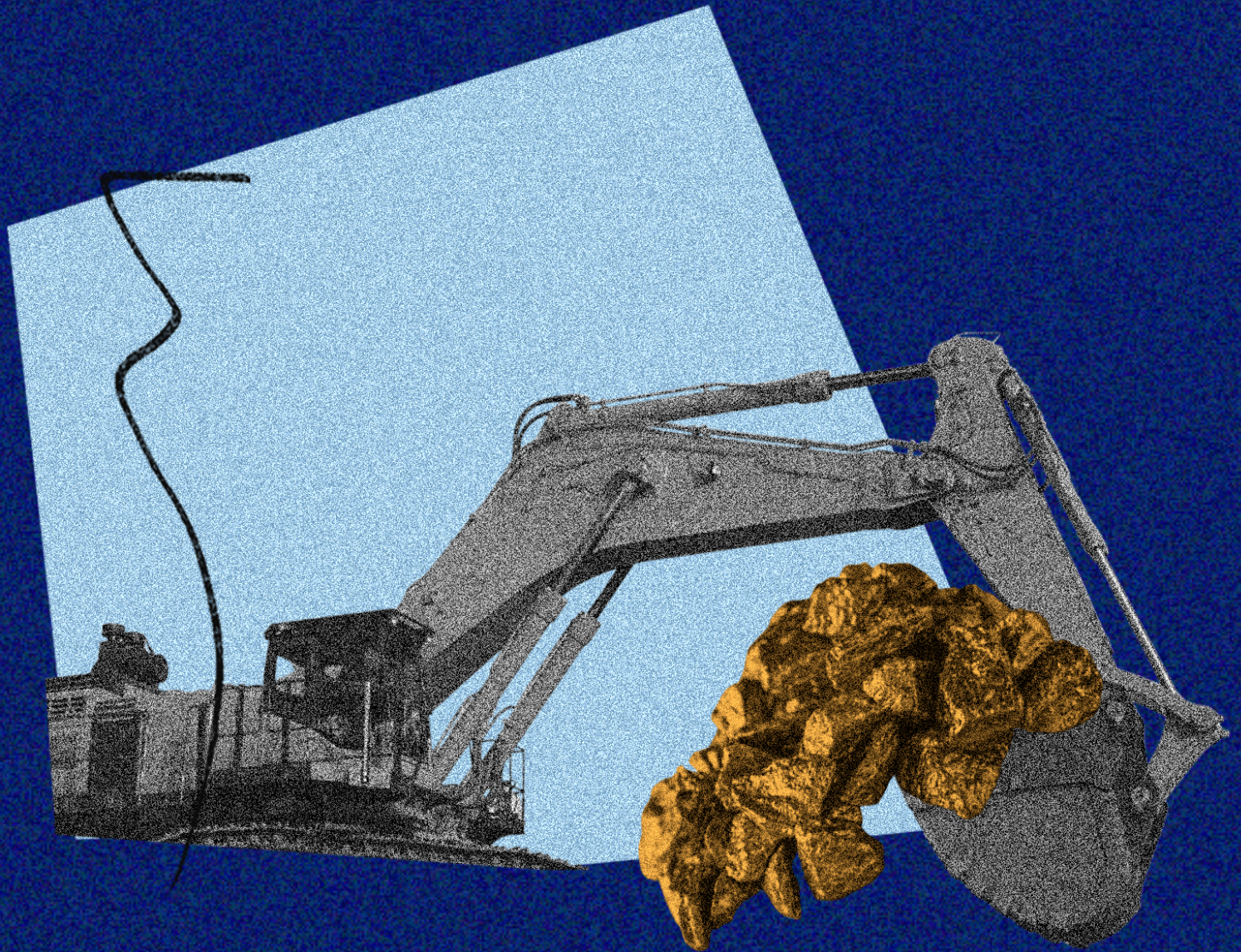




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MARKETS AND FOREST:

Regulatory
Opportunities
in the Amazon

Report 1:

MINING

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Introduction

Regulating sectors that impact forests is essential to prevent, reduce, and combat environmental crimes in the Amazon. Illegality does not lie in natural resources themselves, but in how they are extracted, processed, transported, and traded. When markets for gold, timber, cattle, and land operate without effective regulation, illicit practices make their way into legitimate supply chains and often face little consequence. Strengthening the regulatory framework is a concrete way to address criminal activities driving forest loss.

This report draws on the study *Markets and Forest* (Igarapé Institute, 2025), which analyzed how eight countries in the Amazon Basin—**Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela**—regulate these markets. Countries in the basin are not starting from scratch. In each, there are rules, registries, and practices that, with adjustments, resources, or better coordination, can strengthen regulation. Many of these tools are little known beyond their national contexts; others are recent and not yet documented. This report compiles these initiatives and presents them as regulatory opportunities, drawing on concrete experiences across the region.

This analysis does not assess the effectiveness of these tools or how they operate in practice, which would require dedicated field studies in each country. Its value lies in bringing together what exists but remains scattered, showing how different countries address similar challenges, and in offering options that can be adapted, combined, or strengthened to fit each context. Rather than judging what works, it invites exploration of what is available.

The report is organized into three parts: an overview of the gold sector in the Amazon, a set of regulatory opportunities illustrated by experiences from countries in the basin, and a final section synthesizing the patterns that emerge from this comparative review.

Context of Gold Mining in the Amazon Region

Gold mining is one of the economic activities with the greatest impact in the Amazon Basin. The sector is broad, ranging from large-scale industrial operations to artisanal and subsistence mining, often carried out under irregular conditions. These different scales coexist with informal, irregular, and criminal practices, making the gold supply chain one of the most difficult to regulate and oversee in the region.

The upward trend in international gold prices, which have reached historic highs in recent years, has intensified this pressure. The higher the price, the greater the incentive for new actors to enter the market, often bypassing existing regulations and local oversight. In practice, illegal or irregular extraction supplements legal supply, taking advantage of the sector's high profitability in export markets.

The level of informality in gold mining in the Amazon is far higher than the global average, which ranges between 40% and 50%. In the Amazon region, it varies between 75% and 85% (*Markets and Forest*, Igarapé Institute, 2025).

Gold mining is associated with deforestation, mercury contamination, and social impacts in territories where state presence is limited and tensions run high. Various regional estimates, including those compiled in *Markets and Forest* (2025), indicate that this activity accounts for between 10% and 15% of total forest loss in the Amazon. There are recorded cases of gold mining in protected areas and Indigenous territories across all countries in the basin.

Although Amazonian countries have developed regulatory frameworks to govern the sector, significant implementation gaps remain. Challenges in coordinating actions across institutions, ensuring production traceability, and maintaining continuous oversight in remote areas remain considerable. Illegal mining adapts quickly, operates through flexible networks, and exploits regulatory gaps, overlapping jurisdictions, and logistical constraints.

Opportunities to Strengthen Regulatory Framework

Countries in the region have developed instruments aimed at organizing the sector, controlling the enablers of illegal activity, and strengthening institutional presence on the ground. This section presents these regulatory opportunities, illustrated with experiences from **Brazil, Colombia, Ecuador, Peru, and Guyana**.

1. Structuring the Sector: Regulatory Clarity as a Starting Point

A first step in strengthening mining governance in the Amazon is to establish clear legal definitions of which activities are permitted, which are subject to sanctions, and which responsibilities fall to each institution. When these categories are not well defined, oversight becomes uneven, interpretive gaps widen, and loopholes emerge where irregular practices can thrive.

Regulatory clarity alone does not resolve informality or illegal mining, but it establishes a basic framework that allows for more consistent action.

In Brazil, the regulatory framework distinguishes between different mining regimes and establishes formal criteria to identify and sanction operations that do not comply with granted authorizations (Law No. 9,605/1998, Art. 55). In practice, oversight faces significant challenges, particularly because artisanal mining often operates at scales beyond those provided in the applicable legislation (Mining Code of 1967 and Decree 9,406/2018). Even so, this differentiation provides a legal basis to guide the actions of environmental and mining authorities.

Guyana formally recognizes artisanal mining through the Mining Act of 1989, which establishes the registration and licensing of these operations. While it does not eliminate informality, this category makes it possible to distinguish between different scales of activity and to generate basic information about operators and affected areas.

In other countries in the basin, even where legal categories for artisanal and small-scale mining exist, the lack of clearly differentiated regulations and procedures between traditional, informal, and mining linked to illicit activities creates broad gray areas. This lack of clarity complicates oversight and allows a significant share of irregular activity to rely on formal classifications or gaps in control.

Making clear distinctions—what activities are legal, which are illicit, who is allowed to operate, and under what conditions—reduces room for interpretation, improves institutional coherence, and strengthens the State’s capacity to apply existing sanctions. Regional experience shows that the legal precision of mining categories and sanctionable conduct emerges as a relevant starting point for reducing interpretive conflicts in a sector marked by informality and overlapping regulations.

2. Reducing Operational Capacity: Control of Inputs, Equipment, and Logistics

Illegal mining in the Amazon depends on critical inputs, specialized machinery, and logistical networks that allow it to push into new extraction areas far from State presence. Controlling these enablers is a necessary measure that complements direct intervention at extraction sites, especially in remote areas where activities shift rapidly.

In Colombia, Law 1658 of 2013 banned the use of mercury in mining, and Decree 419 of 2021 extended this measure by also prohibiting its manufacture, import, and export, complemented by administrative and criminal provisions that allow authorities to seize machinery, materials, and minerals.

In Brazil, the use of dredges and barges in Amazonian rivers is subject to specific restrictions and requirements, especially when it occurs in Indigenous territories and protected areas. In cases of illegal operations, the Brazilian Institute of Environment and Renewable Natural Resources (Ibama) and the competent environmental authorities may seize unlawfully used equipment and, when properly justified and documented—and when removal proves unfeasible—proceed with its on-site disabling or destruction (Decree No. 6,514/2008 and ANM Resolution No. 209/2025).

At the subregional level, the Andean Community has moved in the same direction with Decision 774 (2012), which adopts an Andean Policy to Combat Illegal Mining and provides that national authorities may implement measures such as the seizure, destruction, immobilization, or disabling of machinery, equipment, and inputs used in these activities. The decision also seeks to strengthen oversight of the import, export, transport, and commercialization of minerals, machinery, equipment, and inputs from a

cross-border perspective. Controlling inputs, machinery, and logistics aims to create bottlenecks that could make illegal operations more difficult, especially in territories where State presence is limited and extraction fronts shift rapidly.

3. Intervening in the Financial Dimension: Sanctions on Illegal Financiers

Illegal mining depends on capital, cash flow, traders, and financiers who enable the acquisition of equipment, the purchase of fuel, the mobilization of labor, and the commercialization of gold in both formal and informal markets. Intervening in this financial dimension, even without reaching extraction sites, aims to curtail reinvestment capacity and limit the continuity of illegal operations.

In Peru, the competent authorities may apply, in a coordinated manner, tax, environmental, labor, and financial instruments—ranging from fines and embargoes to asset freezes and credit restrictions—against companies or individuals with repeated violations or classified as high risk.

The Peruvian Criminal Code also classifies the financing of illegal mining as a crime, which has enabled the Public Prosecutor's Office to bring charges against individuals involved in supplying inputs and machinery used in this activity.

In Ecuador, the Comprehensive Organic Criminal Code establishes prison sentences of three to five years for those who finance, facilitate, or supply inputs and equipment for illegal mining, thereby incorporating criminal control over financing and supply as complementary tools to territorial oversight.

In Colombia and Peru, asset forfeiture allows authorities to target the financial structure that sustains illegal mining. Authorities may impose embargoes, seize, and intervene in assets, vehicles, machinery, real estate, or financial assets linked to illicit extraction activities or financing networks, even when extraction sites cannot be immediately reached.

Sanctioning those who finance illegal operations and applying asset forfeiture can affect the ability of these organizations to reactivate and constrain their operating margins. However, financial restrictions may also affect small-scale miners seeking to formalize, who, lacking access to formal credit, end up relying on informal circuits. Facilitating such access is a necessary part of a balanced approach.

4. Establishing Formalization Requirements for Artisanal and Subsistence Mining

Artisanal mining is a widespread reality across much of the Amazon and does not disappear through prohibition alone. Establishing specific rules for small-scale mining, clearly defining which activities are authorized, under what conditions, and within which limits, can open pathways for the gradual formalization of miners who have traditionally remained outside the regulatory framework.

In Brazil, the registration and licensing of small-scale mining, including artisanal mining and Artisanal Mining Permits (Permissões de Lavra Garimpeira,¹ PLG), are coordinated through the National Mining Agency (ANM), which requires registration, prior authorization, and compliance with basic environmental management obligations. In some Amazonian areas, cooperatives have implemented

¹ According to the Garimpeiro Statute, a garimpeiro is defined as “any individual of Brazilian nationality who, either individually or as part of a group, is directly involved in the process of extracting minerals that may be mined through garimpeiro activities.” (Art. 2, Law No. 11.685/08).

formalization programs aimed at integrating artisanal operators into a system that includes permits, technical assistance, and access to credit. This model serves as a starting point for generating information on who is operating, where, and under what conditions, reducing the institutional invisibility of an activity that would otherwise remain beyond the reach of the State.

However, a significant share of mining activity in the Brazilian Amazon has moved beyond small-scale operations, relying on industrial equipment such as dredges and barges that exceed the scope of artisanal mining. This gap between a regulatory framework designed for smaller operations and the reality of increasingly mechanized mining limits the reach of existing formalization mechanisms and calls for control points capable of verifying compliance with regulations and adherence to granted authorizations.

In other countries in the region, formalization registries for artisanal and subsistence mining have shown significant vulnerabilities: registrations using false identities, declared production volumes incompatible with subsistence activity, and channels that end up conferring an appearance of legality on gold of illicit origin. These experiences show that a registry without verification capacity and cross-checking of information can become a laundering mechanism rather than a formalization tool.

Certification schemes offer a complementary pathway to verify compliance with formal requirements along the value chain while facilitating access for small-scale miners to differentiated markets. The Alliance for Responsible Mining (Alianza por la Minería Responsable), through the Fairmined standard, establishes verifiable criteria for responsibly produced gold, creating incentives for artisanal and small-scale operations that meet environmental, labor, and traceability requirements to compete under better conditions.

Progressive formalization through registration, basic licensing, and minimum operating requirements emerges across the region as a recurring mechanism to identify actors, tie information to specific locations, and strengthen traceability. However, as regional experience shows, its reach is conditioned by institutional capacity to verify information, cross-check data across systems, and distinguish genuine artisanal miners from those who use registration as a cover for illegal operations.

5. Oversight in Remote Areas: Monitoring, Technology, and Institutional Presence

In the Amazon, the capacity for oversight against illegal mining activities is limited by distance, difficult access, and the sporadic presence of the state. Centralized enforcement is insufficient to respond to a phenomenon that moves rapidly from site to site and operates in areas where authority is only sporadically present. Strengthening enforcement requires combining technological tools that expand detection capacity with an institutional presence capable of acting on what is detected.

Brazil has developed an enforcement model that integrates satellite monitoring, drones, and environmental surveillance systems. IBAMA, in coordination with technical institutions such as the National Institute for Space Research (INPE), uses high-resolution imagery and early alerts to detect irregular activities and guide targeted interventions, reducing the need for constant on-the-ground patrols. In specific operations, these efforts may rely on logistical and security support from the police and the Armed Forces, without implying a permanent technical role in environmental enforcement.

Detection capacity does not replace intervention. Satellite monitoring identifies where activity is taking place, but without sufficient resources to act in the field—inspectors, logistics, and sustained presence—detection alone does not deter.

In other countries in the region, such as Colombia and Peru, environmental enforcement of small-scale and artisanal mining has been transferred to subnational authorities as part of decentralization processes. These entities formally hold sanctioning powers—suspending activities, imposing fines, ordering seizures—but in practice face severe constraints in budget, personnel, and equipment. Administrative autonomy, while bringing enforcement closer to the territory, can also expose it to local dynamics that compromise its independence, weakening rather than strengthening its control function.

Expanding enforcement capacity through technological tools and bringing authority closer to the territory are identified, in regional experience, as factors associated with a stronger response to illegal mining in remote areas. However, regional experiences suggest that territorial proximity, without mutual oversight mechanisms, accountability, and technical backing from the central level, can reproduce at the local level the same weaknesses it seeks to address.

6. Coordinating Sectors that Typically Work in Isolation

Illegal mining thrives where institutions do not act in a coordinated manner—where environmental, fiscal, judicial, policing, and territorial responses operate in isolation, allowing illegal actors to exploit institutional gaps, overlaps, or contradictions. Several countries have sought more consistent responses through formal multisectoral coordination bodies capable of aligning mandates, sharing information, and sustaining interventions over time.

In Peru, the Permanent Multisectoral Commission against Illegal Mining, together with the High Commissioner appointed by the Presidency of the Council of Ministers, brings together environmental, policing, judicial, and tax authorities, as well as regional governments. This structure seeks to integrate environmental competencies, fiscal capacities, security responses, and regional actions, reducing the institutional fragmentation that has historically hindered oversight in critical areas.

In some provinces, this coordination has translated into multisectoral checkpoints, where tax authorities, explosives control agencies, transport authorities, and security forces jointly verify what enters and leaves mining areas—ore, fuels, chemical inputs, and machinery—in an effort to disrupt the logistical routes that sustain illegal activity.

In Ecuador, bodies such as the National Committee for Integrity in the Mining Sector (CONIN) and the Special Commission for the Control of Illegal Mining (CECMI) work in coordination with the Ministry of Energy and Mines, the Ministry of Environment, Water and Ecological Transition, the Agency for Mining Regulation and Control (ARCOM), the National Police, and the Armed Forces. Their mandate includes sector risk assessment, coordination of actions against illegal mining, and alignment among entities responsible for mining registries, environmental authorizations, and oversight actions. In provinces such as Napo, processes to audit and purge registries have been initiated, in a context where significant challenges to control and formalization persist. Other countries in the region have also established interinstitutional commissions or committees with similar functions, although with varying trajectories and levels of activity.

Regional regulatory experiences show that multisectoral coordination is not a complement but a requirement for addressing illegal mining. However, the existence of formal coordination bodies does not automatically translate into sustained action. Their effectiveness depends on political continuity, resource allocation, and the ability to translate institutional coordination into consistent operational action on the ground.

7. Controlling Outflows: Traceability, Due Diligence, and Public Integrity

Mining governance in the Amazon does not depend solely on territorial controls; it also requires mechanisms to verify what happens to minerals after extraction. It is in the stages of commercialization, transport, processing, and export that illegal production enters formal supply chains through false declarations of origin, unverified permits, or opaque financial transactions. Strengthening controls at these points requires action on two complementary fronts: due diligence standards targeting supply chain actors and regulatory frameworks that reinforce the accountability of public officials who validate these processes.

Brazil, Colombia, and Peru have adhered to the recommendation of the Organisation for Economic Co-operation and Development (OECD) on due diligence for responsible mineral supply chains from conflict-affected and high-risk areas. Although none of these countries has incorporated it as a generally binding legal standard, the guidance serves as a reference in technical cooperation, capacity-building, and engagement with the private sector. Exporting companies and international buyers use it as a benchmark to improve gold traceability and manage risks associated with illegal mining.

At the domestic regulatory level, several countries in the region have introduced provisions aimed at sanctioning irregularities in mineral commercialization chains and holding public officials accountable for enabling them. In Colombia, the Penal Code criminalizes the allocation of public resources to induce false declarations regarding the origin or provenance of precious metals, as well as the declaration of production in favor of municipalities other than the producing one—a practice known as *trasteo de regalías*, used to lend an air of legality to gold of illicit origin.

In Ecuador, the Mining Law establishes, in Article 119, that public officials responsible for mining administration and oversight may incur administrative, civil, or criminal liability for failure to fulfill their duties.

Mechanisms such as due diligence standards, public official accountability, and sanctions in commercialization stages complement operational controls in the field and target the stages where illegal extraction is converted into “legal” production on paper through permits, declarations of origin, financial transactions, and exports. Their reach depends on institutional enforcement capacity. Where verification of mineral origin is weak, or certificates are issued without effective controls, regulations exist but fail to close the gaps through which illegal production enters formal circuits.

Lessons for the Region

A review of national experiences reveals consistent patterns that can guide action across different Amazonian contexts:

- **Clear regulatory frameworks can limit the room for maneuver of irregular activity.** Countries that clearly distinguish between legal and illegal mining and align their sectoral and criminal legislation, seek to reduce the spaces in which irregular activity operates without consequences. Where regulatory contradictions persist, illegality tends to take root in these ambiguities, hindering consistent state action and limiting response capacity.
- **Controlling inputs and equipment enables rapid responses to mobile operations.** Restrictions on mercury, oversight of fuels, explosives, and chemical inputs, and the possibility of destroying machinery in situ aim to affect operational capacity without relying on a continuous state presence in remote areas. These responses gain greater reach when combined with financial controls and territorial oversight.
- **Illegal mining is sustained not only through territorial control but also by financing networks that provide working capital, inputs, and trade channels.** Sanctioning those who finance illegal mining and applying instruments such as asset forfeiture makes it possible to target the economic structure that sustains operations, even without directly reaching extraction sites. A balanced approach also includes access to formal credit for small-scale miners seeking to formalize, as an alternative to informal financing circuits.
- **Territorial oversight can be strengthened by combining technological tools—satellite monitoring, drones, and administrative records—with an institutional presence capable of acting on what is detected.** Without this technical layer, operations tend to be reactive and costly. Regional experience points to the translation of detection capacity into effective intervention as a central condition of these models.
- **Progressive formalization processes make it possible to identify who is operating, where, and under what conditions, reducing the institutional invisibility characteristic of artisanal mining.** These mechanisms create points of contact with the state and seek to strengthen traceability. Regional experience highlights verification capacity and cross-checking of information across systems as key conditions for these processes.
- **Decentralizing oversight brings authority closer to the territory. In several countries, environmental oversight of mining has been transferred to subnational authorities that formally hold sanctioning powers.** Territorial proximity can enable more timely responses. Regional experience points to cross-supervision mechanisms and technical support from the central level as conditions associated with the functioning of these models.

- **Multisectoral coordination seeks to reduce the gaps that illegal mining exploits when institutions act in isolation.** Experience shows that bringing actors together is not enough. A clear mandate, shared information flows, and compatible procedures are required. Political continuity, resource allocation, and operational capacity in the field are conditions associated with these processes.
- **The commercialization, transport, and export chain offers control points where it is possible to identify and hinder the entry of illegal production into formal circuits.** Illegal mining enters these circuits—or is “legalized” on paper—through false declarations of origin, unverified permits, or opaque transactions. Integrating due diligence standards, reinforcing the accountability of public officials who validate these processes, and controlling commercialization are responses that target these stages and complement operational controls in the field.

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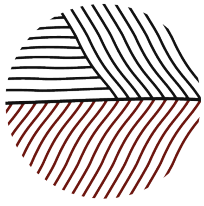
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The Igarapé Institute is an independent think-and-do tank that conducts research, develops solutions, and establishes partnerships to influence public and corporate policies and practices, addressing key challenges related to nature, climate, and security 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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