et al. (2013), The Way of the Gun: Estimating Firearms Traffic Across the U.S.-Mexico Border
5. The area of analysis covers the middle basin of the Caquetá–Japurá River, from Araracuara (Puerto Santander) in Colombia to the city of Japurá in Brazil, and the entire basin of the Puré/Puruê River, extending into its surrounding areas of influence, national parks, and Indigenous territories. This binational corridor includes zones of high ecological value such as the Río Puré National Natural Park, contiguous with Cahuinarí National Natural Park in Colombia, and the Juami–Japurá Ecological Station in Brazil. To the north, it connects with the macroterritory of Jaguares del Yuruparí and the Indigenous lands along the Apaporis River. The international border follows part of the Apaporis River (a tributary of the Caquetá–Japurá) for about 50 km of fluvial boundary, then continues along a straight line defined by the Tratado García Ortiz-Mangabeira de 1928 of 1928 (the Tabatinga–Apaporis line), cutting through the forest south of the Apaporis.
6. An igarapé is a small freshwater stream or narrow waterway found in the Amazon rainforest. It often connects larger rivers and serves as a vital route for transportation, fishing, and access to forest communities. The word comes from the Tupi language, meaning "path of the canoe."
7. The area of influence encompasses border regions affected by mining and drug-trafficking dynamics, from Taraira in the north — marked by historic mining activity and gold-mining pressures on the Brazilian side — to Tarapacá in the south, connected to the Putumayo–Içá axis characterized by illegal economies and criminal networks. See Amazonian Institute of Scientific Research – SINCHI (2024), Conflictos: Explotación minera en Taraira. It also maintains operational links with Brazilian municipalities such as Santo Antônio do Içá, São Gabriel da Cachoeira, and São Paulo de Olivença. Further south, Maraã functions as a logistical and service hub along the Japurá River, coordinating routes, markets, and networks associated with garimpo and other illicit economies. See Committee on Economic, Social and Cultural Rights (CDESC), United Nations Office on Drugs and Crime (UNODC), and United Nations Development Programme (UNDP), Tráfico de drogas en la Amazonía. Resultados Preliminares (2023).
8. The creation of the park has proven insufficient to safeguard the rights of mobile Indigenous peoples. See Oficina del Alto Comisionado de las Naciones Unidas para los Derechos Humanos – OHCHR (2024), Declaración final del Relator Especial de las Naciones Unidas sobre los derechos de los Pueblos Indígenas, Francisco Calí Tzay, al concluir su visita oficial a Colombia
9. Other Indigenous Territories (TIs) under the jurisdiction of the municipality of Japurá include Uati–Paraná, Alto Rio Negro, Médio Rio Negro I, Santa Cruz da Nova Aliança, and São Sebastião, located north and west of the municipality, outside the direct Caquetá–Japurá and Puré–Puruê corridor. Further west, the conservation mosaic expands with the oriented toward sustainable use by riverine communities.
10. See also Serviço Florestal Brasileiro (SFB) (2024). Cadastro Nacional de Terras Públicas; and IPAM (2025). Falta de destinação deixa 56 milhões de hectares vulneráveis na Amazônia
11. Aguas Amazónicas (2016). Caquetá-Japurá
12. Fundación Panthera (2025). Panthera's Jaguar Program; SiB Colombia (2022). Biodiversidad en cifras, Sistema de Información sobre la Biodiversidad de Colombia – Tarapacá.
13. In the past, the Japurá region was much more populated, particularly during the fur trade cycles of the 1960s, the rubber boom of the 1970s, and gold mining along the Traíra River between the 1980s and 1990s. The population grew by up to 16% per year but declined again after the closure of garimpos in 1994. See Superintendencia de Desarrollo de la Amazonia (SUDAM) & Organización de los Estados Americanos Organization of American States - OAS (2000). Zoneamento Ecológico-Econômico Brasil-Colômbia: Eixo Tabatinga-Apapóris. Informe Final, Vol. I, p. 112.
14. In this region live the Yurí-Passé Indigenous peoples, who remain in voluntary isolation and maintain a nomadic way of life in the forest. Their territory extends along the Puré and Japurá rivers, on the Colombia–Brazil border.
15. Overflight monitoring by The Foundation for Conservation and Sustainable Development (FCDS) identified dredges equipped with *Starlink* antennas in May 2025. See Monitoring of the Andean Amazon Project – MAAP (2025). MAAP #228: La Minería Ilegal en los Ríos Puré y Cotuhé en la Amazonía Colombiana
16. There are no directly comparable measurements of extreme poverty between Colombia and Brazil. In Colombia, the proportion of people living in extreme poverty (a specific category within the NBI Index), measures households with multiple structural deprivations. In Brazil, the Unified Registry for Social Programs (CadÚnico) — a system created in 2001 to coordinate programs such as Bolsa Família — defines extreme poverty as a per capita monthly income equal to or below BRL 218, equivalent to USD 1.3–1.4 PPP per day in 2025. The methodology for calculating the poverty rate is detailed in Souza & Osorio (2024), Estimativas de famílias pobres e de baixa renda para o Cadastro Único

17. The Vásquez Cobo–Martins Treaty of Boundary and Inland Navigation (1907) stipulates free navigation on the Amazon and other Colombian–Brazilian rivers, complemented by the Tratado García Ortiz–Mangabeira (1928). See Ministry of Foreign Affairs, Colombia (1982). Arreglo de Límites entre la República de Colombia y la República de los Estados Unidos de Brasil
18. Data from the Brazilian Federal Prosecution Office (Ministério Público Federal) indicate that in 2024, 749 irregular airstrips were identified in the state of Amazonas, 175 of which were on Indigenous lands (including the TI Rio Negro). See *Amazonas Atual* (2025). MPF pede fiscalização sobre pistas clandestinas no Amazonas
19. Despite the absence of traditional banks, Brazil's northern region records the country's highest per capita frequency of use for the PIX payment system, with an average of R$141 per transaction, according to FGV (2025), Geografia do Pix. In Colombia, banking correspondents and digital apps, including Movii, facilitate electronic payments in regions lacking physical infrastructure.
20. For an overview of regulatory differences among Amazon Basin countries, including Brazil and Colombia, see Igarapé Institute (2025), Markets and Forest: Comparative Analysis of the Economic Sectors that Pressure the Amazon Basin
21. Amazonian Institute of Scientific Research – SINCHI (2024). Conflictos: Minería de oro en el río Puré
22. The information in this section is based on fieldwork, expert interviews, conversations with local authorities, and official sources.
23. Data for Brazil are sourced from the Portal da Transparencia do Ouro - PTO
24. In the Traíra mountain range, mining has taken place since 1980, in crystalline rocks of Precambrian origin that form the foundation of the Guiana Shield in both Colombia and Brazil. See FOIRN (2020), Recomendações para Gestão Territorial e Ambiental da Terra Indígena Rio Apapóris e Entorno – Região do Rio Traíra
25. The first cases of illegality recorded in the Portal da Transparência do Ouro database date back to 1993 in São Gabriel da Cachoeira, although irregular artisanal mining in this municipality has existed since 1983. Over time, mining moved downstream toward Japurá, following the river's course, with recurring cycles of widespread illegal activity. Data on the extent of illegal mining in Brazil come from MapBiomas (2025), Mining statistics - MapBiomas Brasil Collection 9
26. Annual Series of Land Cover and Land Use Maps of Colombia, consulted on October 23, 2025. MapBiomas (2025), Colección 3
27. The mercury content in humans (Hg) represents a quantitative approximation based on the data presented in section 4.2 of this document.
28. After consulting local authorities and informants in the field, no use of cyanide in alluvial mining within this circuit was identified. However, this does not rule out the possibility of its presence.
29. Record-high global gold prices have expanded illegal mining and deforestation across South American tropical forests. This surge has driven mercury prices up to as much as USD 330 per kilogram, according to the Environmental Investigation Agency - EIA) (2025), Traffickers Leave No Stone Unturned: What the largest exposed mercury smuggling operation tells us about gold, the shortcomings of the Minamata Convention on Mercury, and the convergence of crimes in Latin America. According to *Mongabay* (2025), Tráfico de mercurio: hablan los investigadores que descubrieron el nexo del narcotráfico mexicano con la minería ilegal en la Amazonía
30. Cambio & Unidos por los Bosques (2024). Adiós al Agua, bienvenida la minería
31. María Elena Crespo-López et al. (2023). Mercury in the Amazon: The danger of a single story. See also *Última Hora* (2011), Mineros usan cinco kilos de mercurio por cada kilo de oro
32. Defensoría del Pueblo (2018). Economías ilegales, actores armados y conflictos territoriales
33. It is estimated that around 10% of the gold extracted through alluvial mining is paid as quotas or "vaccines" (protection payments) to illegal armed groups operating along the Caquetá, Puré, and Cotuhé Rivers. See Vorágine (2024), Oro y coca: la maldición de la guerra en las selvas de Putumayo
34. In cases of illegal mining in Brazil, when "owners of dredges" are identified, judicial investigations usually point to local entrepreneurs with the financial means to fund machinery, inputs, and logistics, reflecting the business-oriented nature of this illicit economy in the Amazônia Legal. See Igarapé Institute (2024), Dynamics of the Ecosystem of Environmental Crimes in the Brazilian Legal Amazon (p. 9); and Garimpeiros no Amazonas são soltos após pagamento de fiança de R$ 48 mil
35. An example of settlements that temporarily serve mining operations is the community of Purezinho, a tiny miners' village made up of simple wooden houses and two floating brothels locally known as "love boats." See *InfoAmazonia* (2023), Garimpeiros retiram equipamentos e escapam de megaoperação no Amazonas
36. On major rivers such as the Solimões, where navigation is more open and easier for authorities to monitor, the risks associated with dredge circulation are higher. A recent joint operation involving the Fundação Nacional dos Povos Indígenas (FUNAI), Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), the Brazilian Army, and the Federal Police demonstrates the strategy of dispersing equipment to hinder enforcement. See Funai (2025), Operação articulada pela Funai, Ibama, Exército e Polícia Federal desmonta rede de garimpo ilegal no Amazonas
37. These groups ensure mobility — of both money and gold — along the rivers in their areas of control, providing security services to buyers and drug traffickers in exchange for payments, thus preventing law enforcement from carrying out operations that might seize or destroy their equipment.
38. The city of Japurá has an operational airport (identified on the Mining Map, coordinates: 1°53'45"S 67°1'9"W). According to Flapper, an official charter flight to Manaus costs around BRL 40,000 (about USD 7,500), and to Porto Velho about BRL 53,000 (about USD 8,400). A large national scheme documented by *Repórter Brasil* during Aerogold Operation (2022) Esquema que prendeu 'rei do ouro' envolve balsas de garimpo ilegal no Amazonas

39. Five military police officers were arrested in 2022 for direct involvement in piracy cases downstream from the Japurá River, in the city of Maraã. See *G1* (2022), PMs são detidos no interior do AM por suspeita de pirataria; defesa diz que não há provas. Another report indicates that Federal Police investigations revealed the involvement of an Army lieutenant colonel accused of leaking operational data to illegal mining groups in Japurá. See *Terra* (2023), PF diz que militar recebeu R$ 930 mil para vazar dados de operação a garimpo na Amazônia

40. Data for Colombia were collected through fieldwork, while those for Brazil were adjusted based on InfoAmazonia (2023), Dragas: ouro estimula crime e corrupção na fronteira Brasil-Colômbia, which reported a value of BRL 270 in August 2023. The figure was adjusted to May 2025 according to real exchange rate calculations (considering inflation in both the United States and Brazil, along with the nominal exchange rate), resulting in an estimated range of BRL 510–570.

41. For studies addressing law enforcement challenges, see AARIMO (2024), Addressing Illegal Gold Mining in the Amazon Region: From Recognition of the Problems and Challenges to Collective Action; and Igarapé Institute (2021), Lessons from fighting illegal gold mining in the Amazon Basin

42. Data sourced from the commodities base of the International Monetary Fund (IMF)

43. United Nations Office on Drugs and Crime - UNODC (2025). Global Analysis on Crimes that Affect the Environment – Part 2b: Minerals Crime: Illegal Gold Mining; Organization of American States - OAS (2022). Typologies and Red Flags Associated to Money Laundering from Illegal Mining in Latin America and the Caribbean

44. This reality is consistent with other river basins in tropical forest regions around the world. For example, Bazilier and Girard (2020), The gold digger and the machine. Evidence on the distributive effect of the artisanal and industrial gold rushes in Burkina Faso, find that the increase in international gold prices leads to higher household consumption among communities located near artisanal mines in the Black Volta Basin, Burkina Faso. According to Girard, Molina–Millán, and Vic (2024), Artisanal mining in Africa. Green for Gold?, the historic rise in gold prices accounts for 8% of deforestation in Africa and 28% in areas with gold deposits or suitable for artisanal mining. However, it has also raised local incomes and offered an alternative to communities affected by agricultural decline due to climate change and desertification.

45. Since the 1970s, the region has been linked to drug trafficking, including the "Cartel de Leticia," associated with the Medellín Cartel and the use of clandestine airstrips, now overgrown by forest within the Puré National Natural Park (PNN Rio Puré). See *El Tiempo* (2021), Evaristo Porras, el triste final de un capo. Likewise, Fernandinho Beira-Mar was captured in Barrancominas (Guainía) in 2001 for his involvement in drug-trafficking networks and logistical supply operations — including arms trafficking — to armed groups in the jungle. See Semana (2001), La confesión de Fernandinho. The Taraira River has also been the site of several incidents involving arms trafficking and theft throughout the region's history. See *El Tiempo* (2021), La incursión militar brasileña que hace 30 años dejó seis desaparecidos

46. Although cocaine remains a central element of the illicit trade in the Amazon, this section focuses on the marijuana route along the Caquetá–Japurá axis, due to its growing relevance in recent seizures and press reports. This does not imply overlooking the role of the Caquetá River in cocaine trafficking.

47. *A Crítica* (2017). Nova rota do tráfico de drogas é disputada por organizações criminosas

48. In this research, both in Brazil and Colombia, the press, regulatory agencies, and individuals interviewed during fieldwork mentioned creepy and skunk marijuana, known for their high THC levels.

49. *El Espectador* (2022). El pesebre de Marihuana que crece en el norte del Cauca. Institute for Development and Peace Studies (INDEPAZ) (2024). La economía de la marihuana en el enclave productivo del norte del cauca – punto de encuentro 81

50. Multiple reports on this route include: Armada de Colombia (2022), Estudio de caso de narcotráfico marino # 34-2022; *El Tiempo* (2024), Caquetá en época de paz total: refugio de disidentes y ruta de marihuana; *Revista Raya* (2023), ¡Es la marihuana, estúpido!: violencia y mercado en la paz total; and *El Espectador* (2023), El corredor de marihuana entre Brasil y Colombia que financia el conflicto

51. *El Tiempo* (2025). Las rutas de la marihuana en el sur de Colombia: lo que reveló la incautación de tres toneladas en menos de cinco días

52. Field research conducted by the The Foundation for Conservation and Sustainable Development (FCDS) team in the Caquetá–Japurá region in May 2025.

53. The riverine route along the Río Marie has also been highlighted in *El Tiempo* (2022), Así las disidencias mueven la marihuana creepy desde Cauca para narcos en Brasil, and in the Committee on Economic, Social and Cultural Rights (CDESC), United Nations Office on Drugs and Crime (UNODC), and United Nations Development Programme - UNDP (2023), Tráfico de drogas en la Amazonía. Resultados Preliminares

54. Amazonas State Department of Public Security (2023). Hórus/Fronteira Mais Segura: Dupla é presa com 32 quilos de droga no aeroporto de Japurá; *Portal do Amazonas* (2025). Operação Queda do Céu: PC-AM prende três militares da FAB e outros dois indivíduos por esquema de envio de drogas em voos da Força Aérea e lavagem de dinheiro

55. Colombia (2025). Policía Nacional de Colombia. Resultados operativos; and Brazil, information requests to the Amazonas State Department of Public Security (SSP-AM).

56. Along both the Caquetá River and the Japurá in Brazil, there have been various cases of Indigenous communities reacting differently to garimpo activity: some opposing it, while others reached agreements to extract or receive payments from gold mining on their territories. See Cassette, A. (1989), Reinvenção do garimpo no Brasil

57. The Foundation for Conservation and Sustainable Development (FCDS) and Igarapé Institute (2025). Amazonia en Disputa: Seguridad climática y conflictos socioambientales en la Amazonía Noroccidental

58. Brazilian Forum on Public Security - FBSP (2022). Cartografias das violências na região amazônica: relatório final

59. International Crisis Group (2024). Un problema de tres fronteras: detener la criminalidad en la Amazonía

60. *El País* (2025). La fragmentación de las disidencias de las FARC activa las alertas para la Amazonia colombiana (2022). "Un pueblo flotando": la minería ilegal crece en el río Puré y afecta a los pueblos aislados

61. Since 2024, the EMC faction led by Mordisco broke off dialogue with the government, while the EMBF faction led by Calarcá continues to negotiate under the "Total Peace" policy. The Frente Carolina Ramírez remains divided between both factions: one under Mordisco and another, the Frente Raúl Reyes, aligned with Calarcá. See Institute for Development and Peace Studies (INDEPAZ) (2025), Las dinámicas del conflicto en zonas con y sin cese al fuego: estudio comparativo de Arauca, Cauca, Caquetá y Meta; and El País (2025), Diálogos con las disidencias de las FARC: ofensiva militar contra el Estado Mayor Central y negociación con el Estado Mayor de los Bloques y Frente
62. Brazilian Forum on Public Security (FBSP) (2024). Cartografias da Violência na Amazônia 2024
63. *A Crítica* (2020). Chacina: piratas do rio matam sete ribeirinhos no rio Japurá
64. AlaOrilladelRío (2022). Las guerras del posacuerdo: ¿Quiénes son los Comandos de Frontera?
65. In the 1980s, mining in the Colombian Amazon began with the arrival of miners from Brazil and from traditional gold-mining hubs. See Constitutional Court of the Republic of Colombia, Judicial Branch (2025). Sentencia T-106/25
66. Truth Commission (2022). Corredores estratégicos del conflicto armado en los territorios étnicos
67. The Foundation for Conservation and Sustainable Development (FCDS) (2025). Análisis Territorial en Fronteras Amazónicas Recorrido Pedrera-Taraira-Pedrera (Amazonas y Vaupés). Equipo Paz y Ambiente.
68. MapBiomas bases its data on the annual land-use classification derived from Landsat and Sentinel imagery, allowing the identification of territorial pressure zones and trends with high precision. For a detailed visualization of Japurá, see MapBiomas – Brasil (2025). Município: Japurá
69. Data from the bulletins of the Management and Operational Center of the Amazon Protection System (Censipam) (2024). Boletim de Desmatamento e ilicitos ambientais - Nº4 Anual 2024. The bulletins combine data from the DETER-INPE deforestation alert system, Brasil MAIS (Ministry of Justice and Public Security), LOGAR (illegal mining site locator), and LOPIS (airstrip locator) systems. They are published bimonthly and constitute one of the main up-to-date sources on environmental crimes in the Amazônia Legal.
70. Management and Operational Center of the Amazon Protection System (Censipam) (2025). Boletim de Desmatamento e ilicitos ambientais - Nº 5 Jan/Fev 2025 and Boletim de Desmatamento e ilicitos ambientais - Nº 6 Mar/Abr 2025
71. Civil Circuit Court Specialized in Land Restitution of the Judicial District of Cundinamarca (2023). Interlocutory Order No. 214, Case File No. 2023-00063.
72. Equivalent to 1,000 official soccer fields.
73. InfoAmazonia (2023). Dragas: ouro estimula crime e corrupção na fronteira Brasil-Colômbia
74. Instituto Socioambiental (2022). Garimpo ilegal cresce há 3 anos dentro de estação ecológica da Amazônia na fronteira com a Colômbia
75. Instituto Socioambiental (2022). Garimpo ilegal cresce há 3 anos dentro de estação ecológica da Amazônia na fronteira com a Colômbia
76. The Monitoring Deforestation in the Brazilian Amazon by Satellite (PRODES) project employs a specific methodology to estimate deforestation in Amazon rainforest areas using high-resolution satellite imagery (Landsat).
77. Sousa-Domingues et al. (2024). Mercury Dynamics and Bioaccumulation Risk Assessment in Three Gold Mining-Impacted Amazon River Basins
78. Amazon Cooperation Treaty Organization (ACTO) (2024). Study will provide a regional overview of the mercury contamination situation in the Amazon Basin
79. National Natural Parks of Colombia (2018). Contenido de Mercurio en comunidades étnicas de la subregión planicie en la Amazonia Colombiana
80. The reference limit for methylmercury concentration in fish established by the World Health Organization (WHO) is 0.5 mg/kg for non-predatory fish and 1 mg/kg for predatory or piscivorous species. See World Health Organization (2017). Documento de debate sobre niveles máximos de metilmercurio en el pescado
81. National Natural Parks of Colombia (2018). Contenido de Mercurio en comunidades étnicas de la subregión planicie en la Amazonia Colombiana
82. The tucunaré (peacock bass) is a predatory and piscivorous fish; therefore, the reference values established by the WHO would be 1 mg/kg, equivalent to 1 ppm.
83. Amazon Cooperation Treaty Organization - ACTO (2024). Study will provide a regional overview of the mercury contamination situation in the Amazon Basin
84. Eight studies were identified and analyzed for the Colombian side of the border region, and only one for the Brazilian side. See Amazonian Institute of Scientific Research – SINCHI (2014), Un análisis descriptivo de la presencia de mercurio en agua, sedimento y peces de interés socio-económico en la amazonia colombiana; Olivero-Verbel, J. et al. (2016), Human exposure and risk assessment associated with mercury pollution in the Caqueta River, Colombian Amazon; Ministry of Health and Social Protection, National Institute of Health, and University of Córdoba (2016), valuación epidemiológica de los efectos en salud por exposición ocupacional y ambiental a mercurio en los departamentos de Chocó, Nariño y Vaupés, Colombia; National Natural Parks of Colombia (2018), Contenido de Mercurio en comunidades étnicas de la Subregión Planicie en la Amazonia Colombiana; Poveda Castillo, L. (2018), Contenido de mercurio total en sedimentos, agua, vegetacion y flora acuática en la cuenca media del Río Caquetá, Amazonas – Colombia; Alcala-Orozco, M. et al. (2019), Mercury exposure assessment in indigenous communities from Tarapaca village, Cotuhe and Putumayo Rivers, Colombian Amazon; Valdelamar-Villegas, J. and Olivero-Verbel, J. (2019), High Mercury Levels in the Indigenous Population of the Yaigojé Apaporis National Natural Park, Colombian Amazon; Amazonian Institute of Scientific Research – SINCHI (2019), La calidad de los ecosistemas acuáticos amazónicos y sus recursos; Basta, P. C. et al. (2023), Risk Assessment of Mercury-Contaminated Fish Consumption in the Brazilian Amazon: An Ecological Study

85. Olivero-Verbel, J. et al. (2016). Human exposure and risk assessment associated with mercury pollution in the Caqueta River, Colombian Amazon

86. The threshold established by the World Health Organization (WHO) is 5 µg/g.

87. Ministry of Health, Brazil (2021). Orientações para a notificação de intoxicações por mercúrio

88. Ministry of Health, Brazil (2021). Orientações para a notificação de intoxicações por mercúrio

89. Valdelamar-Villegas, J. and Olivero-Verbel, J. (2019). High Mercury Levels in the Indigenous Population of the Yaigojé Apaporis National Natural Park, Colombian Amazon

90. Interviews conducted by the Igarapé Institute team and field research by The Foundation for Conservation and Sustainable Development (FCDS) team in the Caquetá–Japurá region in May 2025.

91. Olivero-Verbel, J. et al. (2016). Human exposure and risk assessment associated with mercury pollution in the Caqueta River, Colombian Amazon

92. For example, the advance of mining toward the intangible zone of the Puré National Natural Park threatens the Yurí communities living in voluntary isolation, violating their decision to remain uncontacted and exposing them to disease and resource loss. The imminent risk of contact with Indigenous groups such as the Yurí–Passe has been repeatedly flagged by the Defensoría del Pueblo since 2021. See Defensoría del Pueblo de Colombia (Office of the Ombudsman of Colombia) (2021), Ficha de Alerta Temprana Inminencia 002-21; and Botero, R (2025). ¿Inminente contacto con pueblos indígenas aislados? The Foundation for Conservation and Sustainable Development (FCDS).

93. The Foundation for Conservation and Sustainable Development (FCDS) (2025). Análisis Territorial en Fronteras Amazónicas Recorrido Pedrera-Taraira-Pedrera (Amazonas y Vaupés). Equipo Paz y Ambiente.

94. Defensoría del Pueblo de Colombia (Office of the Ombudsman of Colombia) (2021). Alerta Temprana de Inminencia 022-21 para La Pedrera, en Amazonas; El Heraldo (2021). Defensoría alerta por reclutamiento de menores en Amazonas

95. Amazon Watch, *InfoAmazonia*, and *Amazon Underworld* (2023). Amazon Underworld: Economías criminales en la mayor selva tropical del mundo

96. *InfoAmazonia* (2023). Garimpeiros retiram equipamentos e escapam de megaoperação no Amazonas

97. *InfoAmazonia* (2023). Dragas: ouro estimula crime e corrupção na fronteira Brasil-Colômbia

98. Fundação de Vigilância em Saúde do Amazonas – Dra. Rosemary Costa Pinto (FVS–RCP) (2025). Panorama epidemiológico da violência sexual contra crianças e adolescentes no estado do Amazonas, entre 2020 e 2024

99. Defensoría del Pueblo (Office of the Ombudsman of Colombia)(2021). Alerta Temprana 002-21

100. Brazilian Forum on Public Security (FBSP) (2024). A nova corrida do ouro na Amazônia: garimpo ilegal e violência na floresta

101. Defensoría del Pueblo (Office of the Ombudsman of Colombia) (2021). Alerta Temprana de Inminencia 022-21 para La Pedrera, en Amazonas; Defensoría del Pueblo (Office of the Ombudsman of Colombia)(2023). Ficha de Alerta Temprana Inminencia 017-23

102. Instituto Socioambiental (ISA) (2008). Funai de Tabatinga pede ajuda para tirar índios das drogas e do álcool; Mapa de Conflitos (2009). AM – Intromissão do tráfico de cocaína na vida dos povos indígenas do Sudoeste Amazonense – inoperância dos governos federal e estadual facilita a atividade dos narcotraficantes e deixa os jovens indígenas em situação de enorme vulnerabilidade

103. Mapa de Conflitos (2009). AM – Intromissão do tráfico de cocaína na vida dos povos indígenas do Sudoeste Amazonense – inoperância dos governos federal e estadual facilita a atividade dos narcotraficantes e deixa os jovens indígenas em situação de enorme vulnerabilidade

104. Interviews conducted by the Igarapé Institute team in October 2025.

105. La Silla Vacía (2023), Suicidio Indígena: una herida abierta en la Amazonía Colombiana, and Barcelos, P. et al. (2022), O suicídio em indígenas da Amazônia Brasileira: revisão sistemática da literatura

106. National Administrative Department of Statistics (DANE) (2025). Sistema de información y consulta de estadísticas vitales

107. Department of Informatics of the Unified Health System (DATASUS) (2025). Mortalidade – desde 1996 pela CID-10: Óbitos por causas externas

108. Indigenist Missionary Council (CIMI) (2023). Relatório Violência contra os Povos Indígenas no Brasil. Dados 2023. The Comissão Pastoral da Terra - CPT also identified additional conflicts over land and water affecting Japurá, including in Aldeia Nova São Joaquim (T.I. Uneuxi), Aldeias Jutaí, Nova Canaã, and Jeremias (T.I. Paraná do Boá–Boá) between 2018 and 2019.

109. The Yaigojé Apaporis National Natural Park was created by Resolución 2079 del 27 de octubre de 2009, issued by the Ministry of Environment, Housing, and Territorial Development, shortly after the granting of mining titles IH3-16001X and IGH-15001X to the company Cosigo Frontier Mining Corporation, one of them approved just one day after the park's creation.

110. Indigenist Missionary Council (CIMI) (2021). Recuo do governo sobre garimpo no AM foi justo e recomendável

111. In 2024, Brazil's Amazônia Legal recorded a homicide rate of 24 per 100,000 inhabitants — higher than the national average (20.7) — maintaining a gap observed since 2019. The Foundation for Conservation and Sustainable Development (FCDS) and Igarapé Institute (2025). Amazonia en Disputa: Seguridad climática y conflictos socioambientales en la Amazonía Noroccidental

112. Data obtained under the Freedom of Information Act (Lei de Acesso à Informação, LAI) from the Public Security Secretariat of Amazonas (SSP-AM). Homicides are considered the key indicator in Brazil for Crimes Violentos Letais Intencionais (CVLI, or intentional lethal violent crimes), which include homicides, murders committed during robberies (latrocínios), and deaths resulting from bodily harm.

113. Brazilian Yearbook of Public Security, of the Brazilian Forum on Public Security (Fórum Brasileiro de Segurança Pública - FBSP); *Portal Norte* (2022). Japurá, no AM, está entre as 14 cidades mais violentas do país, diz Anuário de segurança pública

114. G1 (2021). Três homens são mortos a tiros em garimpo ilegal no Rio Japurá, no interior do AM

115. G1 (2022). Homem é morto e carbonizado durante tumulto em Japurá, no interior do AM

116. A Crítica (2022). Corpos esquartejados são encontrados em covas no município de Japurá; dois suspeitos foram presos

117. Portal do Holanda (2024). 'Pirata' morre durante ataque de fuzil contra policiais em Japurá

118. Onda Digital (2025). Corpo de comerciante é encontrado em rio, no interior do Amazonas

119. A Crítica (2017). Chacina: piratas do rio matam sete ribeirinhos no rio Japurá. BCAMAZONAS (2020). Piratas atacam barcos e matam em Maraã, no rio Japurá

120. Defensoría del Pueblo (Office of the Ombudsman of Colombia) (2025). Alertas Tempranas, La Pedrera, Tarapacá y Puerto Santander (Araracuara) y Taraira. In particular, the early warnings (002-21, 022-21, 017-23, 007-24, 001-25) were issued specifically for these territories. These forms of violence fall within a broader pattern of victimization carried out by armed groups across the Caquetá–Japurá basin. In 2023, the same front executed four Indigenous teenagers in Los Estrechos (Solano, Caquetá), upstream along the Caquetá River, as they attempted to flee forced recruitment. See Radio Nacional de Colombia (2023). Denuncian reclutamiento y asesinato de jóvenes indígenas en Caquetá

121. Data from the National Police of Colombia (2025). Estadística Delictiva

122. Defensoría del Pueblo (Office of the Ombudsman of Colombia)(2021). Alerta Temprana de Inminencia 022-21 para La Pedrera, en Amazonas; Defensoría del Pueblo (2023). Ficha de Alerta Temprana Inminencia 017-23; Defensoría del Pueblo (2025). Alerta Temprana 001-25

123. Casanare Noticias (2022). A la cárcel hombre que habría asesinado a machete a su hermano. The Defensoría del Pueblo referred to the killing of a drug user by the Frente Primero. See Defensoría del Pueblo (2023). Alerta Temprana de Inminencia Nº 017-23

124. Murder of Indigenous leader Custodio Yucuna Tanimuca in 2023, attributed to dissidents of the EMC-FARC in La Pedrera.

125. Agencia Prensa Rural (2018). Intento de homicidio, tortura y amenazas contra lideresa indígena del Amazonas

126. Detailed homicide data were obtained by the Igarapé Institute through annual information requests submitted to the National Police of Colombia since 2012. Departmental districts (corregimientos departamentales) are not explicitly listed in official records, revealing a structural gap in territorial reporting. However, a detailed review of rural records associated with Leticia (the departmental capital) made it possible to identify cases that occurred in these territories.

127. A través de solicitudes de acceso a información, el Instituto Igarapé tuvo acceso a los TACs firmados entre el Ministerio Público Federal (MPF) y algunas empresas, como Mercado Libre, OLX y B2Brazil. Estos acuerdos buscan ajustar las prácticas comerciales sin necesidad de acciones legales, mediante compromisos de monitoreo, transparencia y bloqueo de anuncios ilegales. Para más información, ver Ministerio Público Federal - MPF (2025). COP30: MPF mira plataformas digitais para frear garimpo ilegal de ouro na Amazônia. Ver también MPF (2025). MPF firma acordo inédito com Starlink para coibir uso de internet por garimpeiros ilegais na Amazônia

128. The Portal da Transparência do Ouro, developed by WWF-Brazil with support from NAP.Mineração (the Mining Research Support Center at the University of São Paulo) and the Igarapé Institute, compiles and cross-references relevant public data to assess the level of compliance of gold mining activities with the parameters established under Brazilian law.

129. Fairmined is an international certification that ensures gold is responsibly sourced and traceable, extracted under good mining practices that protect the environment and promote the social and economic development of artisanal and small-scale mining communities. For more information, see: What is Fairmined? In 2024, a miners' association in Madre de Dios, Peru (AMATAF) became the first legal mining association in the Amazon to obtain Fairmined certification. See also: Historic Milestone for Miners in the Amazon: First Fairmined Gold Sale in Peru

130. For more information, see: Ministry of Mines and Energy of Brazil (2025). MME articula parceria com a ONU para projeto de mineração de ouro em pequena escala; Ministry of Mines and Energy of Colombia (2024). PAN: Un plan para combatir el uso de mercurio en la minería artesanal y de pequeña escala

131. Igarapé Institute (2025). Transforming the economy in the Amazon: Lessons from Community-Led Initiatives

132. See Oficina de Negocios Verdes y Sostenibles, Ministry of Environment and Sustainable Development (in cooperation with Corpoamazonia), Negocios Amazónicos, SINCHI Institute. SEDECTI (2025). Plano de Bioeconomía do Amazonas and Ministry of Environment and Climate Change (2023). Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal (PPCDAm) – 5.1, Eixo I – Atividades produtivas sustentáveis

133. In coordination with structures such as Centros de Atenção Psicossocial (CAPs) in Brazil. In Colombia, coordination should involve municipal Health and Education Departments, together with the Territorial Health Directorates, in collaboration with the Ministries of Health and Justice, and with the Colombian Institute of Family Welfare (ICBF) for underage populations. For reference, see: Ministry of Health (2025). Directorio de Direcciones Territoriales. Colombian Institute of Family Welfare (ICBF) Herramientas para la Formulación y la Gestión de Planes de Desarrollo Territoriales para la Niñez. (AMAZONAS)

134. Socio-Environmental Institute (Instituto Socioambiental, 2024). São Gabriel da Cachoeira (AM) lança plano de prevenção ao suicídio

135. For more information, see: Ministry of Health – Brazil (2025). Consultório na Rua

136. Vice Presidency of Colombia (2024). MinIgualdad presenta los resultados del Sistema Nacional del Cuidado con el inicio de la ruta fluvial del cuidado en el Amazonas

137. Due to the low internet connectivity in the region, electronic reporting systems should be able to operate offline and automatically synchronize once connectivity is restored.

138. In Brazil, an example of coordination and dialogue between local leaders and public health systems is the Departmental Councils on Social Policy. These councils are deliberative bodies designed to address actions related to the health of Indigenous populations. The municipality of Japurá is part of the District Council on Indigenous Health (CONDISI) of the Upper Rio Negro.

139. For more information, see: World Wide Fund for Nature (WWF, 2024). Dinâmica do mercúrio e avaliação dos seus riscos: o impacto da contaminação nos rios da Amazônia brasileira; Oswaldo Cruz Foundation, Ministry of Health, and Ministry of Indigenous Peoples – Brazil (2025). Manual técnico para o atendimento de indígenas expostos ao mercúrio no Brasil

140. Ministry of Foreign Affairs – Brazil. Bilateral relations with the Republic of Colombia

141. Embassy of Colombia in Brazil. Instrumentos y acuerdos vigentes entre Colombia y Brasil

142. Ministry of Justice and Public Security – Brazil (2011). Acordo de Cooperação Policial entre a Polícia Federal do Brasil e a Polícia Nacional da Colômbia

143. Presidential Agency for International Cooperation of Colombia, APC (2021). Colombia y Brasil firman siete acuerdos de cooperación en la Visita Oficial del Presidente Duque and on the Binational Border Commission (Combifron); Ministry of Foreign Affairs (2015). Relaciones Bilaterales - República de Colombia

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The Igarapé Institute is an independent think-and-do tank that conducts research, develops solutions, and establishes partnerships to influence public and corporate policies and practices, addressing key challenges related to nature, climate, and security in Brazil and worldwide. Igarapé is a nonprofit, nonpartisan organization based in Rio de Janeiro, operating at both local and global levels.

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The Foundation for Conservation and Sustainable Development (FCDS) is a non-governmental organization whose mission is to promote peacebuilding through environmental land-use planning. Its work is primarily focused in the northwestern Amazon, with emphasis on the departments of Guaviare, Caquetá, and the border areas, where it develops projects in collaboration with international agencies and community organizations. Its efforts are structured around three main areas of work: advocacy and institutional strengthening, territorial analysis, and territorial transformations. Currently, through its offices in Colombia and Peru, FCDS is consolidating a regional and integrative vision aimed at conserving nature and strengthening human development throughout the Amazon basin.

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