Mercury and Gold Mining in the Amazon

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Abstract

This Article addresses one of environmental law's most daunting challenges: mercury-based gold mining. Across the tropics, such activity threatens human health, ecosystems, and community wellbeing; the problem is nowhere more serious than in the Amazon Basin. Through an examination of five Amazonian countries, we showcase both the potential and limits of environmental law in the world's most biodiverse region.

Recognizing the problem of mercury contamination from gold mining and other sources, the global community in 2013 adopted the Minamata Convention. Along with more than 150 others, the five countries studied herein are Parties. Although the treaty does not prescribe a strict set of laws or policies, it requires meaningful steps to reduce mercury emissions from artisanal and small-scale gold mining.

By documenting approaches in five hot-spot jurisdictions, this Article informs governmental decision-making vis-à-vis mercury-based gold mining. Through our analysis, we present the key elements of effective law and policy, including controls on mercury imports and sales; gold-sector formalization; enforcement, penalties, and restoration; respect for the rights of Indigenous peoples and local communities; and cross-border cooperation.

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Introduction

In the Amazon Basin, gold mining using mercury threatens the environment, public health, traditional livelihoods, cultural integrity, security, and, in many instances, basic human dignity.[1] Gold mining in the Amazon has grown thanks to international demand and rising prices; over the past decade, the price per ounce of gold has soared from approximately $1,000 in 2015 to well over $4,000 in 2026.[2]

While narrow evaluations focused on economic returns might applaud this growth, a holistic evaluation paints a picture of unsustainable development, where alluvial gold mining in the Amazon, particularly when mercury is used, clashes with ecological and human wellbeing.[3] For both present and future generations living in the Amazon Basin, gold mining with mercury hinders peoples' ability to meet their needs and aspirations, as entire river systems and surrounding forested areas become unrecognizable and persistently toxic.[4]

Although some miners and financiers receive significant economic benefit from gold mining with mercury, most people living and working near mining sites suffer a net loss. The full account shows a lopsided ledger: miners exposed to mercury emissions; invasions of Indigenous territories and protected areas; scarce to non-existent tax collections by virtue of the illegal or informal methods used; and increasing cooperation with drug-trafficking organizations, including through money-laundering and shared corruption and trafficking networks.[5] Does this sound like healthy development?

We think not, and the global consensus—reflected in a raft of civil-society publications, but also national legislation, soft-law instruments, and, most pointedly, the Minamata Convention on Mercury[6]—supports that view. As described in more detail below, the overarching objective of the Minamata Convention is "to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds."[7] Recognizing that artisanal and small-scale gold mining (ASGM) is the largest single source of mercury emissions,[8] the Convention contains an Article devoted exclusively to this sector's reform.[9] Specifically, each Party is required to "take measures to reduce and, where feasible, eliminate the use of mercury and

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[1] *See generally* Jeff Tollefson, *Illegal Mining in the Amazon Hits Record High amid Indigenous Protests*, 598 NATURE 15 (2021), https://www.nature.com/articles/d41586-021-02644-x.
[2] Gold Price, *10 Year Gold Price History in US Dollars per Ounce*, https://goldprice.org/gold-price-charts/10-year-gold-price-history-in-us-dollars-per-ounce (last visited July 5, 2026); Gold Price, *Gold Price per Ounce*, https://goldprice.org/gold-price.html (showing $4,175 USD as of July 5, 2026) (last visited July 5, 2026).
[3] *See* World Comm'n on Env't & Dev., Our Common Future, P 49, U.N. Doc. A/42/427 (1987) (defining "sustainable development" as development that meets "the needs and aspirations of the present without compromising the ability to meet those of the future").
[4] *See generally* Tollefson, *supra* n. 1.
[5] *See* Irene Vélez-Torres & Diana Vanegas, *Contentious Environmental Governance in Polluted Gold Mining Geographies: The Case of La Toma, Colombia*, 157 WORLD DEVELOPMENT 105953 (2022), https://linkinghub.elsevier.com/retrieve/pii/S0305750X22001437.
[6] Minamata Convention on Mercury, UNEP (Jan. 19, 2013) [hereinafter Minamata Convention], https://minamataconvention.org/sites/default/files/documents/information_document/Minamata-Convention-booklet-Oct2024-EN.pdf.
[7] Minamata Convention, art. 1.
[8] UNEP, Chemicals and Health Branch, *UN Environment Global Mercury Assessment* 12, 14 (2018).
[9] Minamata Convention, art. 7.

mercury compounds from [ASGM] and the emissions and releases of mercury into the environment resulting from [ASGM]."[10]

To explore how countries particularly affected by mercury-based ASGM have pursued the obligation to "reduce and, where feasible, eliminate" the use of mercury in ASGM, we researched laws and policies in five Amazon Basin countries: Bolivia, Brazil, Colombia, Ecuador, and Peru. All five countries are Parties to the Minamata Convention,[11] and all have developed laws and policies focused on mercury and other issues associated with illegal and informal gold mining.[12]

Although mercury in ASGM is a global issue, the stakes get no higher than in the Amazon Basin, where mercury emissions from ASGM account for about 70% of all such emissions in South America.[13] Globally, of the ten countries with the highest mercury emissions from ASGM, six comprise part of the Amazon Basin (Peru, Colombia, Bolivia, Brazil, Venezuela, and Ecuador).[14] Of those six, this Article covers five.

A brief tour of the ASGM hotspots in these countries reveals environmental and social collapse. In most cases, illegal or informal miners establish their operations in or alongside rivers, destroying riparian ecosystems with heavy machinery and suction dredging.[15] They then use toxic metallic mercury in a crude amalgamation process to separate gold from sediment.[16] The end result is riverine sites altered beyond recognition; mercury contamination in local food webs, with dangerous levels bioaccumulating in higher-trophic fish consumed by humans; poisoned miners directly exposed to evaporated mercury during amalgamation; Indigenous territories and protected areas under assault from the promise of "easy money"; and the full litany of ills that accompany organized crime, from violence and corruption to prostitution and money laundering.[17]

"Gold rush" is indeed the proper term, for while gold mining in the Amazon is nothing new, it has exploded in recent years.[18] Take Brazil, home to nearly 60% percent of the Amazon Basin.[19]

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[10] *Id.*, art. 7, para. 2.
[11] United Nations Env't Programme, Minamata Convention, *Party Profiles*, https://minamataconvention.org/en/parties/profiles.
[12] *See generally infra* Pt. II.B.
[13] United Nations Env't Programme, Chemicals and Health Branch, *UN Environment Global Mercury Assessment* 12 (2018), https://wedocs.unep.org/items/7baaa34c-268a-4bbf-aa3c-e73f0a817b9a.
[14] Susan Keane et al., *Mercury and Artisanal and Small-Scale Gold Mining: Review of Global Use Estimates and Considerations for Promoting Mercury-Free Alternatives*, 52 AMBIO 833 (2023); *cf.* Maria Elena Crespo-Lopez et al., *Mercury in the Amazon: The Danger of a Single Story,* 256 ECOTOXICOLOGY AND ENVIRONMENTAL SAFETY 114895 (2023).
[15] *See generally Illegal Gold Mining Surges into New Parts of Peru's Amazon, Threatening Rivers and Lives*, AP NEWS (Feb. 23, 2026), https://apnews.com/article/peru-illegal-gold-mining-amazon-mercury-indigenous-1938504793e97fc181acaf1e63213028.
[16] Irene Vélez-Torres & Diana Vanegas, *supra* n. 5.
[17] Luiz Cortinhas Ferreira Neto et al., *Uncontrolled Illegal Mining and Garimpo in the Brazilian Amazon*, 15 NAT. COMMUN. 9847 (2024); Abra Atwood et al., *Landscape Controls on Water Availability Limit Revegetation after Artisanal Gold Mining in the Peruvian Amazon*, 6 COMMUN EARTH ENVIRON 419 (2025); M.E. Ramírez Requelme et al., *Assessment of Hg-Contamination in Soils and Stream Sediments in the Mineral District of Nambija, Ecuadorian Amazon*, 18 APPLIED GEOCHEMISTRY 371 (2003); Livia Wagner, *Organized Crime and Illegally Mined Gold in Latin America*, THE GLOBAL INITIATIVE AGAINST TRANSNATIONAL ORGANIZED CRIME (April 2016).
[18] *Illegal Gold Mining Surges into New Parts of Peru's Amazon, supra* n. 15.
[19] Bernardo M. Flores et al., *Critical Transitions in the Amazon Forest System*, 626 NATURE 555 (2024).

Experts estimate over 50% of Brazilian gold is illegally sourced,[20] and the yearly rate of deforestation from illegal mining activities jumped more than 90% from 2017 to 2020.[21]

In Colombia, illegal and informal mining account for more than 70% of all gold extracted and a majority share of exports.[22] The profits are staggering: in the country that leads the world in cocaine production, the value of illegal gold exports now eclipses drugs.[23] Illegal and informal gold mining complement the narcotics trade, serving as "the easiest and most profitable way to launder money in the history of Colombian drug trafficking."[24]

The narco-gold nexus has emerged with equal strength in Ecuador, where illegal mining is often carried out by sophisticated criminal syndicates[25] like the notorious Lobos gang.[26] Initially, the Lobos extorted miners for "protection," while simultaneously providing them drugs to endure the grueling work.[27] Over time, the Lobos took complete control of mining operations.[28] Corruption, too, looms large in the Lobos' maneuverings, as crooked officials inform miners of untapped deposits and then protect the miners and gang members by leaking details of impending enforcement operations.[29]

The story is similar in Bolivia, where gold has become the top export[30] and the country has evolved into South America's hub for the mercury trade.[31] Since 2015, Bolivia has ranked first or second globally in mercury imports.[32] For context, between 2016 and 2021, Bolivia imported over 1,100 tons versus Brazil's reported 100 tons during the same timeframe, despite producing similar amounts of gold.[33] Although recent regulatory changes made a dent in declared imports, the upshot

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[20] Carrie Kahn et al., *Brazil's New Leftist Government Attempts to Crack down on Illegal Gold Mining*, NPR, Nov. 15, 2023, https://www.npr.org/2023/11/15/1213130035/brazils-new-leftist-government-attempts-to-crack-down-on-illegal-gold-mining.
[21] Juliana Siqueira-Gay & Luis E. Sánchez, *The Outbreak of Illegal Gold Mining in the Brazilian Amazon Boosts Deforestation*, 21 REG. ENVT'L CHANGE 28 (2021).
[22] ORG. OF AM. STATES: DEP'T AGAINST TRANSNAT'L CRIME, *On the Trail of Illicit Gold Proceeds: Strengthening the Fight Against Illegal Mining Finances: Colombia's Case* (Feb. 2022) [hereinafter OAS Colombia], https://www.oas.org/en/sms/dtoc/docs/On-the-trail-of-illicit-gold-proceeds_Colombias-case.pdf.
[23] Livia Wagner, *supra* n. 17.
[24] *Id.* at 20 (quoting Colombia's Institute for the Study of Development and Peace)
[25] OAS, *On the Trail of Illicit Gold Proceeds: Strengthening the Fight Against Illegal Mining Finances: Ecuador's Case* 6 (Dec. 2021) [hereinafter "OAS Ecuador"], https://www.oas.org/en/sms/dtoc/docs/On-the-trail-of-illicit-gold-proceeds-Ecuador-case.pdf.
[26] Anastasia Austin, *As Government Pressure Mounts, Ecuador's Gangs Strike Gold*, INSIGHT CRIME (July 23, 2024), https://insightcrime.org/news/as-government-pressure-mounts-ecuadors-armed-gangs-strike-gold/.
[27] *Id.*
[28] *Id.*
[29] *Id.*
[30] Thomas Graham, *In Bolivia, Mercury Pollution Spreads Amid a Surge in Gold Mining*, YALE E360, https://e360.yale.edu/features/bolivia-mercury-gold-mining.
[31] María Fernanda Ramírez, *The Poisonous Mercury Trade*, INSIGHT CRIME (May 2, 2024), https://insightcrime.org/investigations/poisonous-mercury-trade/.
[32] *Id.*
[33] Fernanda Wenzel, *Widespread Use of Smuggled Mercury in Amazon Gold Mining*, MONGABAY (Jul. 17, 2024), https://news.mongabay.com/2024/07/report-reveals-widespread-use-of-smuggled-mercury-in-amazon-gold-mining/.

over the past decade is clear: Bolivia introduced a surplus of mercury ripe for contraband export to neighboring countries.[34]

Peru, for its part, is in ways the epicenter of mercury-based gold mining, with images of cratered jungle landscapes frequently appearing in *The New York Times* and *The Guardian*.[35] Peru produces more gold than any other country in South America.[36] Naturally, the share corresponding to illegal and informal mining evades precise calculation. But experts agree the figures are high. According to the Peruvian Economic Institute, exports of illegally extracted gold generated $6.84 billion in 2024,[37] and over 40% of all gold illegally extracted in South America comes from Peru.[38] With much of this occurring as alluvial extraction using mercury, environmental and human health conditions in regions like Madre de Dios have reached catastrophic levels.[39]

In sum, the problem is immense. But immense doesn't necessarily mean intractable. In addition to the deployment of mercury-free technology fit for ASGM (e.g., gravimetric separating tables), law and public policy present an important avenue for progress. In that spirit, this Article evaluates the most significant laws and policies bearing on mercury in gold mining in the Amazon. By documenting the approaches taken by Bolivia, Brazil, Colombia, Ecuador, and Peru, the Article informs debate and decision-making around one of today's most pressing environmental issues. Looking ahead, the Article further identifies a set of goals, principles, and best practices that point the way to reduced mercury in ASGM, healthier ecosystems, and empowered communities.

Part I begins by introducing the Minamata Convention and then sets forth the grim reality of gold mining with mercury in the Amazon Basin. Because this activity is fundamentally economic and responds to the demand for gold in global investment and consumer markets—domestic but especially foreign markets, with end buyers far from source countries—we include a brief discussion of the gold trade.

Part I then pivots to the mercury supply side of the equation. Apart from abundant cheap labor and plentiful gold in the Amazon Basin, mercury remains the amalgamating agent *du jour* for alluvial

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[34] Maxwell Radwin, *Mercury Rising: Why Bolivia Remains South America's Hub for the Toxic Trade*, MONGABAY (Nov. 8, 2022), https://news.mongabay.com/2022/11/mercury-rising-why-bolivia-remains-south-americas-hub-for-the-toxic-trade/.

[35] *See, e.g.,* Luke Taylor, *Illegal Gold Mining Clears 140,000 Hectares of Peruvian Amazon,* THE GUARDIAN (Oct. 8, 2025), https://www.theguardian.com/environment/2025/oct/08/gold-mining-deforestation-peru-amazon; Suzanne Daley, *Peru Scrambles to Drive Out Illegal Gold Mining and Save Precious Land*, N.Y. TIMES (July 25, 2016), https://www.nytimes.com/2016/07/26/world/americas/peru-illegal-gold-mining-latin-america.html.

[36] Fatih Aranoglu, et al., *Analysis of Artisanal and Small-Scale Gold Mining in Peru under Climate Impacts Using System Dynamics Modeling*, 14 SUSTAINABILITY 7390 (2022); *Global Mine Production by Country*, WORLD GOLD COUNCIL (June 9, 2026), https://www.gold.org/goldhub/data/gold-production-by-country.

[37] *El Perú Exporta el 44% del oro ilegal de Sudamérica*, INSTITUTO PERUANO DE ECONOMIA (May 19, 2024), https://ipe.org.pe/el-peru-exporta-el-44-del-oro-ilegal-de-sudamerica/

[38] *Id.*

[39] *See, e.g., Gold Mining in Madre de Dios: Mercury in Every Body*, IUCN NL (Dec. 24, 2024), https://www.iucn.nl/en/story/gold-mining-in-madre-de-dios-mercury-in-every-body/; Jacqueline R. Gerson, et al., *Amazon Forests Capture High Levels of Atmospheric Mercury Pollution from Artisanal Gold Mining*, 13 NAT. COMMUN. 559 (2022).

gold mining.[40] Accordingly, Part I continues with an overview of mercury trafficking routes; the actors involved; the places where this activity tends to occur, with special emphasis on territories of Indigenous Peoples and Local Communities (IP&LCs) and protected areas; and the various environmental, public health, and social ills that flow from mercury-based gold mining in the Amazonian regions of Bolivia, Brazil, Colombia, Ecuador, and Peru.

Part II discusses the ways in which governments have responded through law and policy. Despite common challenges, the countries have at times developed distinct approaches to the problem of mercury-based gold mining. While the five focus countries have pursued a handful of shared, high-level strategies—chief among them formalization of informal gold miners and restrictions on the mercury trade—they have used different tactics, supported by disparate levels of commitment and available resources, yielding an array of results.

Part II begins with a survey of the goals, principles, and best practices that guide—or ought to guide—law and policy efforts vis-à-vis mercury and gold mining. These goals, principles, and best practices represent consensus benchmarks that have been embraced by civil-society organizations and enshrined in high-level official statements by national representatives in international fora, including the Minamata Convention.

Cognizant of differences in legal systems, Part II explains how these benchmarks represent system-agnostic lodestars for law and policy governing mercury and ASGM. While some are more specific than others, they are all flexible enough to apply meaningfully throughout the Amazon Basin and other regions affected by mercury in gold mining. And with an understanding of this basic vision, it becomes easier to evaluate national laws and policies in relation to these benchmarks.

Part II then pivots to describing the legal and policy landscape in the focus countries as concerns the use of mercury in gold mining. This entails a review of both international and national legal instruments. Internationally, the Minamata Convention is first and foremost, but not too far behind in importance are other multilateral environmental agreements (e.g., the Convention on Biological Diversity), agreements focused on the rights of IP&LCs (e.g., International Labour Organization Convention No. 169), a regional agreement focused on sustainable management of Amazon Basin ecosystems (the Amazon Cooperation Treaty), the region's supranational human rights infrastructure (whose foundation lies in the American Convention on Human Rights), and, for several countries in the Amazon Basin, the Andean Community, a trade bloc that has recently shown significant interest—backed by the ultimate threat of trade sanctions—in mitigating the effects of mercury in its constituent nations of Colombia, Peru, Ecuador, and Bolivia.

As concerns national law, Part II discusses the extent to which the laws of each country regulate use of mercury in gold mining; importation and exportation of mercury; domestic commerce in mercury; and penalties for violations of any such norms. Relatedly, Part II explores how each country has attempted to formalize ASGM, much of which occurs outside the strictures of mining laws and permit systems. In addition, because gold mining with mercury in the Amazon Basin

[40] This is not to suggest mercury is indispensable to the ASGM sector. It is not. *See, e.g.,* V. L. Morgan et al., *Emerging Mercury Mitigation Solutions for Artisanal Small-Scale Gold Mining Communities Evaluated through a Multicriteria Decision Analysis Approach*, 41 ENVIRON. SYST. DECIS. 413 (2021).

frequently involves incursion into protected areas and IP&LC territories, Part II analyzes legal frameworks associated with such areas vis-à-vis illegal and informal gold mining. Finally, Part II discusses broader pollution laws, remediation and restoration obligations, monitoring and enforcement authority, citizen participation regimes, and opportunities for public-interest litigation responsive to gold mining using mercury. In addition to furnishing a basis for comparative evaluation of national approaches to mercury in ASGM, this legal review enables analysis of treaty compliance. Part II effectively doubles as a measurement, however rough, of the assessed countries' progress towards satisfying their Minamata Convention obligations to reduce or eliminate mercury in ASGM.[41]

Here, however, an important qualification is in order. To achieve our goal of writing a paper that is not merely descriptive of the status quo of law and policy in each country but also evaluative and normative (identifying problematic and promising approaches alike), we chose to vary the scope and emphasis of our national analyses. Rather than attempting to catalogue every law, regulation, and decree germane to the various issues surrounding gold mining with mercury, we selectively highlight remarkable features of each national context. We intentionally chose to focus on a subset of salient features per country—and we ensured that these features bore a nexus to the broader consensus goals, principles, and best practices. Depending on the country and law or policy issue examined, this sometimes translates to a generally praising view of how the country has navigated a particular challenge; with equal frequency, our selective approach sometimes translates to a more critical appraisal, highlighting design or implementation problems we hope policymakers avoid in the future.

Part III closes with a series of observations and recommendations, describing the extent to which certain laws, policies, and practices have helped to reduce the use of mercury in ASGM or otherwise mitigate the scale and harmful effects of illegal and informal gold mining. Because several approaches have proven ineffective or even counterproductive, Part III discerns the good from the bad, while taking care not to overlook nuance that in many cases renders firm conclusions elusive. Based on this comparative review, we offer a dozen high-level take-away points. Zooming out to the level of broader policy critique and best practices, the higher-level commentary in Part III complements the more granular analysis of Part II's country-by-country discussion.

Overall, the Article concludes with a series of messages that are at once realistic, hopeful, and, perhaps most importantly, useful to policymakers and other stakeholders. The contributions of this Article to the field are important. Although the alarming scale of gold extraction using mercury in the Amazon Basin has been covered in scores of newspaper articles, films, NGO reports, national action plans, and Minamata Convention documents, we believe this Article to be the first of its kind: an in-depth comparative review of several countries' laws and policies as they relate specifically to mercury-based gold mining. Navigating the various laws and shifting policy goals of five independent countries facing an environmental crisis is no easy task, but ameliorating the toxic legacy of mercury-based gold mining in the Amazon is a global obligation. This requires a proper, contextualized understanding of what countries have done, what has worked, and what has not worked—and, through synthesis and analysis, at least a rough sense of *why* certain approaches or governance principles should be prioritized over others. This Article begins to answer those questions.

[41] Minamata Convention, art. 7.

I. Gold Mining and Mercury Trade in the Amazon

Here, we describe the overall problem of mercury trade and illegal and informal ASGM in the Amazon Basin, including examination of market demand for gold, mercury trade routes, and a few of the more salient characteristics of informal and illegal ASGM and associated activities. First, however, we must establish the importance of the Minamata Convention and its delineation of a global policy on mercury.

A. Introduction to the Minamata Convention and Its Treatment of ASGM

The overarching objective of the Minamata Convention, to which all five focus countries are Parties,[42] is "to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds."[43] Recognizing that ASGM is currently the greatest source of mercury emissions, the Convention contains an entire Article on this sector.[44] Specifically, each Party is required to "take measures to reduce and, where feasible, eliminate the use of mercury and mercury compounds from [ASGM] activities and the emissions and releases of mercury into the environment resulting from them."[45] Notably, and in contrast to the use of mercury for certain other purposes wherein the treaty contains phase-out deadlines (e.g., manufacturing processes that use mercury),[46] the Minamata Convention does not command countries to entirely *prohibit* the use of mercury in ASGM.[47] Rather, the treaty's vision is flexible but firm: Parties should make concerted efforts to reduce mercury in ASGM.[48] In some contexts, that may mean elimination. In others, it may mean something short of that.

Of course, the definitions of key terms modulate the reach of obligations. As concerns "artisanal and small-scale gold mining" (or ASGM), the Minamata Convention defines that as "gold mining conducted by individual miners or small enterprises with limited capital investment and production."[49] This term, together with its operative uses in Article 7 and Annex C of the treaty, is designed to capture the gold-mining sectors most strongly associated with mercury and informality. However, while the term "artisanal and small-scale gold mining" is clear enough in the context of the treaty, it is worth noting that the definition does not always map on perfectly to national law, vernacular use of similar terms, or the actual scale of mining operations. In national legislation, Parties often draw distinctions between "artisanal" mining, on the one hand, and "small-scale" mining, on the other; they may also use varied or additional terms, like "subsistence" or "ancestral" mining, and regulate those sectors differently than ASGM operators. Similarly, the definitional criteria for "artisanal" or "small-scale" mining, even if those terms are used in national legislation, may diverge from the treaty (e.g., where the treaty focuses on "limited capital investment," national legislation may define "artisanal" mining as mining without heavy machinery). Finally, many mining groups engaged in informal or illegal gold mining with mercury

[42] UNEP, Minamta Convention, *Party Profiles*, https://minamataconvention.org/en/parties/profiles.
[43] Minamata Convention, art. 1.
[44] *Id.*, art. 7.
[45] *Id.,* art. 7, para. 2.
[46] *Id.*, art. 5.
[47] *See id.*, art. 7, para. 2.
[48] *See id.*
[49] *Id.*, art. 2(a).

operate on a scale that belies the label "artisanal" or "small scale." For purposes of this paper, we nevertheless use "ASGM" with its treaty meaning in mind unless indicated otherwise. To cover a broader range of scenarios, we also frequently employ the term "gold mining using mercury."

Procedurally, the Minamata Convention pursues the goals of Article 7 by requiring each Party to (1) notify the Secretariat if the Party determines that ASGM in its territory "is more than insignificant," and (2) in the case of such a determination, develop a "national action plan" (NAP) in accordance with specific criteria.[50] These NAPs, when developed with care, contain both a wealth of information on national laws and policies and, more importantly, articulate roadmaps for reduction of mercury use in ASGM, increased formalization within the ASGM sector, and more.[51]

To furnish guidance and a common structure, the Convention instructs Parties to include in their NAPs eleven basic components, including, among others, "national objectives and reduction targets," "actions to eliminate" various forms of amalgamation with mercury, "strategies for managing trade" of mercury "and preventing the diversion of mercury" from authorized uses to illegal mining, and "[s]teps to facilitate the formalization or regulation of the [ASGM] sector[.]"[52] These strategic areas—particularly reduction of trade and use of mercury and formalization of ASGM—resonate with long-standing observations from environmental advocates.[53]

In the cases of Bolivia, Brazil, Colombia, Ecuador, and Peru, all five countries have acknowledged the need to develop a NAP considering their emission levels;[54] however, not all have thus far followed through. While Colombia and Ecuador have published NAPs,[55] Brazil, Bolivia, and Peru have not. Publicly available information suggests Bolivia and Brazil are actively working on these documents, with Brazil having recently released a draft for public comment.[56] The case of Peru is

[50] *Id.*, art. 3.
[51] *See* Minamata Convention, Annex C.
[52] *Id.*
[53] *See, e.g.*, CEDIB, et al., *Illegal Gold Mining: Impacts on Human Rights and Biodiversity in the Amazon* (Dec. 2024), https://www.cedib.org/biblioteca/illegal-gold-mining-impacts-on-human-rights-and-biodiversity-in-the-amazon-six-countries-report/; Robert Muggah, *Formalizing Small-Scale Gold Mining Can Reduce Environmental Impacts & Crime*, MONGABAY (Aug. 7, 2025), https://news.mongabay.com/2025/08/formalizing-small-scale-gold-mining-can-reduce-environmental-impacts-crime-commentary/.
[54] Bolivia, Notification—Article 7.3 (May 30, 2019), https://minamataconvention.org/en/documents/bolivia-plurinational-state-notification-article-73; Brazil, Notification—Article 7.3 (Nov. 20, 2019), https://minamataconvention.org/en/documents/brazil-notification-article-73; Colombia, Notification—Article 7.3 (June 23, 2016), https://minamataconvention.org/en/documents/colombia-notification-article-73; Ecuador, Notification—Article 7.3 (Aug. 21, 2015), https://minamataconvention.org/en/documents/ecuador-notification-article-73; Peru, Notification—Article 7.3 (Aug. 21, 2015), https://minamataconvention.org/en/documents/peru-notification-article-73.
[55] Colombia, *Plan de Acción Nacional sobre Mercurio en la Minería Artesanal y de Pequeña Escala en Colombia* (Dec. 27, 2023), https://minamataconvention.org/sites/default/files/documents/national_action_plan/Colombia-ASGM-NAP-2024-SP.pdf; Ecuador, *Plan de Acción Nacional sobre el uso de Mercurio en la Minería Artesanal y de Pequeña Escala de Oro en Ecuador* (May 2020), https://minamataconvention.org/sites/default/files/documents/national_action_plan/NAP-Ecuador-May2020-ES.pdf.
[56] *See, e.g.,* Jimena Mercado, *Convenio de Minamata: Arce Deja Plan del Mercurio a Largo Plazo y Sin Consenso Con los Pueblos Indígenas*, AGENCIA DE NOTICIA AMBIENTALES (Nov. 7, 2025), https://anabolivia.org/convenio-de-minamata-arce-deja-plan-del-mercurio-a-largo-plazo-y-sin-consenso-con-los-pueblos-indigenas/; UNEP/Global Envt'l Facility, *Development of National Action Plan for Artisanal and Small-Scale Gold Mining in Brazil*, https://www.unep.org/gef/projects/development-national-action-plan-artisanal-and-small-scale-gold-mining-brazil.

somewhat distinct, as Peru has published a "National Implementation Plan," which, despite the similar-sounding name, falls short of a NAP as envisioned by the treaty.[57] A separate draft NAP specific to ASGM has so far failed to move beyond the public comment stage.[58]

Without attempting to canvas every detail of the NAPs and associated Convention documents (e.g., "short national reports"), a review of these documents provides a sense of the challenges and priorities as perceived by Party governments. The following table summarizes the more important points.

Table 1: National Action Plans

Party	**NAP Published?**	**Year of Publication**	**Highlights**
Bolivia	No	N/A	N/A
Brazil	No[59]	N/A	N/A
Colombia	Yes[60]	2024[61]	Establishes goals to: • eliminate the worst practices involving mercury in ASGM; • formalize (i.e., legalize) as many informal gold miners as possible; • reduce mercury emissions and exposure risks; • improve responses related to illegal commerce in mercury; • reduce illegal gold mining; • enhance stakeholder participation in implementation and improvement of the NAP; • build knowledge and social acceptance of mercury-free gold mining; • address gender, child labor, and human-rights concerns in ASGM using mercury; and • improve public health.[62]
Ecuador	Yes[63]	2020[64]	Sketches interrelated strategies to: • formalize the informal sector; • reduce emissions of mercury in ASGM, reduce the risk of exposure to mercury for

[57] Although Peru has posted the similar sounding "National Implementation Plan" to the Minamata website, that document is considerably different than NAPs published by other countries and what the treaty contemplates. *Compare* Peru, National Implementation Plan (April 18, 2019), https://minamataconvention.org/en/documents/national-implementation-plan-peru *with*, *e.g.*, Colombia, *Plan de Acción Nacional*, *supra* n. 55.
[58] *See* Ministry of Environment, Resolución Ministerial N.° 020-2024-MINAM (Jan. 30, 2024) https://www.gob.pe/institucion/minam/normas-legales/5144122-020-2024-minam.
[59] *But see supra* n. 57 and accompanying text.
[60] Colombia, *Plan de Acción Nacional*, *supra* n. 55.
[61] *Id.*
[62] *Id.*
[63] Ecuador, *Plan de Acción Nacional*, *supra* n. 55.
[64] *Id.*

			miners and others, and eliminate the worst practices; • address illegal trade and use of mercury; • reduce illegal gold mining; • provide public health services to populations exposed to mercury from ASGM; • improve gender and child labor problems in ASGM; • facilitate participation in the continuing implementation of Ecuador's NAP.[65]
Peru	No.[66]	N/A; National Implementation Plan published in 2019.[67]	N/A[68]

In sum, the NAPs developed to date advance the Convention's objective to reduce the use and adverse effects of mercury in ASGM. And, as envisioned by the Convention, the NAPs reflect a harmonized approach, wherein Parties both (1) address shared critical challenges, especially reducing informal and illegal gold mining and the prevalence of mercury in national markets, and (2) enjoy latitude to tailor law and policy to national circumstances without going so far as to work at cross-purposes with the treaty's overall framework.

Of course, drawing up a plan is one matter; implementing that plan effectively is another. As the following discussion makes clear, Party implementation of the Minamata Convention and associated NAPs is no easy chore in the face of global demand for gold and challenging local conditions.

B. Demand for Gold as a Driver of Mining in the Amazon

Gold extraction responds to demand. For millennia, gold has represented wealth and served as a means of exchange and capital accumulation.[69] Today, gold is used in jewelry production and technology, as well as held by investors and central banks.[70] By sector, jewelry accounts for the largest share of global gold purchases, a position it has held since at least 2010.[71] Next comes investment, followed by central bank purchases, and then technology.[72] Importantly, the price of gold has nearly quadrupled over the past decade.[73]

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[65] *Id.*
[66] *See supra* n. 57 and accompanying text.
[67] Peru, *National Implementation Plan*, *supra* n. 57.
[68] But see *infra* n. 57 regarding Peru's National Implementation Plan.
[69] Paweł Kowalewski & Dominik A. Skopiec, *Price Processes in the Global Gold Market*, 55 BANK I KREDYT 381 (2024), https://www.bankandcredit.nbp.pl/content/2024/04/BIK_04_2024_01.pdf.
[70] *Gold Demand by Country*, WORLD GOLD COUNCIL (Apr. 29, 2026), https://www.gold.org/goldhub/data/gold-demand-by-country.
[71] *Id.*
[72] *Id.*
[73] *Gold Spot Price and Cost of Gold*, WORLD GOLD COUNCIL (Aug. 7, 2026), https://www.gold.org/goldhub/data/gold-prices.

Although it is difficult to discern how much gold from the Amazon Basin remains in the Basin, how much is exported beyond the Basin, to which countries, and to which end sectors, general trends provide rough answers. In broad terms, the Global North, Middle East, South Asia, and East Asia form the major destination markets for gold worldwide.[74] So, while the Amazon Basin countries maintain important domestic markets for gold, much of this gold ends up far beyond the Basin.[75]

As a driver for extraction and, indirectly, for use of mercury in ASGM, the demand for gold raises important issues of shared responsibility. Similar questions have emerged in the contexts of other commodities associated with illegal activity and environmental harm, including forestry products, fish, wild fauna, leather products and beef, and other commercially valuable minerals (e.g., diamonds and cobalt).[76]

Helpfully, many Global North countries and industry players have begun to acknowledge a duty to sanitize the supply chain. However nascent these efforts may be, it is encouraging to see both private entities[77] and the governments of consumer countries beginning to leverage their market power to insist upon mercury-free and legally mined gold.

Regulatorily, the European Union (EU) is often cited as a leader in legislative action focused on mineral supply chains. Effective since 2021, the EU Conflict Minerals Regulation established a series of due diligence requirements for importers of gold and other minerals.[78] As its name suggests, the core aim of the Conflict Minerals Regulation is to prevent EU firms from underwriting, knowingly or otherwise, groups engaged in armed conflict through the purchase of valuable minerals trafficked by such groups.[79] Yet, while the Conflict Minerals Regulation does not directly address gold processed with the use of mercury, its due-diligence requirements force inquiries that may reveal the use of mercury and other details associated with illegal gold mining, such as extraction from protected areas.[80]

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[74] Daniel Workman, *Gold Imports by Country 2025 Plus Average Prices*, https://www.worldstopexports.com/international-markets-for-imported-gold-by-country/.

[75] *See generally Dirty Gold Routes: A Decade of Illegal Mining and Laundering*, OJO PUBLICO, https://ojo-publico.com/especiales/latinoamerica/las-rutas-del-oro-sucio-amazonia/.

[76] *See, e.g.,* Lena Partzsch & Martijn C. Vlaskamp, *Mandatory Due Diligence for 'Conflict Minerals' and Illegally Logged Timber: Emergence and Cascade of a New Norm on Foreign Accountability*, 3 THE EXTRACTIVE INDUSTRIES AND SOCIETY 978 (2016).

[77] *See, e.g.*, *Gold Traceability, the Weak Link in Swiss Watchmaking*, SWI, SWISS BROADCASTING CORP. (Sept. 23, 2025), https://www.swissinfo.ch/eng/trade-policy/where-does-the-gold-in-swiss-watches-come-from-the-industrys-silent-sustainability-problem/89986528.

[78] Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 Laying Down Supply Chain Due Diligence Obligations for Union Importers of Tin, Tantalum and Tungsten, Their Ores, and Gold Originating from Conflict-Affected and High-Risk Areas, 2017 O.J. (L 130) 1, 9 [hereinafter "Conflict Minerals Regulation"]. *See also Conflict Minerals Regulation*, European Commission, Trade and Econ. Sec. (June 16, 2026), https://policy.trade.ec.europa.eu/development-and-sustainability/conflict-minerals-regulation_en.x

[79] *Id.*

[80] *Id.*; *see also* Commission Implementing Decision (EU) 2025/2071 of 16 October 2025 on the Recognition of Equivalence under Article 8(3) of Regulation (EU) 2017/821 of the European Parliament and of the Council of the Supply Chain Due Diligence Scheme Responsible Minerals Assurance Process Owned by the Responsible Minerals Initiative of 2025; *FAQs - How to Comply with the EU Conflict Minerals Regulation*, THE EUROPEAN PARTNERSHIP FOR RESPONSIBLE MINERALS (Apr. 25, 2022), https://www.europeanpartnership-

Meanwhile, the Organisation for Economic Co-operation and Development (OECD) has similarly issued detailed guidance for companies sourcing minerals from third parties.[81] The OECD Due Diligence Guidance has the power to influence firms' supply-chain management through the OECD's reputational force. And while the OECD's advice, like the EU Conflict Minerals Regulation, primarily focuses on screening out minerals "linked to serious human rights abuses (e.g. child labour, forced labour), money laundering, bribery, and funding for terrorism or armed groups,"[82] minerals tainted with such practices may overlap with those sourced through environmentally destructive means. Specifically, in the case of gold extracted from the Amazon Basin, ASGM actors that use mercury are frequently implicated in abuse of IP&LCs, money-laundering, corruption, and armed violence.[83] Again, the OECD's focus may not target mercury as such, but its promotion of due diligence—if adopted in earnest by gold-purchasing firms—has the natural tendency of exposing the use of mercury in ASGM. At the very least, this increased vetting creates the conditions for firms to prevent mercury-amalgamated gold from infiltrating their supply chains.

And, incidentally, recent developments under the Minamata Convention reveal a growing consensus around the need for precisely such a focus on the "demand" side of the gold market. Although the Convention text does not explicitly mention gold-purchaser responsibility, the spirit of the Convention cuts in this direction. Thus, in 2025 the COP adopted Decision 6/8, recognizing the linkage between mercury use in ASGM and "strengthened accountability throughout the full life cycle of gold supply chains, including buyer and intermediary due diligence, traceability and verification of origin[.]"[84]

C. The Mercury Trade

Operating in tandem with the gold trade, the mercury trade is equally complex. As a heavy metal and highly toxic substance, mercury has been subject to a patchwork of legal controls in various countries for some time.[85] Prior to the Minamata Convention's entry into force in 2017, however, there was not a global framework devoted exclusively to the control of mercury. With the Minamata Convention in place, mercury continues to be traded both legally and, increasingly, illegally, with ASGM a magnet of the latter.[86]

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responsibleminerals.eu/page/view/73f644c4-da24-4134-b381-97e541e46a15/faqs-how-to-comply-with-the-eu-conflict-minerals-regulation

[81] OECD, OECD DUE DILIGENCE GUIDANCE FOR RESPONSIBLE SUPPLY CHAINS OF MINERALS FROM CONFLICT-AFFECTED AND HIGH-RISK AREAS (3rd ed. 2016), https://doi.org/10.1787/9789264252479-en.

[82] *Id.*

[83] Fernanda Wenzel, *Organized Crime & Gold Trade Are Increasingly Connected, Report Shows*, MONGABAY (June 25, 2025), https://news.mongabay.com/2025/06/organized-crime-gold-trade-are-increasingly-connected-report-shows/.

[84] UNEP/MC/COP.6/25/Add.1, Decision MC-6/8: Artisanal and Small-Scale Gold Mining (Nov. 24, 2025), https://minamataconvention.org/sites/default/files/documents/final_report_and_outcomes/UNEP-MC-COP6-25-Add1-Compilation-Decisions%20-%20ADVANCE.pdf

[85] Larissa Myers, *The U.N. Environment Program: Development of A Legally Binding Instrument on Mercury*, 32 UTAH ENVTL. L. REV. 463, 469-83 (2012).

[86] Yingchao Cheng et al., *Examining the Inconsistency of Mercury Flow in Post-Minamata Convention Global Trade Concerning Artisanal and Small-Scale Gold Mining Activity*, 185 RESOURCES, CONSERVATION AND RECYCLING 106461 (2022).

Reams of reports and studies have been written on the subject of trade patterns, licit or otherwise.[87] While the topic is vast, we devote this sub-section to just two issues: (1) how the Minamata Convention governs trade in mercury, especially mercury destined for use in ASGM; and (2) how mercury is illegally traded across borders to feed the demands of ASGM in the Amazon Basin, spotlighting the Mexican role both for its significance and its illumination of common dynamics within the underground trade.

1. Legal Controls Under the Minamata Convention

Under the Minamata Convention, imports and exports of mercury are subject to strict controls but not outright prohibited. When coupled with the phase-out schedules for various uses of mercury and products containing mercury, the import and export controls are designed to minimize trade in mercury. As concerns mercury for use in ASGM, the Convention does not explicitly forbid imports and exports of mercury for this end use. Nevertheless, examination of the treaty shows the drafters aimed to reduce (and even eliminate) international trade in mercury for ASGM as a corollary to Parties' separate but related obligation to "take measures to reduce and, where feasible, eliminate the *use* of mercury" in ASGM.[88]

Starting from the top, the Convention regulates mercury by sector and overlays this scheme with a cradle-to-grave approach, addressing extraction, trade, use, and disposal.[89] All provisions are meant to advance the overarching objective "to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds."[90] Accordingly, any ambiguities in the treaty text should be interpreted to further this fundamental purpose.[91]

As concerns international trade, the Convention begins with a default rule that exports and imports are prohibited unless authorized by the Convention. Article 3 provides that Parties shall not export mercury unless the importing country consents *and* the transaction is for a use or product authorized under the Convention,[92] including (1) "mercury-added products," defined as products that "contain[] mercury or a mercury compound that was intentionally added" (e.g., batteries);[93] (2) manufacturing processes in which mercury or mercury compounds are used (e.g., production of polyurethane);[94] and (3) ASGM.[95]

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[87] *See, e.g.,* María Fernanda Ramírez, *supra* n. 1; ENVIRONMENTAL INVESTIGATION AGENCY, *Traffickers Leave No Stone Unturned* (July 2025), https://eia.org/wp-content/uploads/2025/07/EIA_US_Mercury_Smuggling_report_0725_FINAL.pdf.
[88] Minamata Convention, art. 7, para 2 (emphasis added).
[89] Tseming Yang, *The Minamata Convention on Mercury and the Future of Multilateral Environmental Agreements*, 45 ENVTL. L. REP. NEWS & ANALYSIS 10064, 10066 (2015).
[90] Minamata Convention, art. 1.
[91] Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331, art. 31(1).
[92] Minamanta Convention, art. 3(6). Note, however, that this basic scheme applies to mercury by itself; the rules for trade in "mercury-added products," defined as "a product or product component that contains mercury or a mercury compound that was intentionally added" (e.g., products used in calibration of instrumentation), are distinct. *Id.*, art. 1(f); *see also id.*, art. 4; *id.*, art. 3(2)(c).
[93] *Id.*, art. 2(f); *id.*, art. 4; *id.*, Annex X.
[94] *Id.* art. 5; Annex B.
[95] *See id.*, Annex 7.

Although trade and corresponding use of mercury for these products and processes is *potentially* legitimate under the Convention, the treaty hardly blesses them per se. The permit system is exacting[96] and, more significantly, the treaty includes phase-out schedules for mercury-added products and manufacturing processes in which mercury or mercury compounds are used.[97]

But what about imports and exports of mercury for ASGM? The Convention does not categorically prohibit imports and exports of mercury for use in ASGM. Instead, the Article 3 permit scheme applicable to all other sectors likewise applies to trade of mercury for ASGM.[98] This does not mean, however, that the Convention contemplates unrestricted trade in mercury for this purpose. Instead, and as illustrated by our earlier discussion of the NAP requirement and Part II's in-depth discussion of national law in Bolivia, Brazil, Colombia, Peru, and Ecuador, the Convention directs countries to develop NAPs and, effectively, corresponding national legal instruments that limit or even prohibit trade in mercury for ASGM.

Further, on the mercury supply side, the Convention's provisions on mining for mercury (as opposed to mining for gold *with* mercury) work to dry up global mercury sources, with the knock-on effect of starving ASGM of inputs. Here, it is important to recognize that many countries, including all those in the Amazon, do not host mining operations focused on mercury extraction (a.k.a., "primary mercury mining").[99] Yet, if there were no controls on primary mercury mining in countries with such sites, production from those sites could work at cross-purposes with the Convention's overall objective.

Thus, the Convention also aims to reduce primary mercury mining regardless of location, in addition to trade and use in mercury. Specifically, the Convention provides that a Party may "allow primary mercury mining that was being conducted within its territory at the date of entry into force of the Convention for a period of up to fifteen years after that date."[100] Doing the math, this means Parties may, consistent with the treaty, allow primary mercury mining until mid-2032.[101]

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[96] *See id*., art. 3(6)-(9).
[97] *See generally id.*, Annex A, Part I; Annex B, Part I.
[98] *Id.*, art. 3. Note, however, that this scheme applies to mercury itself; the rules for trade in "mercury-added products," defined as "a product or product component that contains mercury or a mercury compound that was intentionally added," are distinct. *Id.*, art. 1(f); *see also id.*, art. 4.
[99] *See* 2023 Short Reports of the Minamata Convention on Mercury: Colombia, sec. 3.1 (Dec. 29, 2023) (responding "no" as to presence of primary mercury mines), https://minamataconvention.org/sites/default/files/documents/national_report/Report_Colombia_2023_Spanish.pdf; 2023 Short Reports of the Minamata Convention on Mercury: Brazil sec. 3.1 (Dec. 28, 2023) (same), https://minamataconvention.org/sites/default/files/documents/national_report/Report_Brazil_2023_Amended_English.pdf; 2023 Short Reports of the Minamata Convention on Mercury: Ecuador, sec. 3.1 (March 21, 2024) (same), https://minamataconvention.org/sites/default/files/documents/national_report/Report_Ecuador_2023_Spanish.pdf; 2023 Short Reports of the Minamata Convention on Mercury: Bolivia, sec. 3.1 (Dec. 31, 2023) (same), https://minamataconvention.org/sites/default/files/documents/national_report/Report_Bolivia_2023_Spanish.pdf; Ministry of Environ. of Peru, *Informe sobre Identificación de Existencias de Mercurio*, sec. 5.2 (Nov. 2022) (reporting primary mercury extraction hasn't occurred since the 1970s), https://minamataconvention.org/sites/default/files/2024-12/PER_3.3.pdf; *see also* Minamata Convention, art. 1(i) (defining "primary mercury mining); *id.*, art. 3, paras. 3-4 (substantive provisions on primary mercury mining).
[100] Minamata Convention, Art. 3, para. 4.
[101] *See id.*, art. 31 (containing provisions on entry into force); Minamata Convention on Mercury, Timeline (Dec. 2024) (listing August 16, 2017, as date of entry into force), https://minamataconvention.org/en/about/timeline. *See also* ENVIRONMENTAL INVESTIGATION AGENCY, *supra* n. 87 (explaining that the Minamata Convention "in practice

Crucially, the Convention further limits the end uses to which mercury from such mining is permitted, even during the phase-out period. Textually, the Convention states that during the fifteen-year grace period, "mercury from such mining shall only be used in manufacturing of mercury-added products in accordance with Article 4."[102] ASGM is not included among the allowed uses. Accordingly, a Party to the Convention that continues to engage in primary mercury mining during the phase-out period should not, per the Convention, allow such mercury to be used in ASGM, whether in its own territory or in another country through export.[103] As explained immediately below, this becomes important when analyzing the mercury trade to and throughout the Amazon Basin.

2. Mercury Trafficking Routes, Smuggling Methods, and the Role of Mexico

Despite hosting significant mercury-based mining, each country analyzed in this Article has indicated in Minamata reports that it does not have primary mercury mines.[104] Thus, setting aside smaller amounts of "secondary" or "by-product" mercury,[105] mercury must be imported, legally or otherwise, into each of the countries. Where does this mercury originate? While other source and hub nations exist (including Türkiye, Singapore, Russia, and Hong Kong SAR), Mexico is consistently identified as the main supplier.

A review of academic literature, NGO reports, and enforcement actions supports this assertion. For example, a July 2025 report from the Environmental Investigation Agency (EIA), describing EIA's successful penetration of a smuggling operation, concluded that "the traffickers exposed in the report" were "responsible for the largest illegal flows of mercury ever documented, conservatively amounting to 200 tons of mercury smuggled from the mercury mines in Mexico . . . to the gold mines in Bolivia, Colombia, and Peru between April 2019 and June 2025."[106] Leveraging quasi-legal mercury production from mines that Mexico is reportedly phasing out under the auspices of the Minamata Convention, the traffickers studied by EIA developed a sophisticated method to siphon off and transport mercury to South America. Rather than smuggling mercury in its liquid form—the traditional but far more detectable method used by smugglers—the trafficking network sends mercury-impregnated gravel. This allows the network to send shipments through formal customs ports by mislabeling the gravel as construction material or "decorative stones." Then, once successfully imported, clandestine processing sites extract liquid mercury for use in illegal gold mining. "Smugglers told EIA investigators that each 20-ft container shipment of mercury-rich gravel yields between 3.5 and 4 tons of liquid mercury."[107]

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allows mercury mining for a 'grace period' that extends until 2032"), https://eia.org/wp-content/uploads/2025/07/EIA_US_Mercury_Smuggling_report_0725_FINAL.pdf.

[102] Minamata Convention, art. 3, para. 4.

[103] *Id.*; ENVIRONMENTAL INVESTIGATION AGENCY, *supra* n. 87.

[104] *See* Short Reports, *supra* n. 99.

[105] *See* UNEP Chemicals and Health Branch, *Global Mercury Supply, Trade and Demand* (2017), Table 4 (showing 2015 figures for by-product mercury in Peru, Chile, and Argentina), https://minamataconvention.org/sites/default/files/2021-06/global_mercury.pdf.

[106] ENVIRONMENTAL INVESTIGATION AGENCY, *supra* n. 87.

[107] *Id.*

Apart from high gold prices and concomitant demand for mercury, the Mexico-to-Amazon mercury pipeline is facilitated by questionable management of mercury mines and mercury exports in Mexico. Although Mexico's declared exports of mercury dropped from 301 tonnes in 2014 to 24 in 2021—the last year for which official data is available—EIA estimates the actual figure remains much higher.[108]

Part of the problem, according to EIA, is Mexico's continued operation of mercury mines at a level inconsistent with the goal of significantly reducing mercury use in ASGM and otherwise.[109] On the one hand, primary mercury mining in Mexico does not, by itself, directly conflict with the Minamata Convention, as the Convention provides that a Party may "allow primary mercury mining that was being conducted within its territory at the date of entry into force of the Convention for a period of up to fifteen years after that date."[110] On the other hand, while Mexico could allow primary mercury mining until 2032 (fifteen years following the Convention's 2017 entry into force),[111] the Convention states that during the fifteen-year grace period, "mercury from such mining shall only be used in manufacturing of mercury-added products in accordance with Article 4."[112] That rules out ASGM. Without attempting to discern the more difficult question of state responsibility for Mexican mercury used in ASGM abroad, for now it suffices to say that primary mercury mining in Mexico and subsequent exports (whether through ostensibly legal channels or outright smuggling) contribute to the pathology of mercury-based gold mining in the Amazon.[113]

D. The Scale of Gold Mining with Mercury in the Amazon Basin

Since the early 1990s, if not earlier, scientists and academics have sounded the alarm over the damaging effect of gold mining with mercury in the Amazon.[114] Estimates suggest mercury-based ASGM in the Amazon Basin accounts for a fifth of all gold on the world market.[115] Although mercury emissions from South America are not exclusive to the Amazon Basin, there is no question that the Amazon is the emissions epicenter—certainly of the continent, and perhaps of the entire planet—as 78% of South America's mercury emissions originate in the Basin.[116]

It is worth unpacking the ways in which this mining occurs, along with the role played by mercury. Although the term "artisanal and small-scale gold mining" may seem to imply limited use of machinery, putative ASGM gold mining operations often rely on significant amounts of expensive

[108] *Id.*
[109] *Id.*
[110] Minamata Convention, art. 3(4).
[111] ENVIRONMENTAL INVESTIGATION AGENCY, *supra* n. 87.
[112] Minamata Convention, art. 3(4).
[113] *Id.*
[114] *See, e.g.*, W. C. Pfeiffer et al., *Environmental Fate of Mercury from Gold Mining in the Brazilian Amazon*, 1 ENVIRON. REV. 26 (1993); Fernando J.P. Branches et al., *The Price of Gold: Mercury Exposure in the Amazonian Rain Forest*, 31 JOURNAL OF TOXICOLOGY: CLINICAL TOXICOLOGY 295 (1993).
[115] Jaqueline Gerson, *Gold Mining is Poisoning Amazon Forests with Mercury*, SCIENTIFIC AMERICAN (Jan. 28, 2022), https://www.scientificamerican.com/article/gold-mining-is-poisoning-amazon-forests-with-mercury/
[116] Maria Elena Crespo-Lopez et al., *supra* n. 14.

equipment and large, organized networks.[117] Describing a typical scene in Madre de Dios, for example, one reporter recounted the various stages as beginning with miners felling "trees to create space for their dredgers, sluices, and vacuum pumps that can open a pit as deep and wide as a five-story building in a matter of weeks."[118] Understandably, heavy machinery increasingly finds its way to mining sites. In a law-enforcement operation in Ecuador, for example, authorities located and destroyed over 30 backhoes, valued at over $250,000 each, and two large power generators, among other equipment.[119] Despite technologically viable alternatives, mercury is employed as an amalgamating agent in most of these operations. A 2022 investigation conducted in Ecuador found that 90% of miners in two studied river systems still used mercury.[120]

And notwithstanding bold legal reforms like Ecuador's 2015 prohibition of mercury use in gold mining,[121] on-the-ground progress is stymied by illegal and informal ASGM's confluence with other environmental crimes (e.g., timber trafficking) and other forms of organized crime, most notoriously drug trafficking. These criminal industries cross paths and multiply, reinforcing each other to create lawless ecosystems where profit, exploitation, and corruption often eclipse the powers of the state and any opposed IP&LCs.[122] In short, fighting illegal gold mining and mercury can mean entering a lion's den of criminality, where authorities are outnumbered and, in some cases, literally outgunned.

II. Law and Policy

Given the globalized nature of the gold and mercury markets, to say nothing of the Amazon's importance to biodiversity and climate goals, the countries of the Amazon Basin need and deserve the support of the international community. Absent additional material resources and policy collaboration, the Amazon Basin will struggle to turn the tide against illegal and informal gold mining and mercury.

Notwithstanding efforts by the international community, responses originating within the region may be the most important. If well-designed and effectively implemented, domestic and regional law and policy create the conditions for positive change. Conversely, poorly designed law and policy make matters worse.

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[117] Nick Miroff, *Peru Fights Gold Fever with Fire and Military Force*, THE WASHINGTON POST (Aug. 18, 2014), https://www.washingtonpost.com/world/peru-fights-gold-fever-with-fire-and-military-force/2014/08/18/2c9db976-bfd5-4217-a846-31bde9871e21_story.html.

[118] Robert Thomas, *The Impact of Illegal Artisanal Gold Mining on the Peruvian Amazon: Benefits of Taking a Direct Mercury Analyzer into the Rain Forest to Monitor Mercury Contamination*, 34 SPECTROSCOPY 2 (2019).

[119] *Militares Tienen Nuevamente Luz Verde para Destruir Máquinas de Minería Ilegal con Explosivos*, CÓDIGO VIDRIO (July 31, 2024), https://www.codigovidrio.com/code/militares-tienen-nuevamente-luz-verde-para-destruir-maquinas-de-mineria-ilegal-con-explosivos/.

[120] Carlos Mestanza-Ramón et al., *Artisanal and Small-Scale Gold Mining (ASGM): Management and Socioenvironmental Impacts in the Northern Amazon of Ecuador*, 14 SUSTAINABILITY 6854 (2022).

[121] Ley Orgánica reformatoria a la Ley de Minería, art. 17 (Ecua. 2013); *id.*, Third Trans. Prov. (implementing prohibition two years following enactment).

[122] *See, e.g.*, Maria Luisa Valencia, *Gold Mining in Colombia Increasingly Tied to Organized Crime*, INSIGHT CRIME (Dec. 7, 2023); https://insightcrime.org/news/gold-mining-colombia-increasingly-tied-organized-crime-report/; *Exploring Illegal Mining in Colombia's Amazon*, INSIGHT CRIME (Sept. 8, 2021), https://insightcrime.org/investigations/exploring-illegal-mining-colombia-amazon/.

In this Part, we describe the existing laws and policies most germane to mercury-based ASGM in the Amazon Basin. This includes international instruments that sit alongside the Minamata Convention, as well as national laws and policies in Bolivia, Brazil, Colombia, Ecuador, and Peru. Although only a snapshot of a moving picture, this review begins to reveal what's working, what's not, and realistic opportunities for improvement.

Before diving into existing laws, however, this Part starts with a survey of the goals, principles, and best practices (collectively "benchmarks") that guide—or ought to guide—the Amazon Basin's law and policy efforts. With few if any exceptions, these benchmarks represent consensus standards that have been embraced in official statements in international fora like the Conference of the Parties (CoP) to the Minamata Convention and regional fora like the Andean Community (AC or CAN) and the Amazonian Cooperation Treaty Organization (ACTO or OTCA). For the most part, civil-society organizations and other stakeholders likewise support these Benchmarks.

A. Survey of Goals, Principles, and Best Practices

In addition to more granular goals, the focus countries generally recognize they must: (1) reduce legal imports of mercury (for gold mining and otherwise); (2) reduce illegal imports of mercury (i.e., smuggling); (3) ensure that remaining legal imports of mercury do not fuel unauthorized gold mining operations (i.e., "diversion"); (4) distinguish between informal mining (potentially eligible for formalization) and illegal mining (fundamentally contrary to mining, environmental, and other laws); (5) deter the worst forms of illegal gold mining with mercury and effectively punish the worst offenders; (6) encourage the formalization of informal miners without encouraging new entrants into the mining sector; (7) ensure formalization processes produce verifiable improvements (especially reduction of mercury); (8) foster community participation in the fight against illegal gold mining and mercury, especially among IP&LCs; (9) promote mercury-free alternatives for gold mining; (10) facilitate alternative livelihoods; (11) advance traceability of gold in the global market; and (12) secure remediation and restoration of contaminated ecosystems.[123]

Each of these goals corresponds to one or more animating principles that reflect even broader values, often mirroring classic tenets of environmental law, criminal law, sustainable development, environmental justice, and economics. These principles include the polluter-pays principle, the user-pays principle, the precautionary principle, the prevention principle, public participation and the related subsidiarity principle,[124] access to information, access to justice, common but differentiated responsibilities (insofar as consumer countries have a responsibility to avoid importing illegally-mined gold or gold produced with mercury),[125] triage in the face of limited

[123] These common goals grown in large part from a set of common, cross-cutting challenges. At the risk of over-analysis, these common, cross-cutting challenges could be further subdivided into challenges related to the problem (i.e., factors that tend to fuel gold mining using mercury) and challenges related to the response (i.e., factors that hinder effective government control and responsive actions).

[124] Subsidiarity is defined as "the principle that a central authority should have a subsidiary function, performing only those tasks that cannot be performed effectively at a more immediate or local level." Oxford English Dictionary, *Subsidiarity*.

[125] *See* Christopher D. Stone, *Common but Differentiated Responsibilities in International Law*, 98 AM. J. INT'L L. 276, 276–77 (2004) (describing the concept and its role in international environmental law).

resources, unintended consequences,[126] the principle of non-regression,[127] the principle of proportionality in criminal justice,[128] and concepts related to incentives.[129] Of course, a single policy goal may be anchored in multiple broader principles. For example, the goal of promoting mercury-free alternatives resonates with sustainable development, the principle of prevention, and the power of incentives; the goal of reducing legal imports of mercury aligns with the principle of non-regression and the principle of prevention; and so forth.

But if the region's consensus policy goals are rooted in broader principles, those goals likewise point the way to more specific practices when instrumentalized through laws, regulations, and protocols. Take the policy goal of deterring the worst forms of illegal mining with mercury and effectively punishing the worst offenders. This goal is consonant with the principal of proportional punishment (a criminal-law classic), the polluter-pays principle (especially if any sort of fine or restoration is imposed), and the principle of prevention via deterrence. Yet the goal still lacks the fine-tuning we would expect to see in codified law. This is where best practices come into play. Here, the goal of effectively punishing the worst offenders might be operationalized through graduated custodial terms and fines depending upon the degree of environmental harm or risk of harm (e.g., illegal mining with mercury should yield higher penalties than illegal mining without mercury, all else being equal), schemes for recidivists, incentives for lower-level associates to testify, and particularly strong penalties for those who finance, organize, and disproportionately benefit from illegal mining and mercury trafficking.

The following table summarizes the relationship between the goals, principles, and best practices that characterize (or at least ought to characterize) the efforts of Amazonian countries in the fight against gold mining with mercury.

Table 2. Benchmarks

Goals	Principles	Best Practices
Reduce legal imports of mercury	Prevention; intergenerational equity; sustainable development; non-regression	Import phase-outs with firm timelines, ideally leading to complete prohibition by a date certain Registration systems for mercury importers and all users, transporters, and vendors of mercury following import
Reduce illegal imports of mercury	Prevention; intergenerational equity; sustainable development; non-regression	National and regional enforcement plans designed to detect and prevent contraband imports through, e.g., continuous training for customs officials regarding smuggling methods, enhanced enforcement presence at trafficking hot spots, rewards for information leading to arrests

[126] Brian Tomasovic, *Tradeoffs in Environmental Law*, 34 J. LAND USE & ENVTL. L. 93, 94–96 (2018).
[127] Nicholas S. Bryner, *Never Look Back: Non-Regression in Environmental Law*, 43 U. PA. J. INT'L L. 555 (2022).
[128] Mitchell N. Berman, *Proportionality, Constraint, and Culpability*, 15 CRIM. L. & PHIL. 373 (2021).
[129] Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era from an Old Idea?,* 18 ECOLOGY L.Q. 1 (1991).

Ensure that remaining legal imports of mercury do not fuel unauthorized gold mining operations	Unintended consequences; prevention; user-pays	Lawful imports limited to critical non-mining sectors, paired with strict import quotas Registration systems for mercury importers, transporters, vendors, and users GPS devices on authorized imports, tracking movement from import to authorized end use, financed by importers
Distinguish between informal and illegal mining	Sustainable development; limited criminalization	Clear criteria establishing illegal mining ineligible for formalization (e.g., operation in a protected area) and illegal mining eligible for formalization (e.g., mining without a permit in an area zoned for mining)
Deter the worst forms of illegal gold mining with mercury and effectively punish the worst offenders	Prevention; triage; deterrence; proportionality	Ensure authorized penalties meet UNTOC definition of "serious crime" Liberal use of criminal and civil forfeiture to target assets acquired through or used in illegal mining operations Routine use of specialized investigation techniques (e.g., undercover agents, wiretaps) in cases involving gold mining with mercury Enhanced penalties for leadership roles Incentives for lower-level operatives to cooperate and provide testimony Protocols for formal and informal cross-border cooperation
Encourage the formalization of informal miners without encouraging new entrants into the informal mining sector	Incentives; sustainable development; intergenerational equity	Limited amnesty periods for informal miners who register and complete formalization process; tax benefits (e.g. reduced taxes or tax-free operation) for a limited time following or parallel with formalization; grants and low- or no-interest credit lines for purchase of mercury-free mining technology All such incentives should be contingent upon verified abandonment of mercury and other detrimental practices (e.g., suction dredging)
Ensure formalization	Measurability and verification	Mandatory reporting, video monitoring, use of observers at mining sites, increased field audits,

produces verifiable improvements		and regular monitoring of mercury levels in nearby ecosystems (hair, fish, water, and soil sampling)
Foster community participation in the fight against illegal gold mining and mercury, especially among IP&LCs	Community participation in decision-making; protection of the most vulnerable; subsidiarity and local empowerment	Recognize legal authority of IP&LCs and municipalities to declare geographical areas as "mining free" or "mercury free" Establish and advertise confidential hotlines to solicit denouncements and tips Consider limited deputization of IP&LC community members Bolster witness protection programs and local police presence to prevent retaliation
Promote mercury-free alternatives for gold mining	Incentives; subsidiarity and local empowerment	Grants and low- or no-interest credit lines for purchase of mercury-free mining technology (e.g., gravimetric tables) Reduced tax and royalty rates for miners using the same
Facilitate alternative livelihoods	Incentives; community participation in decision-making relating; protection of the most vulnerable; subsidiarity and local empowerment	Grants and low- or no-interest credit lines for development of small businesses and cooperatives that work in harmony with the lands and waters most effected by alluvial gold mining (e.g., coffee cultivation, sustainable fishing, aviculture with native bees) Formalization of land tenure rights (including in community tenure situations) Certification programs for products, subsidized vocational training, support of community-based management of natural resources, and payments for ecosystem services
Advance traceability of gold in the global market	Common but differentiated responsibilities; measurability and verification; user pays	Supply chain due diligence obligations for buyers, smelters, and exporters; chain of custody documentation requirements; digital tracking systems
Secure remediation and restoration of contaminated ecosystems	Polluter-pays	Criminal penalties directed to remediation/restoration rather than general treasury

		Mandatory civil restoration when environmental damage exceeds a fixed threshold Laws establishing civil responsibility for purchasers and other supply-chain actors who knowingly or negligently purchase, process, or re-sell illegally mined gold

Each of the countries we analyzed has taken steps toward achieving the goals set forth above. The following discussion describes how law and policy in each country address the various challenges presented by the gold and mercury crisis. Because international agreements and other sources of international law and policy often speak to the matter as much as domestic law, we begin there before turning to national instruments.

A. International Law and Policy

Apart from the Minamata Convention, several other international instruments bear on the issues associated with mercury-based gold mining in the Amazon. These include the Convention on Biological Diversity (CBD) and the Kunming-Montreal Global Biodiversity Framework (KM-GBF); the International Labour Organization's Indigenous and Tribal People's Convention (ILO Convention 169); the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP); the American Convention on Human Rights; the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (the Escazú Agreement); work within the Andean Community (AC or CAN) and the Amazonian Cooperation Treaty Organization (ACTO or OTCA); and the UN Convention against Transnational Organized Crime (UNTOC).

1. The CBD and KM-GBF

While not directly focused on either mining or mercury, the CBD has much to say on ecosystems like those of the Amazon Basin by virtue of the treaty's goal to conserve biological diversity. Because gold mining using mercury is such a threat to the Amazon's biological diversity, the CBD and its implementing directives under the KM-GBF have become an important space for policy development.

For example, in designing National Biodiversity Strategies and Action Plans (NBSAPs) under Article 6 of the CBD, Parties should include measures aimed at reducing mercury in gold mining—and, for that matter, measures addressing related topics like formalization—as such measures speak to several of the KM-GBF targets.[130] In fact, gold mining using mercury is essentially incompatible with the KM-GBF targets related to the reduction of pollution from hazardous chemicals, restoration of degraded terrestrial and freshwater ecosystems, the cessation of further

[130] Here, we note some NBSAPs prior to the GBF already addressed mercury in mining. *See, e.g.*, Rwanda NBSAP (2016), https://www.rema.gov.rw/fileadmin/templates/Documents/rema_doc/publications/Planning%20docs/NATIONAL%20BIODIVERSITY%20STRATEGY%20AND%20ACTION%20PLAN%20Final%20version.pdf.

losses of biodiverse rich areas, and the preservation of sustainable livelihoods for IP&LC communities, among others.[131]

2. The Amazon Cooperation Treaty and the Declaration of Belém

Recognizing that the Amazon Basin transcends national boundaries, Bolivia, Brazil, Colombia, Ecuador, Peru, Suriname, and Venezuela in 1978 forged the Amazon Cooperation Treaty (ACT),[132] where regional cooperative work is carried out by the Amazonian Cooperation Treaty Organization (ACTO or OTCA).[133] The treaty is framed by the Parties' overarching agreement to "undertake joint actions and efforts to promote the harmonious development of their respective territories in such a way that these joint actions produce equitable and mutually beneficial results and achieve also the preservation of the environment, and the conservation and rational utilization of the natural resources of these territories."[134] As a broad framework treaty, the ACT institutionalizes and guides regional cooperation between the Parties.[135]

As concerns mercury, one of the more important developments came in 2023 with the Declaration of Belém.[136] A sweeping document, the Declaration of Belém injects new energy into the ACTO by calling for development of a fresh agenda responsive to emerging problems in the Amazon Basin.[137] Although the Declaration of Belém mentions mercury in only three places, these references demonstrate basin-wide agreement around the problem of mercury.[138] Civil-society organizations, among others, may latch on to these mercury-related statements to push the ACTO, and its constituent Parties, to follow through on their words.

Further, although not specific to mercury and gold mining, the Declaration of Belém announced the creation of the Amazon International Police Cooperation Center, a hub designed to "articulate with the competent authorities of each State Party . . . for the exchange of information, intelligence

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[131] *See generally* CBD/COP/DEC/15/4, *Kunming-Montreal Global Biodiversity Framework* (Dec. 19, 2022), https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf; *see also* UNEP/MC/COP.6/20, *Road Map for Enhancing Co-benefits from Implementation of the Minamata Convention and the Kunming-Montreal Global Biodiversity Framework* (July 26, 2025), https://minamataconvention.org/sites/default/files/documents/working_document/UNEP-MC-COP6-20-Roadmap-Biodiversity_English.pdf.

[132] Treaty for Amazonian Cooperation, July 5, 1978, 1202 U.N.T.S. 51 [hereinafter ACT].
[133] ACTO, *Who We Are*, https://otca.org/en/project/amazon-cooperation-treaty/
[134] ACT, *supra* n. 132, art. 1.
[135] *See generally id.*
[136] ACTO, Declaration of Belém (Aug. 9, 2023), https://otca.org/wp-content/uploads/2024/06/EN_web-Belem_Declaration_XVI_MRE.pdf.
[137] *Id.*
[138] *Id.* Specifically, signing countries committed to, *inter alia*, "[s]timulate the strengthening of actions for monitoring water quality for human consumption in the region, . . ., focusing on the exposure to mercury and other hazardous substance from mining activities/small-scale and large-scale mining, in particular those that affect indigenous peoples and local and traditional communities, and to carry out prevention and remediation activities and to strengthen regional and international cooperation for the fight against illegal mining, illegal trade, and other related crimes"; "[w]ork in an articulated manner . . . especially in terms of exchange of information on the trade and smuggling of mercury and other heavy metals and the harmonization of public policies for their regulation and control"; and "[s]trengthen actions to monitor the health of populations exposed to chemicals, particularly mercury[.]" *Id.*

and the development of investigations, warnings and training activities so as to strengthen regional cooperation and contribute to the eradication of illicit activities, including environmental and related crimes[.]"[139] Officially inaugurated in October 2025, the Amazon International Police Cooperation Center could make a profound difference in fighting transborder crime, including mercury trafficking and illegal gold mining.[140]

3. The Andean Community's Policy on the Fight Against Illegal Mining and the Andean Mercury Observatory

The Andean Community is one of the more promising regional spaces for collaborative policy approaches. Importantly, Decisions of the Andean Community are binding on Parties and supersede any national legal framework in the event of conflict.[141] This is particularly important in the mercury and illegal mining contexts, as the Andean Community has issued Decisions, discussed below, that (1) set forth a policy on illegal mining and (2) establish an observatory dedicated to mercury.[142]

In 2012, the Andean Community issued Decision 774.[143] Entitled "Andean Policy on the Fight Against Illegal Mining," Decision 774 charts important positions and creates a legal framework for cross-border cooperation, with a particular focus on traceability, investigation, cross-border collaboration, and enforcement. Yet, according to one of the authors of this Article (Dr. Ipenza, an experienced practitioner before the Andean Community), the Andean Community countries have failed to pursue the Decision's directives with sufficient energy. But if Decision 774 in part represents a missed opportunity, nothing stops the Andean Community and its member states from redoubling efforts under Directive 774, as it remains in full force and effect.

Decision 774 contains six Articles of relevance to gold mining with mercury: Articles 2, 4, 5, 6, 7, and 8.[144] Collectively, these establish a comprehensive regional framework for addressing illegal mining through coordinated action among Andean Community countries. In terms of ends and means, Decision 774 seeks to protect security, economic interests, natural resources, the environment, and public health by strengthening controls over extraction, transport, processing, and trade of minerals such as gold, as well as the machinery, fuel, and supplies used in illegal

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[139] *Id.*
[140] *See UNODC Brazil and the Amazon International Police Cooperation Centre Discuss Cooperation Against Organized Crime*, UNODC Brazil, https://www.unodc.org/cofrb/en/noticias/2025/10/unodc-brazil-and-the-amazon-international-police-cooperation-centre-discuss-cooperation-against-organized-crime.html.
[141] *See* Andean Community of Nations, *Legal Norms* ("One of the main milestones of the Andean Community is the Community Legal Order, which is supranational in nature [and] binding[.]"), https://www.comunidadandina.org/normativa-andina/decisiones/1/?q=.
[142] In addition to Decisions 774 and 844, we would be remiss not to mention Decision 922. The latter Decision, issued in January 2024, calls for joint operations and planning against illegal mining and other transnational criminal threats. *See* Andean Council of Ministers of Foreign Affairs & Andean Cmty. Comm'n, Decision 922 (2024), https://www.comunidadandina.org/normativa-files//uploads/DECISION_922_c786c98d9a.pdf.
[143] Andean Council of Ministers of Foreign Affairs & Andean Cmty. Comm'n, Decision 774 (2012), https://www.comunidadandina.org/DocOficialesFiles/Gacetas/Gace2103.pdf.
[144] *Id.*

mining.[145] The Decision promotes cooperation to combat associated crimes such as money laundering, and it further requires Parties to adopt legislative, regulatory, and operational measures to prevent illegal mining, impose deterrent penalties, monitor inputs, recover criminal proceeds, and encourage sustainable mineral supply chains.[146]

Building on Decision 774, in 2019 the Andean Community established the "Andean Observatory Responsible for the Management of Official Information on Mercury" through Decision 844.[147] This observatory aims to collect, track, and exchange information among member countries regarding the production, import, export, commercialization, transport, and use of mercury.[148] The Andean Observatory appears to encourage candid discussion of troubling trends. For example, its first report did not shy away from forthright statements on Bolivia's disproportionate share of mercury imports, noting that Bolivia accounted for 80.71% of Andean Community mercury imports between January and June 2021.[149]

4. ILO Convention 169, UNDRIP, the American Convention on Human Rights, and the Escazú Agreement

With few exceptions, the countries discussed in this Article are Parties to ILO Convention 169, the American Convention on Human Rights, and the Escazú Agreement. The exceptions are Peru and Brazil as to the latter instrument; despite signing the Escazú Agreement as adopted in 2018, and notwithstanding ongoing pressure from civil society, Peru and Brazil have yet to ratify or accede to the treaty. In contrast, all five focus countries have signed UNDRIP.

a. Territorial and Natural Resource Rights

ILO Convention 169 memorializes a set of rights related to territory and natural resources. These include the right of Indigenous and tribal peoples (1) to own and/or possess the lands they have traditionally occupied,[150] (2) to use lands "to which they have traditionally had access for their subsistence and traditional activities,"[151] (3) to participate in the use, management, and conservation of natural resources within their territories,[152] (4) in the case of sub-surface minerals or other resources owned by the State, to consultation prior to exploration and extraction and,

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[145] *Id.*
[146] *Id.*
[147] Andean Council of Ministers of Foreign Affairs & Andean Cmty. Comm'n, Decision 844, *Creación del Observatorio Andino encargado de la Gestión de la información oficial en materia de Mercurio* [hereinafter Decision 844] (May 26, 2019), http://www.sice.oas.org/trade/JUNAC/Decisiones/DEC844_s.pdf.
[148] Andean Cmty. Gen. Secretariat, Res. 2197, *Reglamento de funcionamiento del Observatorio Andino Encargado de la Gestión de la Información Oficial en Materia de Mercurio,* Gaceta Oficial del Acuerdo de Cartagena, No. 4229, 1 (April 30, 2021).
[149] Andean Cmty., First Report of the Andean Mercury Observatory (July 7, 2022), https://www.comunidadandina.org/wp-content/uploads/2022/08/I-Informe-Observatorio-Andino-del-Mercurio.pdf.
[150] International Labour Organization, Indigenous and Tribal Peoples Convention, C169, June 27, 1989 [hereinafter "ILO Convention 169"], art. 14.
[151] *Id.*
[152] *Id.*, art. 15.

thereafter, to share in the benefits and receive compensation for any damages,[153] and (5) to enjoy governmental protection that prevents outside parties from taking advantage of Indigenous and tribal peoples so as to acquire ownership, possession, or use rights over their land.[154] This last provision is particularly important in the context of gold mining using mercury, as miners and mining cooperatives have illicitly pushed into Indigenous territories in many parts of the Amazon basin.

UNDRIP reiterates these rights, in some cases with even greater emphasis on the duty of States not simply to *refrain* from infringing Indigenous peoples' rights but to provide *affirmative* protection.[155] For example, after reiterating Indigenous peoples' rights to their traditional lands and resources, Article 26 stresses that "States shall give legal recognition and protection to these lands, territories and resources."[156] Continuing in this vein, Article 29 declares that governments must "establish and implement assistance programmes for indigenous peoples for [the] conservation and protection" of their lands and resources.[157]

b. **Legal Recourse, Access to Information, and Protection of Environmental Defenders**

As Parties to ILO Convention 169, the countries discussed in this Article have committed to offer legal recourse to aggrieved IP&LCs by furnishing a mechanism by which such peoples may initiate "legal proceedings" and "can understand and be understood" in those proceedings.[158]

Notably, the fundamental nature of legal recourse and access to courts has been underscored and broadened through the Escazú Agreement.[159] Unlike ILO Convention 169, rights-holders under the Escazú Agreement are not limited to Indigenous or tribal peoples but extend to all persons. As a whole, the Escazú Agreement seeks to guarantee effective implementation in Latin America and the Caribbean of the rights of access to environmental information, public participation in environmental decision-making processes, and access to justice in environmental matters. And it also seeks to protect environmental defenders, in recognition of the disturbing levels of violence against environmental activists in the region, particularly those working to prevent gold mining with mercury.[160]

Likewise, as discussed below, the Inter-American Court of Human Rights has held that access to legal recourse, as well as access to information and public participation in decision-making affecting the environment, are bedrock rights under the American Convention on Human Rights and customary international law.

c. **Jurisprudence from the Inter-American Court**

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[153] *Id.*
[154] *Id.*, art. 17.
[155] G.A. Res. 61/295, United Nations Declaration on the Rights of Indigenous Peoples (2007).
[156] *Id.*, art. 26.
[157] *Id.*, art. 29.
[158] ILO Convention 169, art. 12.
[159] Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean, Mar. 4, 2018, U.N. Doc. LC/PUB.2018/8/Rev.1 [hereinafter Escazú Agreement].
[160] *Id.*, art. 9.

The Inter-American Court has affirmed several of the above principles in judicial decisions. The Inter-American Commission on Human Rights (IACHR), for its part, has piled on with non-judicial but nevertheless authoritative reports. A few of the jurisprudential highlights include the following:

- Interpreting Article 21 of the American Convention on Human Rights, which enshrines the right of persons to property, the Inter-American Court held this translates to IP&LCs as a right to both traditional territory and traditionally important natural resources. As explained by the Inter-American Court, "the natural resources . . . protected under Article 21 are those natural resources traditionally used and necessary for the very survival, development and continuation of such peoples' way of life."[161] Therefore, to the extent that gold mining using mercury threatens traditionally used natural resources like fish, water, and soil, such activity (especially if conducted by outside actors) undermines rights enshrined in the American Convention on Human Rights. It should be noted, however, that there are instances of community members engaged in gold mining using mercury in their own territories, which stresses relationships within and among community members. To our knowledge, there is no legal precedent or court decision within the Inter-American system that addresses impacts perpetrated by IP&LC community members within their own communities.

- Relatedly, the IACHR has observed that States have a legal obligation to protect IP&LCs from third parties seeking to exploit IP&LC natural resources, especially when the conflict flows in part from a State's failure to formalize territorial claims.[162]

- Foreshadowing rights since memorialized in the Escazú Agreement, the IACHR in 1997 observed that "[t]he quest to guard against environmental conditions which threaten human health requires that individuals have access to: information, participation in relevant decision-making processes, and judicial recourse."[163] Again, all of these elements seem particularly relevant in the context of environmental harm suffered by IP&LCs from gold mining using mercury.

- In the context of concessions to extract natural resources, the Inter-American Court has been particularly adamant about the State's responsibility to avoid facilitating third-party activity with a negative impact on lands or natural resources traditionally used by IP&LCs, again citing the American Convention's provisions on the right to property.[164] Although the jurisprudence in this area concerns formal, legal concessions, the precedent may

[161] I/A Court H.R., *Case of the Saramaka People v. Suriname*, Preliminary Objections, Merits, Reparations and Costs (Nov. 28, 2007), Series C No. 172, par. 122; I/A Court H.R., *Case of the Yakye Axa Indigenous Community v. Paraguay*, Merits, Reparations and Costs (June 17, 2005), Series C No. 125, pars. 124, 137; I/A Court H.R., *Case of the Sawhoyamaxa Indigenous Community v. Paraguay*, Merits, Reparations and Costs, (March 29, 2006), Series C No. 146, pars. 118, 121

[162] IACHR, *Democracy and Human Rights in Venezuela*, Doc. OEA/Ser.L/V/II. Doc. 54, (Dec. 30 2009), pars. 1066, 1071, 1137 – Recs. 1 to 4.

[163] IACHR, *Report on the Situation of Human Rights in Ecuador*, Doc. OEA/Ser.L/V/II.96, Doc. 10 rev.1 (April 24, 1997).

[164] I/A Court H.R., *Case of the Saramaka People v. Suriname, supra* n. 161, par. 148.

suggest a similar duty vis-à-vis informal or illegal activity—such as gold mining—if the government is aware of the situation but fails to intervene.

- In a 1997 report critical of oil exploitation in Amazonian Ecuador, the IACHR went out of its way to clarify that its concerns applied equally to harms from mercury-based gold mining. Specifically, the IACHR wrote as follows: "[I]t must be noted that other types of development activities raise similar factual and legal concerns. One pertinent example concerns the effects of gold mining[.] The processes employed involve various types of chemicals, including cyanide and mercury, which may be emitted into streams and rivers. The toxicity of these substances to humans has been thoroughly documented."[165]

In sum, both the jurisprudence of the Inter-American Court and the publications of the IACHR add to the considerable body of law establishing that (1) IP&LCs have important rights that are often compromised by gold mining using mercury,[166] and (2) States have duties to uphold these rights, no matter how challenging the situation.

5. UNTOC and Mutual Legal Assistance

Insofar as transnational criminal organizations have become involved with mercury-based gold mining—either as a new revenue source, a vehicle to launder money from drug-trafficking, or both—UNTOC warrants consideration.[167] All five countries are Parties to UNTOC, and although it is not designed to assist with many of the problems associated with illegal and informal gold mining—issues like traceability and formalization lie beyond its ambit—the treaty nevertheless provides a framework for cross-border collaboration in many situations.

When applicable, UNTOC provides tools such as mutual legal assistance (MLA), extradition, and technical assistance. Significantly, however, these tools are only available in certain situations, with two broad categories of crime triggering the treaty.[168] First, UNTOC's international cooperation mechanisms are triggered when the underlying crime consists of participation in an organized criminal group, laundering proceeds of a crime, corruption, or obstruction of justice (and when the offence is also "transnational in nature" and involves an "organized criminal group").[169] Second, in a provision of potentially far broader reach, UNTOC's cooperation mechanisms are triggered by any other "serious crime" that is also "transnational in nature" and involves an "organized criminal group."[170] Under UNTOC, a "serious crime" is defined as "conduct constituting an offence punishable by a maximum deprivation of liberty of at least four years or a more serious penalty."[171] To translate, a "serious crime" for purposes of the treaty is one that could, according to the relevant Party's national law, result in four years in prison.

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[165] IACHR, *Report on the Situation of Human Rights in Ecuador*, *supra* n. 163.
[166] Here, we acknowledge the nuance surrounding the term "IP&LC" and that the jurisprudence often speaks to "Indigenous peoples."
[167] United Nations Convention Against Transnational Organized Crime and the Protocols Thereto, Nov. 15, 2000, 2225 U.N.T.S. 209 [hereinafter UNTOC].
[168] *Id.*, art. 3.
[169] *Id.*, art. 3(1)(a), 5, 6, 8, 23.
[170] *Id.*, art. 3(1)(b).
[171] *Id.*, art. 2(b).

With few exceptions, the focus countries' legislation meets the "serious crime" threshold, both for illegal mining and for related offenses like trafficking mercury.[172] (To cite one exception, Ecuadorian law authorizes only one to three years' imprisonment as a punishment for illicit *artisanal* mining.[173]) Thus, so long as the other UNTOC elements are met (i.e., the activity is transnational in nature and involves an organized criminal group),[174] the focus countries may take advantage of UNTOC in cases involving mercury and illegal gold mining.

To give a few examples of where UNTOC would apply, imagine any of the following scenarios: (1) a small network of individuals cooperate to regularly traffic mercury from Bolivia to Peru for use in gold mining in Peru; (2) a Colombian drug trafficking organization, with activities in several countries, decides to finance an illegal gold mining operation in Colombia; (3) several individuals in Brazil establish a fraud and bribery racket to export illegally mined gold from Brazil to foreign markets. As basic as these examples may be, they illustrate the point: UNTOC fits well.

But what is the practical upshot of triggering UNTOC? One benefit is unlocking MLA. MLA is a formal process for one government to receive certain forms of legal assistance from another government.[175] This can include, among others, execution of searches and seizures in the jurisdiction of the requested State, compulsion of testimony from witnesses in the requested State, and tracing proceeds of crime located in the requested State.[176] MLA is also contemplated (and in fact more easily triggered) in the Inter-American Convention on Mutual Assistance in Criminal Matters, to which all five countries are parties.[177]

Although it is difficult to discern the extent to which the focus countries have used MLA to investigate transnational crime involving illegal gold mining or mercury trade, at least one report relying on government data indicates that Peru regularly sends and receives MLA requests in cases involving environmental crimes.[178] As a general observation, it would behoove all five countries to consider using MLA to more effectively investigate and disrupt transnational organized criminal groups associated with mercury and illegal gold mining.[179]

B. Domestic Law and Policy

Ultimately, the goals of the Minamata Convention and other international instruments can only be achieved through effective national legislation and policy. With that in mind, this section reviews each country's laws and policies germane to the use of mercury in gold mining and ASGM more broadly. Each country studied has developed a raft of laws and policy documents relating to

[172] *See infra* Pt. II.B.
[173] Código Orgánico Integral Penal, art. 260 (2014).
[174] *See* UNTOC, art. 3(2) (explaining when an offense is "transnational in nature"); art.2(a) (defining "organized criminal group").
[175] UNTOC, *supra* n. 167, art. 18;
[176] *Id.*
[177] OAS, Inter-American Convention on Mutual Legal Assistance in Criminal Matters (May 23, 1992).
[178] Nicholas Fromherz & Erica Lyman, *Asistencia Legal Mutua Internacional en Casos de Trafico de Vida Silvestre en el Perú: Guía Práctica* (ABA 2021).
[179] Beyond the world of binding treaties, the focus countries can also use soft-law instruments to forge collaborative approaches to cross-border problems, including problems related to gold mining and mercury. For instance, Bolivia and Peru signed the Cobija Declaration in this vein in 2018. *Declaración de Cobija: Encuentro Presidencial y Cuarta Reunión del Gabinete Ministerial Binacional Perú-Bolivia* (2018), https://sinia.minam.gob.pe/sites/default/files/siar-puno/archivos/public/docs/declaracion_de_cobija.pdf.

mercury use in gold mining and associated issues. Many were developed prior to the Minamata Convention's entry into force and may need updating; others have come into being since and were no doubt influenced by Minamata's requirements and objectives.

The legal review serves two fundamental purposes. First, we explain how national laws and regulations treat gold mining using mercury and associated activities. Second, and more analytically, we evaluate these norms' efficacy and establish the basis for the broader observations and recommendations set forth in Part III.

Because the political, social, and economic landscapes in each country present unique features, the discussion of each country begins with a brief overview of the national situation. Building on the broader factual overview set forth in Part I, these discussions set the stage for a contextually informed review of the laws and policies in question.

1. Peru

The scale and depth of Peru's struggle with mercury and gold mining are hard to overstate. With the price of gold soaring and the mineral existing in abundant quantities throughout the country, illegal and informal gold mining with mercury has emerged as perhaps Peru's most pressing environmental problem.[180]

Acknowledging that the theoretical and legal distinction between informal and illegal gold mining in Peru is nuanced (see below for more details), the number of people involved in this activity is considerable. Up to 80% of ASGM operators in the country work informally, accounting for some 300,000 jobs.[181]

Mercury-based mining has had a particularly profound impact on human health and the environment in Madre de Dios, in southern Peru. One USAID study estimated that approximately 78% of adults in Puerto Maldonado, the region's capital, have mercury concentration above safe levels.[182] Between 2021 and 2024 alone, a separate study recorded over 30,000 hectares of deforestation associated with ASGM mining.[183] Meanwhile, mercury contamination has been found in intact forests in the Madre de Dios region, including in old-growth forests.[184]

Gold mining in Madre de Dios has fueled violence, including homicides and human trafficking.[185] In 2020, Madre de Dios had the highest murder rate in Peru.[186] The next year, Madre de Dios saw

[180] Dan Collyns, *"Scratch the Earth, There's Gold!": Small Miners, Big Firms and Armed Gangs Fight over Peru's Mineral Wealth*, THE GUARDIAN (May 29, 2025), https://www.theguardian.com/global-development/2025/may/29/gold-peru-small-miners-big-mining-firms-armed-gangs-mineral-wealth.
[181] Fatih Aranoglu, et al., *supra* n. 36.
[182] Dan Collyns, *Peru's Crackdown on Illegal Gold Mining a Success, but Only Briefly,* MONGABAY (Dec. 5, 2023), https://news.mongabay.com/2023/12/perus-crackdown-on-illegal-gold-mining-a-success-but-only-briefly-study-shows/.
[183] *MAAP #208: Gold Mining in the Southern Peruvian Amazon, Summary 2021-2024*, MONITORING OF THE ANDES AMAZON PROGRAM (May 8, 2024), https://www.maapprogram.org/maap-208-gold-mining-in-the-southern-peruvian-amazon-summary-2021-2024/.
[184] Jacqueline R. Gerson, et al., *supra* n. 39.
[185] *See, e.g., Gold Mining in Madre de Dios*, *supra* n. 39.
[186] *Id.*

200 killings, with 40% of the victims hailing from Indigenous communities.[187] Many of the illegal mines in the region are operated by criminal gangs; apart from killing and human trafficking, these gangs engage in land grabs, drug trafficking, extortion, and prostitution, all while contributing to shocking levels of gender-based violence.[188]

In more positive news, a group of women miners have moved away from the use of mercury in ASGM, instead opting for gravimetric tables.[189] Other operations have adopted the gravimetric method in order to obtain the "Fairmined Ecological Gold" certification.[190] While this is a welcome phenomenon, scaling up is a challenge, in part because many purchasers of gold are unwilling to pay more for cleaner gold.[191]

With regard to formalization, Peru has made some strides, having formalized over 9,600 artisanal miners as of the end of 2021.[192] Nevertheless, formalization has yielded "mixed results."[193] While formal ASGM operations have "improved health and safety practices and labor conditions," formalized miners feel increased scrutiny from governmental authorities and report difficulties obtaining technical support and capital investment.[194] According to one study, "the problems and weaknesses within the approach may inadvertently push miners back into informality."[195]

Peru has repeatedly extended the deadlines controlling the formalization process,[196] allowing informal miners to continue operating under temporary permits. While Peru's formalization program is intended to help miners transition to a legal framework, critics argue that the "system has been misused, allowing illegal mining to persist and even expand, as enforcement remains weak."[197] Only a small portion of Peru's informal miners have successfully formalized since the program's launch in 2012. These results underscore the claim that repeated deadline extensions have allowed more miners to exploit the situation, continuing to operate illegally while evading proper regulation.[198] The legal discussion that follows explores the bases for these and other critiques.

a. Introduction to Law and Policy Response

[187] *Id.*
[188] *Id.*
[189] Dan Collyns, *In Peru's Amazon Women Gold Miners Ditch Toxic Mercury*, CONTEXT (Apr. 9, 2025), https://www.context.news/nature/in-perus-amazon-women-gold-miners-ditch-toxic-mercury.
[190] Izzy Sasada, *Gold Standard: Peru Miners Phase Out Mercury in Bid to Clean up Industry*, THE GUARDIAN (Apr. 21, 2023), https://www.theguardian.com/global-development/2023/apr/21/gold-standard-peru-miners-phase-out-mercury-in-bid-to-clean-up-industry.
[191] Dan Collyns, *supra* n. 189.
[192] Gerardo Martinez, et al., *Formalization Is Just the Beginning: Analyzing Post-Formalization Successes and Challenges in Peru's Small-Scale Gold Mining Sector*, 74 RESOURCES POLICY 102390 (2021).
[193] *Id.*
[194] *Id.*
[195] *Id.*
[196] Mitsue Valencia, *Peru Congress Extends Controversial Temporary Mining Permits Amid Allegations of Facilitating Illegal Activities*, JURISTNEWS (Dec. 1, 2024), https://www.jurist.org/news/2024/12/peru-congress-extends-controversial-temporary-mining-permits-amid-allegations-of-facilitating-illegal-activities/.
[197] *Id.*
[198] *Id.*

In line with its Minamata obligations, Peru has for many years pursued the related goals of formalization of ASGM where possible;[199] reduction of mercury use in all cases;[200] and where formalization is not possible (e.g., in protected areas or bodies of water), interdiction and prosecution.[201] While promising in part, the Peruvian legal architecture bearing on mercury-based gold mining is complex and, in some instances, works at cross-purposes with the country's overall policy goals.

b. The Difference Between Informal and Illegal Gold Mining in Peru

As with the other countries analyzed in this Article, the size of Peru's informal mining sector complicates efforts to monitor and regulate how such miners operate. Peru is the leading gold producer in South America, and 80% of ASGM operators in Peru work informally.[202] It is also the largest producer of mercury emissions globally.[203]

Compounding the problem, gold is also extracted in Peru by fully illegal miners.[204] The distinction between "informal" and "illegal" gold mining may seem semantic, but it is critical to understand. National policy treats the former as eligible for incorporation in the formal, legal economy, while the government has effectively classified the latter as of no social value.

What, then, is the difference? "Informal" mining *could* be legal through operational changes that remain feasible without altering the basic character of the operation (e.g., an unlicensed gold mining operation on lands zoned as multi-use).[205] While this may require changes to the operation, such as removing underaged employees, paying license fees and taxes, and ending the use of mercury, the operation may continue in the same basic place and in much (but not precisely) the same manner.[206]

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[199] *See Evaluación Inicial del Convenio de Minamata Sobre el Mercurio en el Perú*, MINAM (2020), https://minamataconvention.org/sites/default/files/documents/minamata_initial_assessment/Peru-MIA-2020-ES.pdf (highlighting formalization as a strategy); *see also Tras el Dinero del Oro Ilícito: El Caso de Perú*, OAS (2021), https://www.oas.org/es/sms/ddot/docs/Tras-el-dinero-del-oro-ilicito-El-caso-de-Peru.pdf, at 9-11 (summarizing legal and policy framework, including formalization).

[200] *See Evaluación Inicial del Convenio de Minamata Sobre el Mercurio en el Perú*, *supra* n. 199, at 18-19 (articulating "priority measures . . . to contribute to the reduction of risks, emissions, and releases of mercury"); *see also Tras el Dinero del Oro Ilícito*, *supra* n. 199, at 9-11 (discussing need to reduce mercury use and imports).

[201] *See Tras el Dinero del Oro Ilícito*, *supra* n. 199, at 9-11 (discussing application of criminal provisions).

[202] Fatih Aranoglu, et al., *supra* n. 37.

[203] Xinran Qiu et al., *Declines in Anthropogenic Mercury Emissions in the Global North and China Offset by the Global South*, 16 NAT. COMMUN. 1179 (2025).

[204] As one might imagine, parsing the data on gold produced from illegal miners, on the one hand, and informal miners, on the other, can be a challenge. Accordingly, many reports seem to combine the two for statistical purposes. *See, e.g.,* Dan Collyns, *supra* n. 180 ("Artisanal gold mining, 90% of it illegal or informal, accounts for at least half of the economy in the sparsely populated region of Madre de Dios[.]")

[205] For the definition in Spanish, *see* Legislative Decree No. 1336, art. 2 (2017), https://www.minam.gob.pe/disposiciones/decreto-legislativo-n-1336/.

[206] *See generally* Geraldine Hernández, *What Are the Differences Between Illegal Mining, Informal Mining, and Artisanal Mining*, RPP (May 5, 2025) https://rpp.pe/economia/economia/cuales-son-las-diferencias-entre-mineria-ilegal-informal-y-artesanal-informe-reinfo-ley-mape-noticia-1601292?ref=rpp#.

In contrast, "illegal" mining in Peru means activity that is so far removed from the legal paradigm that the only option is repression. The primary hallmark of illegal mining is *where* it takes place, such as in a protected area or in a body of water.[207]

One other key to distinguishing "informal" from "illegal" mining in Peru is whether the actor has begun formalization by enlisting with the *Registro Integral de Formalización Minera* (REINFO), created through Legislative Decree No. 1293.[208] An operator or operation that has not registered with the REINFO remains, for purposes of administrative and criminal sanctions, "illegal" even if the operator or operation is *eligible* for registration.[209]

d. Formalization

Peru created the REINFO as its contemporary formalization model in 2016.[210] Among other things, the relevant norm declared mining formalization to be a national priority and directed informal miners operating within zones permitted for mining to register with REINFO within 120 days.[211] Apart from the requirement that they operate within permitted zones, the decree further limited eligibility to ASGM miners who had been operating continuously for at least five years.[212] The decree established that persons who failed to register with REINFO would be subject to otherwise applicable sanctions for their mining activity. In other words, the basic trade-off was this: register with REINFO to avoid exposure to sanctions. The otherwise applicable sanctions include seizure of equipment, administrative fines and injunctions, and criminal penalties.

Shortly thereafter, Peru issued Legislative Decree No. 1336 (2017) to further define the requirements and process for formalization. In addition to clarifying the term "informal mining," Decree No. 1336 introduced the rule that formalization requires approval of an Environmental Management Instrument and the accreditation of rights over the concession and land. Crucially, it tasked the Environmental Assessment and Control Agency with monitoring miners' compliance with the relevant Environmental Management Instrument. Significantly, the Decree did not require abandonment of mercury by miners seeking formalization, although it did underscore that the Ministry of Energy and Mines would seek to promote "private investment for technological improvement, contributing to the reduction of mercury use" in ASGM.[213]

Peru's formalization program has always revolved around two key deadlines: one for initial registration (indicating the miner's commitment to formalization) and one for completion of the process (i.e., achieving compliance with all legal prerequisites, including receipt of an environmental license).[214] If the formalization process were completely open-ended, this would

[207] Decreto Legislativo No. 1105 (2012), art. 3, https://www.minam.gob.pe/disposiciones/decreto-legislativo-n-1105/. Note, however, that Article 3 defines illegal mining to also include mining carried out with equipment or machinery that "does not correspond" to the type of mining performed. *See also* Geraldine Hernández, *supra* n. 206.
[208] Decreto Legislativo No. 1293 (2017), art. 3-4, https://www.minam.gob.pe/wp-content/uploads/2017/06/DLeg-1293.pdf.
[209] *Id.*

[211] *Id.*, art. 4.
[212] *Id.*
[213] Legislative Decree No. 1336 (2017).
[214] Interview with Cesar Ipenza Peralta (April 15, 2025).

allow persons who are not currently engaged in informal mining to begin mining informally, knowing a pathway for formalization would always be available.[215] Thus, Peru long ago made the policy decision to limit registration with a deadline. To be clear, the deadline for registration does not mean that persons not currently engaged in mining are prohibited from entering the sector. Instead, such persons must go through the "ordinary" process, wherein they must obtain all necessary licenses *prior to* beginning mining.[216] Formalization is an exception to the rule, common in most countries, that one needs a license before commencing mining activities

Fast forward to 2019. With the number of miners who had initiated the formalization process still underwhelming, the legislature passed Law No. 31007, extending the deadline for registration with REINFO through the end of 2021. That particular deadline (again, only for initial registration as opposed to completion of the process) has not been extended since.[217]

Finally, at the end of 2024, Congress voted overwhelmingly to extend the deadline for duly registered miners to complete formalization once more, to run until June 30, 2025. The deadline was extended yet again in late June 2025 for another six months.[218] Then, days before that new deadline was set to expire, a fresh law extended the deadline to December 31, 2026.[219]

Despite (and perhaps because of) these extensions, the formalization regime has been roundly criticized as ineffective. According to official data, as of late 2024, slightly more than 90,000 miners had registered with REINFO since its launch in 2017.[220] Of those 90,265 inscriptions, however, only 2,107 had achieved formalization.[221] Some 65,000 registrants had been suspended for various reasons.[222] The reasons behind the suspended registrations vary, from lack of a taxpayer number to failure to obtain an Environmental Management Instrument.[223]

While it is difficult to draw firm conclusions about the causes for Peru's struggles with formalization, at least two points seem clear. First, Peru has not made nearly as much headway as one would hope. Second, it appears the chronic extensions may have contributed to the problem of low formalization rates, both in terms of initial registration and, more significantly, in terms of completing the process. After all, what is the rush if, as seems to be the case, the deadline will be

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[215] *Id.*
[216] *Id.*
[217] *See* Yvette Sierra Praeli, *Pese a Críticas, Congreso Peruano Busca Aprobar Ley que Favorece a Minería Ilegal*, MONGABAY (Feb. 12, 2024), https://es.mongabay.com/2024/02/congreso-peruano-busca-aprobar-ley-que-favorece-a-mineria-ilegal/ ("Registration for Reinfo had closed in 2021, and until now, the deadline extensions approved by Congress had only covered the formalization process for those who were already registered.").
[218] *MINEM Anuncia Ampliación del Plazo del Proceso de Formalización Minera Hasta el 31 de Diciembre de 2025*, MINEM (June 23, 2025), https://www.gob.pe/institucion/minem/noticias/1192963-minem-anuncia-ampliacion-del-plazo-del-proceso-de-formalizacion-minera-hasta-el-31-de-diciembre-de-2025.
[219] Ley No. 32537 (2025), https://img.lpderecho.pe/wp-content/uploads/2025/12/Ley-32537-LPDerecho.pdf.
[220] Evelin Meza Capcha, *Solo el 2% de los Mineros se Formalizó en Perú tras Siete Años del REINFO*, INFOBAE (Dec. 1, 2024), https://www.infobae.com/peru/2024/12/01/solo-el-2-de-los-mineros-se-formalizo-en-peru-tras-siete-anos-del-reinfo/.
[221] *Id.*
[222] *Id.*
[223] *Id.*

extended over and over? Although these extensions may be well-intentioned, at some point a firm deadline must be established to incentivize formalization once and for all.[224]

Alternatively, if the government elects to proceed without a true deadline, it should at least establish clear benefits for important milestones: registration, approval of an environmental management plan, compliance with tax obligations, and, perhaps most vitally, demonstrated use of mercury-free mining techniques. Here, though, it is important to note a major risk of an entirely open-ended program, even if coupled with milestone incentives: If an informal miner can access the benefits at any point, regardless of how long they have been engaged in mining (e.g., without showing that they have been mining since, say, 2015), this could encourage people to begin mining informally. If Peru's goal is to bring existing informal miners into the fold *and* alter the status quo of a new crop of informal miners every year, deadlines both for registration and for completing the process seem critical. Again, imposing a registration deadline does not necessarily mean blocking new entrants into ASGM mining; it simply means that aspiring miners would have to proceed through the "ordinary" process of obtaining a license *prior* to breaking ground.

e. Mercury Use in Gold Mining and Imports of Mercury for Use in Gold Mining

Peru does not explicitly prohibit the use of mercury in gold mining although its use may be illegal in many cases (e.g., for want of a permit, when used in areas not zoned for gold mining, when the user has not enlisted in the Register of Mercury Users, etc.). This is a major shortcoming.

Cognizant of this gap, several actors have called for legislation to phase out mercury use in gold mining, with a complete prohibition by 2030. These calls include the introduction of at least one bill to this effect[225] and, more recently, a civil-society proposal in the context of a push for new sector-wide legislation.[226] Movement around sector-wide legislation is discussed in more detail below, as it involves a suite of reform ideas beyond mercury prohibition.

Related to use, of course, is the issue of imports. Peru has not banned imports despite several popular press articles stating as much. Instead, Peru has chosen to severely restrict but nevertheless allow mercury imports, subject to demanding controls under 2012's Legislative Decree No. 1103,[227] which have apparently led to dramatic decreases in legal imports. The following graphic shows declared imports dropping significantly after 2013 and especially after 2014.

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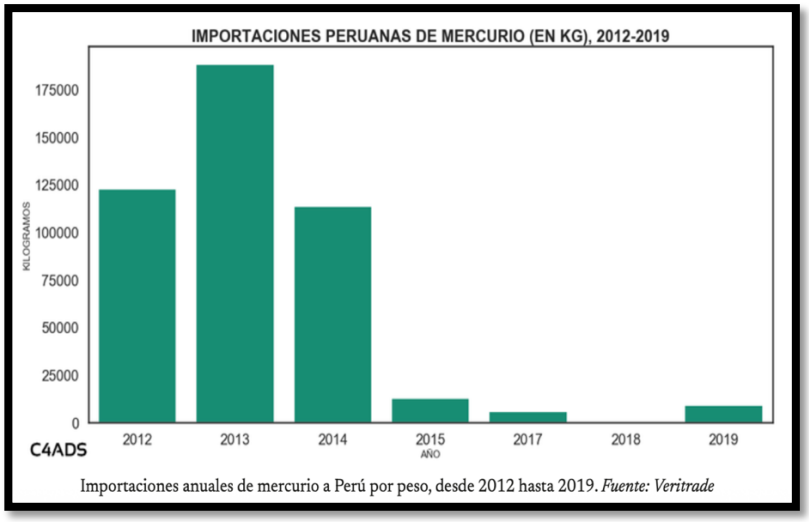
[224] Local NGOs have denounced these extensions as tantamount to Congress abdicating its duty to reduce informal and illegal mining. *See, e.g.*, *Congresistas que Aprueben el REINFO Serán Cómplices de la Minería Ilegal*, OBSERVATORIO DE MINERÍA ILEGAL, https://www.observatoriomineriailegal.org.pe/archives/portfolio-items/pronunciamiento-congresistas-que-aprueben-reinfo-seran-complices-mineria-ilegal.

[225] Congressman Malaga Trillo presented Bill 6906/2023-CR in 2024, calling for the progressive reduction of mercury use and its complete elimination by 2030. Proyecto de Ley 6906/2023-CR (Jan. 29, 2024), https://vlex.com.pe/vid/proyecto-ley-n-06906-980576634.

[226] Cesar Ipenza Peralta et al., *10 Propuestas para la Formalización de la Pequeña Minería y Minería Artesanal*, OBSERVATORIO DE MINERÍA ILEGAL (2025), https://www.observatoriomineriailegal.org.pe/wp-content/uploads/2025/03/10Propuestas_LEY_MAPE_OMI_mar25_002.pdf.

[227] Decreto Legislativo No. 1103 (2017), https://www.minam.gob.pe/wp-content/uploads/2017/04/Decreto-Legislativo-N°-1103.pdf.

Image 1: Peruvian Mercury Imports from 2012 to 2019[228]

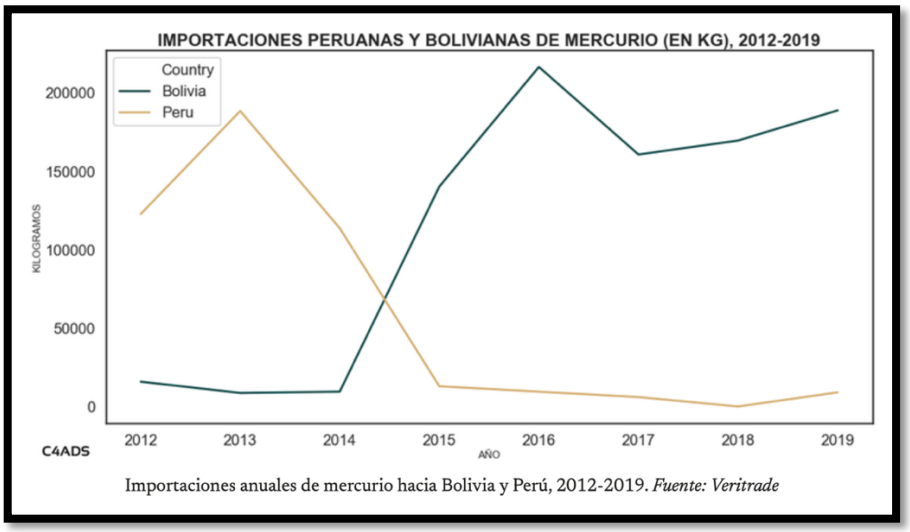


Importaciones anuales de mercurio a Perú por peso, desde 2012 hasta 2019. *Fuente: Veritrade*

This reduction is impressive: Peru is importing far less mercury through legal channels than in years past. Apart from the obvious question around clandestine imports,[229] however, there is another major caveat to the good news. As Peru's declared imports of mercury dropped, they skyrocketed in neighboring Bolivia (*see* Image 2).[230] When combined with the high number of reports tracking the illegal flow of mercury from Bolivia to Peru (and to Brazil),[231] Peru's reduction of imports loses some of its shine. From a regional perspective, the shift of lawful imports from Peru to Bolivia raises a troubling evaluative question: With due respect for Peru's effort, has this translated to less mercury circulating within the Amazon Basin in the aggregate? The answer is unclear.

Image 2: Peruvian Imports Compared with Bolivian Imports[232]

[228] Image from Henry Peyronnin et al., *Senderos Venenosos: El Comercio Ilícito de Mercurio en Perú*, CENTER FOR ADVANCED DEFENSE STUDIES (2020), https://c4ads.org/commentary/senderos-venenosos/.
[229] Again, recent years have seen traffickers smuggling loads of mercury from Mexico to Peru. For example, the *Cártel Jalisco Nueva Generación* is the prime suspect in a recent bust at the Port of Callao. Aaron Worz, *Mercury Trafficking by the Jalisco New Generation Cartel: Investigators Probe Links to a Peruvian Company*, Ojo Publico (March 1, 2026), https://ojo-publico.com/6130/investigan-empresa-peruana-por-traficar-mercurio-vinculado-al-cjng.
[230] Image from Henry Peyronnin et al., *supra* n. 228.
[231] *See The Illegal Route of Mercury from Bolivia to Brazil*, INFOAMAZONIA, https://infoamazonia.org/en/storymap/the-illegal-route-of-mercury-from-bolivia-to-brazil%EF%BF%BC/.
[232] Image from Henry Peyronnin et al., *supra* n. 228.



Importaciones anuales de mercurio hacia Bolivia y Perú, 2012-2019. *Fuente: Veritrade*

f. Prohibited Equipment and Protections for Freshwater Resources

One main goal of formalization is, of course, to shift informal miners away from bad practices and toward better ones, in theory accomplished through compliance with substantive mining and environmental regulations and the acquisition of an Environmental Management Instrument. With this in mind, Peru has issued several laws, decrees, and resolutions to clarify permitted and prohibited practices. A keystone instrument in this area is Legislative Decree No. 1,100 (2012), which, establishes (1) important prohibitions related to the use of dredgers and similar equipment within rivers, lakes, and other freshwater ecosystems, and (2) enforcement powers in interdiction operations.[233] Specifically, Legislative Decree No. 1,100 prohibits the use of a variety of machinery in "small-scale and artisanal mining," including dredges (especially suction dredges) in water bodies and heavy machinery typically used in illegal mining. It also controls the use of mercury and cyanide.[234]

As to enforcement of these prohibitions, Legislative Decree No. 1,100 invests interdiction powers in the Public Ministry (Peru's main prosecutorial unit), the National Police, and the Coast Guard. Prior to taking enforcement actions, one or more of these bodies may contact the Ministry of Mines and Energy to request any authorization or mining title that may correspond to the miners in question.[235] The Ministry of Mines and Energy then has fifteen days to provide this information to the Public Ministry, the National Police, and/or the Coast Guard.[236]

Once the Ministry of Mines and Energy has responded, law-enforcement authorities can begin interdiction and either (1) seize goods, machinery, equipment, and prohibited inputs, or (2) destroy goods or machinery that "due to their characteristics or situation" are not fit for seizure.[237] Importantly, Legislative Decree No. 1,100 provides that the interdiction actions it authorizes do

[233] Decreto Legislativo No. 1100 (2017), https://www.minam.gob.pe/wp-content/uploads/2017/04/DLeg-1100.pdf.
[234] *Id.*
[235] *Id.*
[236] *Id.*
[237] *Id.*

not preclude other administrative, civil, or criminal penalties. Those penalties are discussed in relevant part below.[238]

g. Criminal Penalties and Enforcement

Effective control of illegal gold mining with mercury, in Peru or elsewhere, requires: (1) sufficient enforcement resources; (2) provisions to account for aggravating and mitigating circumstances, allowing for fine-tuning of penalties; and (3) efforts to target financial backers and beneficiaries.

Concerning the latter two points, there appears to be a real or perceived problem of disproportionate enforcement against the lowest, most vulnerable actors in illegal gold mining operations. As with other transnational illicit industries, it may be the weakest actors in environmental crime networks that bear the brunt of prosecution and punishment.[239] Although empirical data on the point is scarce, this dynamic, if true or even simply believed to be true, can undermine the legitimacy of government efforts to fight environmental crime, while dampening community appetite to cooperate with enforcement and reform efforts. To combat these legitimacy-sapping forces, governments can consider establishing higher penalties for aggravating circumstances in offenses involving gold mining with mercury, including, *inter alia*, recidivism, the degree of profit or benefit received, and the defendant's organizational role.

In Peru, the crime of illegal mining is subject to five to eight years' imprisonment, in addition to a fine and ineligibility to secure a mining license or concession for the period of the custodial term.[240] This baseline is reduced, however, in the case of *negligent* illegal mining (e.g., unknowingly operating after expiration of a license) to a penalty of no more than three years' imprisonment or community service.[241] On the other hand, the penalty is increased to between eight to ten years' imprisonment and a higher fine if the illegal mining: (1) occurred in areas not zoned for mining; (2) occurred in protected natural areas, or in lands of native peasant or indigenous communities; (3) used dredges or other similar instruments; (4) used instruments or objects capable of endangering the life, health, or property of persons; (5) affected irrigation systems or water intended for human consumption; (6) was committed by a public official in abuse of their status or privilege; or (7) was committed with the exploitation of minors.[242] At the very least, the fourth circumstance seems tailor-made for mercury cases.

Continuing with this pattern of fine-tuning, Peru has separately criminalized financing illegal mining,[243] obstructing the work of oversight authorities,[244] and trafficking chemicals, such as mercury, and equipment destined for use in illegal mining.[245] The provision on financing illegal

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[238] *Id.*
[239] *See, e.g.,* David Kaimowitz, *Forest Law Enforcement and Rural Livelihoods*, 5 INTERNATIONAL FORESTRY REVIEW 199 (2004) ("Forestry and wildlife departments generally enforce forestry and protected area legislation more vigorously and with less respect for due process and human rights when poor people are involved[.]").
[240] Código Penal del Perú, art. 307-A, 307-G, https://cdn.www.gob.pe/uploads/document/file/3621138/CÓDIGO%20PENAL.pdf.pdf?v=1663014332
[241] *Id.*, art. 307-A.
[242] *Id.*, art. 307-B.
[243] *Id.*, art. 307-C.
[244] *Id.*, art. 307-D.
[245] *Id.*, art. 307-E.

mining, in particular, showcases a determined effort to single out for greater punishment those who make possible (and often organize and benefit the most from) illegal mining.[246] The penalty for this crime is a fine and between four and twelve years' imprisonment, a maximum one-third higher than the penalty corresponding to illegal mining as such.[247]

Building on these provisions, Peru's Law Against Organized Crime enables authorities to more effectively target, prosecute, and punish the intellectual authors and beneficiaries of larger illegal gold mining operations. In broad terms, this law designates several crimes, including illegal mining and money laundering as forms of organized crime; furnishes authorities with several tools (e.g., wiretaps and undercover agents) for more aggressive investigation and prosecution; and establishes higher penalties upon conviction. Although we have not been able to obtain empirical data on the use and effectiveness of this law in the fight against illegal mining with mercury, the law, from a design perspective, paves a pathway for investigators and prosecutors to build larger cases targeting the leaders of illegal mining groups.

Of course, to be effective, these tools depend upon sufficient enforcement resources. Here, recent news from Peru's environmental prosecutors' office—known as "FEMA"—is concerning. In 2025, FEMA chief Dr. Frank Almanza decried budget cuts, declaring that FEMA would not be able to adequately confront illegal mining without additional funding.[248] In fact, Dr. Almanza stated that the budget for illegal mining had been set to "zero."[249] Assuming Dr. Almanza's statements are even close to accurate, this is an obvious area for course correction.

h. New Sector-Wide Legislation

Peru's formalization regime, as currently designed, has failed to achieve its primary objectives. While a significant number of miners have taken the first step toward formalization (i.e., registration), the overwhelming majority have not followed through on subsequent steps. It is those subsequent steps that are most important from the perspective of improving compliance with environmental and other operational norms. In terms of causation, it appears the government has offered a major incentive for initial registration (immunity from prosecution) but not significant incentives for substantive formalization.

Going forward, Peru should ensure that incentives are contingent upon meaningful progress toward formalization and improved environmental performance, including reduced use of mercury. Better still, meaningful incentives should be tied to complete abandonment of mercury.

There appears to be consensus among civil society organizations that Peru needs new sector-wide legislation, and that this legislation should and will reset Peru's formalization regime. While dissecting the details of each proposal is beyond the scope of this Article, a discussion of one leading proposal is instructive. In late 2024, Peru's Council of Ministers approved and presented

[246] *Id.*, art. 307-C.
[247] *Id.*
[248] *Falta de Presupuesto Limita la Lucha Contra la Minería Ilegal, Según el Ministerio Público*, SPDA ACTUALIDAD AMBIENTAL (July 25, 2025), https://www.actualidadambiental.pe/falta-de-presupuesto-limita-la-lucha-contra-la-mineria-ilegal-segun-el-ministerio-publico/.
[249] *Id.*

to Congress bill 9555/2024-PE, hoping to earn enactment and thus stand as the new regulatory framework for ASGM. Although the bill states its purpose is to regulate ASGM in all aspects, it also seems the bill is meant to wipe the slate clean on many past formalization approaches and, in effect, replace the REINFO regime going forward.[250]

Among other features, the bill contemplates creating special zones, free from mining titles held by others, where ASGM actors may operate.[251] These zones would not include areas (such as protected areas) where mining is prohibited. Within these zones, small-scale miners could apply for non-transferable concessions to mine up to four 25-hectare plots. As for artisanal mining, mining permits would be issued by the corresponding regional government (which, it should be noted, heightens the risk of corruption in the eyes of many observers) and would be up to 10 hectares in size.[252]

Employing another strategy to boost formalization, the 2024 bill would also incentivize contracts for mineral exploitation between current holders of mining rights and ASGM miners. As at least one important safeguard against rewarding or incentivizing deforestation and illegal land-grabbing, the bill would prohibit contracts when the area in question has suffered from invasion of third parties' mining rights or is the subject of a denouncement or pending litigation involving invasion.[253]

Finally, and perhaps of most significance environmentally, the 2024 bill provides that, in the context of contracts between mining title holders and ASGM producers, it is the ASGM producers who will be held liable for environmental violations and damages. Although this assignment of responsibility makes sense, both logically and to incentivize mining title holders to forge these contracts (title holders might otherwise find themselves reticent to enter contracts), the 2024 bill goes on to state that title holders have "subsidiary responsibility" for environmental restoration. Although the nature of this responsibility is not clearly defined, the clause seems to suggest that the title holder would be responsible if, for example, the mining tenant that caused the environmental harm was without any means of payment for restoration.

i. Closing Thoughts

Although the 2024 bill is admirable in some respects, it could be better. Specifically, Peru's lawmakers should pay close attention to the recommendations made by civil society organizations, including the need for (1) clearer definitions for artisanal and small-scale miners, as well as differential treatment for newer entrants into the formalization process; (2) a stronger mercury-reduction policy—including a plan to prohibit the use of mercury in ASGM by 2030 at the latest—coupled with more support for cleaner technologies and improved traceability; (3) unambiguous

[250] *See* Alejandro Delgado Tong, *Se aprobó proyecto de Ley MAPE en Consejo de Ministros: ¿en qué consiste?* (Nov. 21, 2024), https://www.infobae.com/peru/2024/11/21/se-aprobo-proyecto-de-ley-mape-en-consejo-de-ministros-en-que-consiste/
[251] Proyecto de Ley No. 9555 (Nov. 11, 2024), art. 4, 7, https://proactivo.com.pe/wp-content/uploads/2024/11/PL0955520241121-Ley-MAPE.pdf.
[252] *Id.*, art. 8.
[253] *Id.*

protections for protected areas, buffer zones, and indigenous territorial reserves; and (4) stronger oversight by national authorities in place of regional authorities.[254]

On the prosecutorial front, recent statements by FEMA head Dr. Frank Almanza that budget cuts specifically jeopardize illegal mining work are extremely concerning, to say the least. Peruvian authorities should prioritize a full budget for FEMA. If financial realities require austerity in some places, cuts to illegal mining work should be avoided at all costs given Dr. Almanza's perception that "among all the environmental crimes, [illegal mining] is today the one that is generating the most worries and problems at the national scale."[255]

Less substantively, but still importantly, Peru should finalize a proper NAP specific to ASGM as required by the Minamata Convention. The country's "National Implementation Plan" available on the Convention website does not suffice when measured against the Convention's instructions and the NAPs of other Parties.[256]

2. Colombia

As in Peru, illegal and informal gold mining with mercury is a booming business in Colombia. IP&LCs who live in remote areas of Colombia tend to experience the greatest impacts.[257] According to a UNODC study, 47% of alluvial gold mining activity in Colombia occurs in areas designated as excluded or restricted vis-à-vis mining, ranging from national parks to Indigenous Reserves and designated Afro-Colombian community lands.[258] In the Department of Chocó, 84% of alluvial gold mining sites are located in Afro-Colombian Community Territories.[259] As for Indigenous Reserves, UNODC found 35 such Reserves harbored alluvial gold mining.[260] UNODC estimates illicit mining operations in Colombia span more than 64,000 hectares, with nearly 30,000 hectares in Indigenous territories or other areas not yet approved for mining.[261]

In addition to its synergistic relationship with timber trafficking and other forestry crimes, illegal and informal gold mining in Colombia goes hand-in-hand with forced labor, human trafficking, and other crimes against women and children.[262] Reports of abuses abound: women being bussed

[254] Cesar Ipenza Peralta et al., *supra* n. 226.
[255] SPDA ACTUALIDAD AMBIENTAL, *supra* n. 248.
[256] *See supra* n. 59.
[257] In each of the focus countries, illegal and informal ASGM is conducted, to some extent, by both IP&LCs and "outsiders." Discerning the share of each cohort is no easy task. Still, investigative journalism indicates much of the most damaging mercury-based gold mining is conducted in or near IP&LC communities by outsiders. *See, e.g.*, Carol Sánchez, *Illegal Mining in Colombia's Amazon Threatens Indigenous Communities*, MONGABAY (Aug. 24, 2021), https://news.mongabay.com/2021/08/illegal-mining-in-colombias-amazon-threatens-indigenous-communities/; Yolanda Booyzen, *New Database Reveals the Struggle for Human Rights and Environmental Justice in Bolivia*, HURIDOCS (Oct. 13, 2022), https://huridocs.org/2022/10/new-database-reveals-the-struggle-for-human-rights-and-environmental-justice-in-bolivia/.
[258] Alluvial Gold Exploitation: Evidences from Remote Sensing 2016, UNODC (May 2018), https://www.unodc.org/documents/publications/Evoa_2016_in_1.pdf at 9.
[259] *Id.* at 58.

[262] *The Devastating Impact of Illegal Gold Mining in Latin America*, INTERPOL (April 28, 2022), https://www.interpol.int/en/News-and-Events/News/2022/The-devastating-impact-of-illegal-gold-mining-in-Latin-America; Maria Luisa Valencia, *supra* n. 122.

into mining areas to labor as sex workers;[263] locals forced to work under systems reminiscent of colonial-era practices, wherein the pay is simply the opportunity to keep a small amount of the gold extracted;[264] debt bondage, extortion, and the luring of young men and even children to remote areas under false promises of good work; and then, should any protest arise, violent intimidation and reprisals by mining operators and their armed "muscle."[265]

Although Colombia has suspended most legal imports of mercury since ratifying the Minamata Convention in 2023, mercury enters the country via the southern border with Peru,[266] which in turn receives much of its mercury illegally from Bolivia following imports primarily from Mexico.[267] From there, illegally mined gold from Colombia continues to find its way into global markets with little resistance. A recent story in *The New York Times* described how the U.S. Mint, relying on purchases by importing firms in Texas, purchased gold illegally extracted by miners working for drug cartels in Colombia.[268]

a. Introduction to Law and Policy Response

Colombia has addressed in myriad ways the use of mercury in gold mining. Most important to this effort is Law 1658 of 2013, which mandated the complete elimination of mercury in the mining sector through a five-year phase-out period ending in 2018. Although Law 1658 has in some ways been a success, especially following a tack-on decree that banned mercury imports and use in for mining (Decree 2133),[269] the ambitious vision of total eradication has not been fulfilled. Mercury use continues to exist in the ASGM sector, drawing on large black-market supplies. Cognizant of this dynamic, the Colombian government appears to recognize the problem is complex and requires both more time and a broader approach, including formalization, education, and capacity-building.

b. Law 1658 of 2013 and the Basic Framework of Mercury Management

As a Party to the Minamata Convention,[270] Colombia must reduce mercury in ASGM.[271] With this in mind, Colombia's Law 1658 of 2013 mandates the "eradication" of mercury in mining within a five-year phase-out period.[272] Specifically, Article 3 of Law 1658 provides that "[t]he use of mercury shall be eradicated throughout the national territory, in all industrial and productive

[263] Anastasia Moloney, *Illegal Mines a Slavery Hotspot in Colombia, Peru*, REUTERS (Sept. 1, 2015), https://www.reuters.com/article/idUSL5N1124T7/.
[264] *See generally*, Kris Lane, POTOSI: THE SILVER CITY THAT CHANGED THE WORLD (2021), https://www.ucpress.edu/book/9780520383357/potosi.
[265] *Forced Labor and "Blood Gold" in Colombia*, HUMAN RIGHTS FIRST (Dec. 2, 2015), https://humanrightsfirst.org/library/forced-labor-and-blood-gold-in-colombia/.
[266] Katie Jones, *Dirty Business—The Smuggling Pipeline Carrying Mercury Across the Amazon*, INSIGHT CRIME (May 13, 2021), https://insightcrime.org/news/dirty-business-smuggling-pipeline-carrying-mercury-amazon/.
[267] *Id.*
[268] Justin Scheck, *How Drug Cartel Gold Ends Up at the U.S. Mint*, THE NEW YORK TIMES (April 26, 2026), https://www.nytimes.com/video/world/americas/100000010806725/how-drug-cartel-gold-ends-up-at-the-us-mint.html?smid=url-share.
[269] Decreto 2133 (2016), https://www.anm.gov.co/sites/default/files/decreto_2133_de_2016.pdf.
[270] Ley 1892 (2018), https://www.minambiente.gov.co/wp-content/uploads/2021/06/ley-1892-2018.pdf.
[271] Minamata Convention, art. 7, para. 2.
[272] Ley 1658 de 2013, https://www.minambiente.gov.co/wp-content/uploads/2021/06/ley-1658-2013.pdf.

processes, within a period of no more than ten (10) years, and for mining, within a maximum period of five (5) years."[273] This was (and is) a highly ambitious endeavor, at least if interpreted to require that Colombia truly exist as a mercury-free jurisdiction, as opposed to simply requiring reasonable efforts to achieve that goal.

Apart from the eradication clause, other significant provisions in Law 1658 include the creation of a strict chain of custody over all imports and uses of mercury;[274] a registry systems for all users and traders of mercury;[275] "incentives for the reduction and elimination of the use of mercury in the mining sector," including "soft loans" for miners to refit and relocate;[276] incentives for formalization, with a focus on small-scale miners operating within a territory for which a third-party has a formal mining title; [277] the establishment of an "Environmental Mining Seal" to certify gold products resulting from mercury-free processes;[278] and, in addition to the criminal penalties otherwise available for illegal mining and related offenses (discussed below), authority to confiscate equipment.[279]

From a policy perspective, Colombian's decision to pursue a phase-out scheme invites consideration of the merits and drawbacks of such an approach, especially in comparison to immediate prohibition. To cite an example of a straightforward ban with immediate effect, Uganda passed legislation in 2022 prohibiting the use of mercury in mining operations.[280] Ecuador has elected a similar approach.[281] In theory, categorical and immediate prohibitions have the advantage of simplifying the enforcement landscape. If a miner of any kind uses mercury after the law takes effect, that miner is breaking the law; defenses are virtually non-existent.

Alternatively, a phase-out policy has the advantage of furnishing time to develop and disseminate feasible alternatives to mercury. Relatedly, the period can be used to train and prepare officials to effectively police the prohibition. And a mercury phase-out period can work in tandem with a progressive formalization effort.

One risk of phase-out approaches, on the other hand, is their susceptibility to prolongation of the phase-out period, particularly if the legal instrument establishing the phase-out contemplates additional regulatory work by a subject-matter agency (e.g., a mining ministry). More obviously, a phase-out policy inherently permits a certain degree of additional mercury contamination in the meantime.

c. Implementation of Law 1658

[273] *Id.*, art. 3.
[274] *Id.*, art. 1.
[275] *Id.*, art. 4.
[276] *Id.*, art. 10. *See also* Troy Segal, *Soft Loans Explained: Benefits, Drawbacks, and Key Insights*, Investopedia (May 13, 2026), https://www.investopedia.com/terms/s/softloan.asp.
[277] Ley 1658, art. 11.
[278] *Id.*, art. 12.
[279] *Id.*, art. 13.
[280] *See* Uganda Mining and Minerals Act (2022), art. 225(1), https://faolex.fao.org/docs/pdf/uga218635.pdf.
[281] *See infra*, Pt. II.B.5.

While Colombia has banned imports of mercury intended for mining as of 2017,[282] prohibited its use since 2018,[283] and made strides with ASGM formalization, it has failed to satisfy Law 1658's call to "eradicate" mercury in mining. In fact, in 2019, Colombia's Constitutional Court observed that mercury use in ASGM continues to evade resolution through legal prohibitions alone.[284]

After upholding ratification of the Minamata Convention, the Constitutional Court in 2019 recognized the failure of Law 1658 to actually eradicate mercury in mining by 2018 (the end of the phase-out period), noting that the date for eradication "has come and gone" without Colombia overcoming "this enormous challenge."[285] The Court suggested the complexity and scale of the problem requires "consensual solutions" with actors in the informal mining sector, noting the need for approaches that are "integral, environmentally responsible and sensitive to social contexts."[286] In this vein, the Court remarked that "[p]erhaps the participation of communities and their plural visions make decision-making more complex, but without a doubt this will also enrich the final result[.]"[287] In other words, the Constitutional Court believes a prohibition regime is an incomplete answer to mercury use in ASGM and that, with the Minamata Convention as the backdrop, authorities should work with the ASGM sector to improve the situation on the ground.

In addition, the Constitutional Court emphasized the need for care with ASGM actors from "marginalized sectors of society," declaring that "punitive measures" should operate as a "last and extreme" resort.[288] The Court similarly noted that "formalization plans . . . should not turn into 'tortuous' scenarios for small-scale miners," but rather should represent "strategic alliances to prevent and control greater harm to the environment and human health."[289] Even if some of these statements can be discounted as dicta, the Court's declarations seem to favor, for better or worse, a more flexible application of Colombia's codified provisions relating to gold mining with mercury.

c. Could a Citizen Suit Compel the Government to Enforce the Mercury Prohibitions in Specific Cases?

While the Constitutional Court seems to believe that statutes alone cannot achieve a mercury-free Colombia, it is worth considering whether an outside actor could hold the government accountable to a more literal interpretation of the law (and especially Law 1658's "eradication" clause) through a citizen suit.

The Colombian Constitution guarantees the rights of all people to live in a healthy environment and provides for community participation in decisions that may affect the environment.[290] It also

[282] Decreto 2133 (2016), https://www.anm.gov.co/sites/default/files/decreto_2133_de_2016.pdf.
[283] *See* Antonio José Paz Cardona, *Colombia Prohíbe el Uso de Mercurio en la Minería*, MONGABAY (July 20, 2018), https://es.mongabay.com/2018/07/colombia-prohibe-uso-de-mercurio-en-mineria/.
[284] Constitutional Court Sentence C-275 (June 19, 2019), para. 140, https://www.corteconstitucional.gov.co/relatoria/2019/c-275-19.htm.
[285] *Id.*
[286] *Id.*
[287] *Id.*
[288] *Id.*, para. 139.
[289] *Id.*
[290] Colombian Political Constitution (1991), art. 79.

creates a state duty to protect areas of special ecological importance,[291] to guarantee sustainable development, to prevent and control environmental deterioration, and to "impose legal sanctions" and secure "the reparation of harms caused."[292] In the context of mercury in gold-mining, this could be read to create a constitutional obligation to punish such activity and to demand environmental reparation by actors who use mercury. Leveraging a related but distinct theory—the rights of nature—civil society has already scored important victories in Colombia in cases seeking redress for rivers contaminated from illegal gold mining and logging.[293]

The Colombian Constitution gives all people the right to seek redress for violation of fundamental rights enshrined in the Constitution[294] and gives everyone the right to demand enforcement of *any* law or administrative act and to secure corresponding injunctive relief.[295] These constitutional provisions would seem to support the use of citizen lawsuits alleging lack of progress in implementing Law 1658—and perhaps even insufficient enforcement of Decree 2133's prohibition of mercury imports and use in mining.

Imagine a situation in which the government is aware of an ASGM operation using mercury near an IP&LC riverine community in the Amazon Basin. Despite this knowledge, the government has not taken any enforcement actions, although it has engaged in dialogue with the miners and issued warnings. Could the community or a civil-society organization within the community bring a suit against the government alleging failure to enforce Law 1658's "eradication" clause and secure a judicial order forcing the government to intervene? Although the rights-of-nature jurisprudence (discussed below) suggests such a strategy may be viable under that theory, it is unclear whether any citizen or group has tried such a suit. Whether it would be successful is uncertain given (1) the language in Sentence C-275 highlighting the Constitutional Court's view on "socialization" and "consensual solutions," at least when the miners come from "marginalized sectors of society," and (2) a more generalized judicial reluctance to order specific enforcement actions, viewing this as an area where law-enforcement authorities traditionally exercise discretion as to the "when, where, and how"—and even the "if."[296]

It is also worth noting that Law 1658 creates an enforcement mechanism: Article 14 provides for sanctions against government functionaries who fail to carry out their responsibilities under Law 1658.[297] This provision could provide a separate lever for advocacy designed to pressure the government to enforce Article 3's "eradication clause" under a more literal interpretation. Yet it is unclear if anyone has tried to demand enforcement of this provision, and our research failed to uncover any evidence suggesting the government has sanctioned public officials for failure to implement Law 1658. This may imply the government believes it has complied with Law 1658

[291] *Id.*
[292] *Id.*, art. 80.
[293] *See infra* Pt. II.B.2.d ("Rio Atrato and the Rights of Nature in Colombia").
[294] Colombian Political Constitution, Art. 86.
[295] *Id.*, art. 87
[296] For instance, U.S. courts have a history of rejecting citizen suits seeking to compel enforcement, as such action is often seen at odds with separation-of-powers theory. *See, e.g., Heckler v. Chaney*, 470 U.S. 821 (1985).
[297] Law 1658 of 2013, Art. 14 (citing Law 734 of 2002), https://www.minambiente.gov.co/wp-content/uploads/2021/06/ley-1658-2013.pdf.

through the decree banning mercury imports in mining as of 2017 and the further ban on use of mercury in mining starting in 2018.[298]

d. Rio Atrato and the Rights of Nature in Colombia

Unlike other countries in the region (*e.g.,* Bolivia and Ecuador), Colombia's Constitution does not have a written provision on the "rights of nature." Nevertheless, this concept is quickly gaining traction through the courts.

In 2016, Colombia's Constitutional Court ruled that the Atrato River is a holder of its own rights.[299] The Atrato and its tributaries have long suffered from illegal gold mining with mercury and illegal deforestation. This activity has not only impaired the watershed and its flora and fauna; it has had a dramatic impact on IP&LCs, affecting livelihoods, food sovereignty, and cultural practices. Against this backdrop, the Constitutional Court found that several of the Constitution's provisions (including the right to a healthy environment) effectively enshrine the "rights of nature." Thus, the court reasoned, the Atrato River has an intrinsic right to "protection, conservation, maintenance, and restoration."[300]

By way of remedy, the court ordered the government: (1) to choose a body, along with a representative of the local Indigenous communities, to serve as the legal representative of the rights of the river; (2) to form a "commission of guardians" that includes the government and community representatives, with the task of ensuring the "protection, recovery, and due conservation" of the river; (3) to develop an action plan to eliminate illegal mining throughout the watershed; and (4) to design and implement a plan to decontaminate the watershed, recover its ecosystems, and avoid additional damage through measures such as reestablishing the flow of the river, eliminating sediment build-ups formed through mining, and reforesting the areas affected by mining.[301]

While this all sounds like good news, there are questions about the extent to which the government has complied with the court's order and whether any such compliance has yielded true improvements from an environmental standpoint.[302]

e. Administrative and Criminal Penalties

Colombian law authorizes several administrative and criminal sanctions against individuals and legal entities engaged in illegal mining. Beginning with administrative sanctions, and apart from

[298] Decreto 2133 (2016); Antonio José Paz Cardona, *supra* n. 283.
[299] Constitutional Court Sentence T-622 (2016), https://atrato.minambiente.gov.co/wp-content/uploads/2021/11/Sentencia-T-622-16-Rio-Atrato.pdf.
[300] *Id.*
[301] *Id.*
[302] *See , e.g., El Atrato, Un Río con Derechos Lastimados Pese a Histórico Fallo en Colombia*, SWI (Nov. 14, 2024), https://www.swissinfo.ch/spa/el-atrato%2C-un-río-con-derechos-lastimados-pese-a-histórico-fallo-en-colombia/88146757.

those listed above under Law 1658, the 2001 Mining Code contemplates confiscation of any illegally extracted minerals[303] and ineligibility for future mining licenses.[304]

On the criminal side, Article 332 of Law 599 (the current Criminal Code) provides for severe penalties for illegal mining, including long prison terms (up to 12 years) and large fines where such mining was done "by means capable of causing serious damage to natural resources or the environment."[305] Likewise, Article 334A contemplates additional penalties for environmental pollution due to mining, "including imprisonment of five (5) to ten (10) years" and, again, large fines.[306] In the ASGM sector, miners are potentially at risk of criminal sanctions under both Article 332 and Article 334A. In fact, liability under both Articles seems possible even if the operation is conducted without mercury; with mercury, liability should easily attach under the enhancement for using "means capable of causing serious damage to natural resources or the environment" given mercury's toxic profile.

f. Colombia's Formalization Regime

Law 2250 establishes a special legal framework for formalization of "traditional mining."[307] The law defines "traditional mining" as mining activities "without a title registered with the National Mining Registry" and wherein the miners can prove at least ten years of continual activity.[308] Significantly, the ten-year period is measured as of the date Law 2250 took effect (i.e., July 11, 2022). The timing provision should therefore prevent an ever-expanding class of "traditional miners" claiming coverage under the law.

Procedurally, traditional miners initiate formalization; if they fail to do so, they can be forced into formalization by the government.[309] Miners who wish to claim status as "traditional miners" have one chance to submit proof of that status.[310] If the government has ordered them to begin formalization, they are given 90 days to begin the process. Failure to do so results in a legal "understanding" that they have no intention to formalize, opening exposure to penalties. On the other hand, informal traditional miners who begin the process benefit from a limited but important immunity provision during the pendency of the process, shielding them from prosecution for illegal mining.[311]

The formalization process includes the incentive of conceding licenses to previously unlicensed miners, focusing especially on ASGM miners who would not normally be eligible for a regular mining license.[312] Law 2250 further provides funding to support miners in the formalization

[303] Law 685 of 2001 (Mining Code), Ch. XVII, arts. 159-161, https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=9202.
[304] *Id.*, arts. 162-163.
[305] Ley 599 (2000), art. 332, https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=6388.
[306] *Id.*, art 334A.
[307] Ley 2250 (2022), p. 1, https://www.anla.gov.co/wanla/eureka/normativa/leyes/ley-2250-de-2022-legalizacion-y-formalizacion-minera.
[308] *Id.*, art. 2.
[309] *Id.*, art. 4.
[310] *Id.*
[311] *Id.*
[312] *See id.*, arts. 5-6.

process, as well as controls on excess production[313] and mineral commercialization.[314] The law also contains special provisions for the purchase, sale, and export of gold.[315]

In an extremely important provision, Article 4 of Law 2250 clarifies that the process of formalization is not available in protected areas and other spaces incompatible with mining (e.g., National System of National Natural Parks, Regional Natural Parks, Protected Forest Reserve Zones, páramo ecosystems, and Ramsar wetlands.)

While Law 2250 does not address the use of mercury directly, the process of formalization and its obligations should lead to greater control of mercury as compared to what is currently an essentially unregulated ASGM sector. Still, as in the Peruvian context, one is left to wonder why the benefits of formalization are not explicitly conditioned upon a showing of mercury-free processes.

g. Special Provisions for Indigenous and Afro-Colombian Communities

Colombian law includes several special measures for Indigenous and Afro-Colombian communities, including measures to incentivize formalization.

As a Party to ILO Convention 169, Colombia has special duties vis-à-vis Indigenous communities. In addition to requiring that the state "consult the peoples concerned . . . whenever consideration is being given to legislative or administrative measures which may affect them directly,"[316] ILO Convention 169 recognizes the right of indigenous peoples to "participate in the use, management and conservation of [natural] resources" and, in the case of state-owned mineral rights, requires the establishment of "procedures through which [the state] shall consult [Indigenous] peoples[.]"[317]

In this vein, Law 685 of 2001 (a.k.a., the Mining Code) has several important provisions. First, Article 5 establishes that, with few exceptions, the state is the sole and exclusive owner of all minerals in the country.[318] This appears to include minerals found in Indigenous and Afro-Colombian communities. That said, the Mining Code provides preferential treatment for Indigenous and Afro-Colombian communities to obtain a mining license (and thus move into formalization) in their territories.[319]

Of course, this does not mean all risks of abuse are eliminated. While Indigenous and Afro-Colombian communities receive preferential treatment in the acquisition of mining licenses, they are free to contract with third parties to develop their mining activities.[320] Thus, there may be a risk that outside actors exploit the Code's allowance for third parties to mine in these communities,

[313] *Id.*, art. 14.
[314] *Id.*, art. 15.
[315] *Id.*, art. 17.
[316] ILO Convention No. 169, Art. 6.
[317] *Id.*, art. 15.
[318] Law 685 of 2001 (Mining Code), art. 5.
[319] *Id.*, art. 124.
[320] *Id.*, arts. 126, 135.

creating a situation of a legal veneer in which Indigenous and Afro-Colombian communities only nominally control mineral resources.

On the other hand, the Mining Code generally fosters community development of mining, including measures to "promote the legalization, organization, and capacity-building" of community associations.[321] Moreover, the Mining Code refers to "traditional operations" and establishes a priority to formalize mining operations traditionally carried out in communities.[322] Relatedly, for simple customary panning, the Mining Code blesses such activity without the need for a regular mining license. Traditional panners need only notify the local mayor and, if done on private property, obtain the authorization of the property owner.[323]

Just as many of these provisions work to protect the rights of Indigenous and Afro-Colombian communities to engage in sustainable and traditional forms of mining within their territory, the Colombian judiciary has been responsive to the realities that these communities are frequently victims of encroachment by outsider ASGM actors. In this vein, in March 2025, the Constitutional Court of Colombia issued a decision in litigation brought by several leaders of Indigenous communities in the Amazonian region of *Jaguares del Yurupari*.[324] The Indigenous representatives claimed the government's failure to adequately control illegal and informal gold mining using mercury violated the communities' fundamental rights to manage their territories, to a healthy environment, to food sovereignty and security, and to cultural identity, among others. The court agreed with the approximately thirty indigenous communities. Among other remedies, the court ordered the Colombian government to initiate dialogues to forge a shared action plan in consensus with the affected communities.

h. Closing Thoughts

Colombia should increase enforcement of the mercury import and use bans established through Law 1658 of 2013 and associated decrees. Picking up on the Constitutional Court's observation that the problem is complex and requires "consensual solutions" with actors in the informal mining sector, authorities should emphasize incentives for miners to voluntarily abandon mercury.

Although use of mercury is prohibited under law—and it appears that Colombia's import ban has achieved its result of minimizing legal imports—ASGM miners continue to obtain mercury from traffickers. In this context, the best approach may lie in a combination of deterrence-generating law enforcement (with prosecutions and strong penalties for the most culpable of actors) and softer, diplomatic-like approaches to encourage compliance by ASGM groups willing to cooperate.

Particularly when IP&LC and Afro-Colombian communities are involved in mining with mercury, the historical context and these communities' special legal rights vis-à-vis territorial management seems to suggest an approach that includes "the participation of communities and their plural visions," to use the words of the Constitutional Court.

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[321] *Id.*, arts. 249 *et seq*.
[322] *Id.*, art. 257.
[323] *Id.*, arts. 155-56. *See also id.*, art. 158 (addressing mining in Afro-Colombian communities).
[324] Constitutional Court, Sentence T-106 (2025), https://www.corteconstitucional.gov.co/relatoria/2025/t-106-25.

This still implies prohibition on use of mercury. That is the law, and it should serve as the baseline for discerning realistic ways to reduce mercury, but the persistent use of mercury despite the ban shows more is needed. Incentives, alternatives to mercury, and assistance for alternative livelihoods are crucial in Colombia.

Separately, given the relative effectiveness of public-interest litigation in Colombia (e.g., in the *Rio Atrato* and *Jaguares del Yurupari* matters), civil society organizations should consider bringing suits in cases involving gold mining with mercury. Such suits can be employed in a variety of ways, from forcing the government to comply with its own laws to securing court orders that mandate restoration payments from private entities (e.g., from refiners and other entities that knowingly or negligently purchase illegally mined gold). To ensure that any court orders secured through litigation in fact executed, civil society and government should both commit to post-litigation monitoring.

3. Brazil

With more than half the Amazon Basin situated within its borders, Brazil is blessed with abundant forests, rivers, and alluvial gold deposits. But this blessing is also a curse. Rising gold prices in recent years have led to a significant expansion of illegal gold mining in the Brazilian Amazon, encroaching on protected areas and Indigenous communities, and contributing to deforestation.[325] Once again, vulnerable communities have borne the brunt of this activity in Brazil, with the Yanomami people offering a tragic case-study. For many years, "illegal miners have looted Yanomami lands due to its large gold deposits and the rivers that allow for the easy transport of gold from the mines."[326] This has led to increases of disease, pollution, hunger, conflict, and forced labor.[327] Gold mining has further become a regional security issue as illegal miners and organized crime groups move back and forth between Brazil, Colombia, Venezuela, and Guyana in response to enforcement operations.[328]

In more positive news, measures taken throughout 2023 led to a 20% drop in reported Brazilian gold exports.[329] (Note, however, that this number may not reflect overall reductions in gold exports, as shifts to illegal trade defy measurement.)[330] At the enforcement level, the Brazilian Federal Police formed a special division exclusively dedicated to environmental crimes, conducting an average of one raid per week against illegal gold miners over the course of 2023.[331] In parallel, Brazil's lead environmental agency, IBAMA, seized or destroyed nearly 2,000 mining machines.[332]

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[325] Carrie Kahn et al., *supra* n. 20; Juliana Siqueira-Gay & Luis E. Sánchez, *supra* n. 21.
[326] Juan Diego Cárdenas, *Illegal Gold Mining Continues Threatening Yanomami Land in Brazil*, INSIGHT CRIME (Jan. 22, 2024), https://insightcrime.org/news/illegal-gold-mining-continues-threatening-yanomami-land-in-brazil/.
[327] *Id.*; Jonathan Watts & Talita Bedinelli, *How Illegal Mining Caused a Humanitarian Crisis in the Amazon*, YALE E360 (Feb. 2, 2023), https://e360.yale.edu/features/brazil-yanomami-mining-malaria-malnutrition-lula.
[328] Juan Diego Cárdenas, *supra* n. 326.
[329] Fernanda Wenzel, *Brazil's llegal Gold Trade Takes a Hammering, but Persists Underground,* MONGABAY (April 16, 2024), https://news.mongabay.com/2024/04/brazils-illegal-gold-trade-takes-a-hammering-but-persists-underground/.
[330] *See id.*
[331] *Id.*
[332] *Id.*

Regulatorily, in July 2023 the government introduced mandatory electronic invoices for gold trading, replacing the paper system that has facilitated fraud and frustrated central monitoring efforts.[333] According to satellite imagery, the rate of deforestation from wildcat gold mining dropped 43% in 2023.[334] Other promising developments include cross-border enforcement cooperation with Colombia[335] and, in the context of prosecutions, the deployment of a new tool to calculate the harm flowing from illegal gold mining, enhancing the ability of prosecutors to seek reparations and advocate for higher criminal penalties based on environmental harm as an aggravating circumstance.[336]

Still, mercury continues to flow into Brazil in alarming quantities. The primary source of this mercury seems to be Bolivia.[337] Smugglers bring mercury across the porous border, feeding sustained demand in Brazil.[338] Indeed, Brazilian (and Peruvian) demand has led to an incredible spike in Bolivian imports of mercury. Although Bolivia itself has major issues with gold mining using mercury, the import numbers belie the notion that all or even most of this mercury is imported for domestic uses. Between 2016 and 2021, Bolivia imported more than 1,100 tons of mercury.[339] In that same period, Brazil imported around 100 tons, or less than 10% of the amount imported by Bolivia, despite Brazil having a population nearly twenty times the size of Bolivia's.[340] The discrepancy is explained by smuggling to gold miners in Peru and Brazil.[341]

a. Introduction to Law and Policy Response

Brazil has implemented a sophisticated system that essentially treats mercury as a controlled substance. Brazil enacted a law in 2024 which embraced the call of the Minamata Convention in almost all respects (not simply those focused on mercury in ASGM).[342] While Brazil does not prohibit the use of mercury in gold mining, it has created a regulatory landscape where legal use of mercury for this purpose should be very difficult and, over time, almost impossible.

b. Importation of Mercury and Domestic Commerce in Mercury

[333] Instrução Normativa RFB No. 2.138 (2023), https://normasinternet2.receita.fazenda.gov.br/#/consulta/externa/129816; Fernanda Wenzel, *Brazil's llegal Gold Trade Takes a Hammering, but Persists Underground,* MONGABAY (April 16, 2024), https://news.mongabay.com/2024/04/brazils-illegal-gold-trade-takes-a-hammering-but-persists-underground/.
[334] Fernanda Wenzel, *supra* n. 329.
[335] Lieth Carillo, *Colombia and Brazil Target Illegal Gold Mining in the Amazon,* OCCRP (Dec. 8, 2023), https://www.occrp.org/en/daily/18290-colombia-and-brazil-target-illegal-gold-mining-in-the-amazon.
[336] Justin Catanoso, *Amazon Prosecutors Get Sharper Impact Tool to Charge Illegal Gold Dealers*, MONGABAY (March 27, 2024), https://news.mongabay.com/2024/03/amazon-prosecutors-get-sharper-impact-tool-to-charge-illegal-gold-dealers/.
[337] Fernanda Wenzel, *supra* n. 34, https://news.mongabay.com/2024/07/report-reveals-widespread-use-of-smuggled-mercury-in-amazon-gold-mining/; María Fernanda Ramírez, *supra* n. 32.
[338] For more information on the Bolivia-to-Brazil pipeline, *see The Illegal Route of Mercury from Bolivia to Brazil, supra* n. 227.
[339] María Fernanda Ramírez, *supra* n. 32.
[340] *Id.*
[341] *Id.*
[342] Instrução Normativa No. 26/2024 (2024), https://www.ibama.gov.br/component/legislacao/?view=legislacao&legislacao=139445.

Brazilian law embodies a vision of reducing and tightly controlling imports of mercury. Since 1989, Decree No 97.634 has provided that registration of mercury is a "necessary condition" for importing, producing, or trading in mercury.[343] This decree requires registered importers to notify IBAMA prior to importation and requires domestic mercury traders (i.e., sellers) to liaise with IBAMA by furnishing a "Metallic Mercury Operations Document."[344]

Building on this basic registration and tracking scheme from 1989, Brazil has recently taken substantial additional steps to "strangle" or zero-out mercury imports and thus deprive gold miners of this key input.[345] Although there is no prohibition on the use of mercury in gold mining, the "strangulation" of mercury imports in theory should leave miners with scarce amounts of mercury.[346]

A 2024 IBAMA regulation (Normative Instruction No. 26-2024) contains the core rules that operationalize the strangulation policy.[347] The 2024 regulation establishes a more robust, digital tracking system for importers and domestic traders, commanding such persons to: (1) obtain a Metallic Mercury Operations Document prior to a trade in mercury, following the requesting party's establishment of eligibility or "qualification" for this document; (2) keep the Metallic Mercury Operations Document with the mercury cargo under their responsibility at all times; (3) confirm the actual quantity of mercury acquired through a commercial transaction or transfer; and (4) declare information on the use, storage, and environmentally appropriate disposal of mercury in a computerized system.[348]

Buyers and users, for their part, are only able to purchase or use mercury for which a Metallic Mercury Operations Document has been issued, and they must carry this document with them during all transport phases and present it upon request.[349] As a cross-check on the sales declaration made by a trader, buyers and users must also confirm the quantity of mercury purchased.[350] Importantly, buyers and users must also adhere to the uses for which the Metallic Mercury Operations Document was issued.[351] This latter requirement, while perhaps obvious, works as a check against diversion of mercury for unauthorized purposes.

The 2024 regulation limits, but does not entirely prohibit, imports and sales of mercury for use in mining. Specifically, Article 9 provides that "import, sale and resale of metallic mercury to people engaged in mining activities is prohibited," but then goes on to create an important exception, stating that this provision "shall not apply in the case of the sale or resale of metallic mercury to the holder of a mining permit . . . for the extraction of gold using metallic mercury."[352] Reading these clauses together yields the following construction: *Imports* of mercury for mining, regardless

[343] Decreto No 97.634 (1989), art. 1, https://www.planalto.gov.br/ccivil_03/decreto/1980-1989/d97634.htm.
[344] *Id.*
[345] Interview with Professor Maria Elena Crespo López (March 20, 2025).
[346] *Id.*
[347] Instrução Normativa No. 26/2024 (2024).
[348] *Id.*, art. 4.
[349] *Id.*, art. 5.
[350] *Id.*
[351] *Id.*
[352] *Id.*, art. 9.

of mining type, are entirely prohibited, but mercury can be *sold* to a person or entity authorized to engage in gold mining.

Because the import of mercury for gold mining is prohibited—and because imports for other uses are tightly controlled, and Brazil is not a mercury-producing country[353]—mercury available for gold mining should, if all goes according to the law, eventually dry up. This is the government's strategy; and, for a strategy that ends short of outright prohibition on using mercury in gold mining, it is compelling. That said, an outright prohibition of all imports, domestic commerce, and use of mercury, at least for mining, would arguably be simpler to police and align better with the Minamata Convention's goals.

c. The Mercury Trade in Practice

Unfortunately, the policy enshrined in IBAMA Normative Instruction No. 26-2024 finds itself swimming against the current of massive contraband imports and unregulated use. In an interview for this Article, Professor Maria Elena Crespo López stated that "the law is good, but the reality is different."[354] While acknowledging that official, legal mercury imports have decreased dramatically, Professor Crespo López noted that Brazil continues to produce and export significant amounts of gold, implying that gold miners using mercury are still able to secure this feedstock in abundance.[355]

A raft of investigative reports agree that mercury remains common in Brazil. As mentioned earlier, the consensus is that mercury flows into the Brazilian Amazon with relative ease across the border from Bolivia, where imports have skyrocketed in recent years.[356]

But while illegal gold mining and black-market trade and use of mercury remain prevalent, recent efforts under the Lula administration have helped. In 2023, the first year of Lula's current term, Brazilian gold exports dropped by 20%.[357] Experts cite a variety of factors to explain this drop, including ramped-up interdiction against illegal mining operations, the creation of a federal police department focused exclusively on environmental crimes, new rules requiring electronic invoices for trade in gold, and judicial decisions (described below) that effectively require greater supply-chain due diligence by gold purchasers.[358]

On the mercury front, IBAMA Normative Instruction No. 26-2024 appears positioned to build on these successes by choking off mercury imports. Yet, because it is so new, it is premature to evaluate its effectiveness. If IBAMA and other actors (customs authorities, transportation control, mining authorities, forest protection authorities, and state counterparts) prioritize implementation and policing of this new framework, it has the potential to be a gamechanger. Even then, this law needs to be coupled with a committed effort to reduce clandestine imports and underground trafficking of mercury, along with sales and exports of illegally mined gold.

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[353] *Where Does So Much Mercury Come From?,* INSTITUTO ESCOLHAS (June 2024), https://escolhas.org/wp-content/uploads/2024/07/EN_SUM_Mercury.pdf
[354] Interview with Professor Maria Elena Crespo López (March 20, 2025).
[355] *Id.*
[356] Fernanda Wenzel, *supra* n. 33; María Fernanda Ramírez, *supra* n. 31.
[357] Fernanda Wenzel, *supra* n. 329.
[358] *Id.*

d. An End to the Presumption of Legality

Until recently, it was relatively easy for illegal miners and other unscrupulous actors to pass off illegally mined gold as legal; as long as the miners were successfully able to register the first transaction, Law 12,884 of 2013 thereafter treated the gold as legal for any subsequent transactions.[359] In 2023, however, the provision containing this presumption was suspended by a Justice of the Federal Supreme Court, and in 2025 that decision was confirmed by the full Federal Supreme Court.[360] Thus, the presumption seems to be buried for good.

Here is how things worked prior to the Court's decision: Under Article 39 of Law 12,884, the first seller (i.e., the miner or mining cooperative) is required to issue an invoice or sales receipt declaring the origin of the gold through identification "of the mining area . . . and the number of the extraction authorization title[.]"[361] The buyer, for their part, must provide a purchase invoice and record with the government the information from the seller. So far, so good. However, Article 39 ends with the following provision: "The legality of the gold acquired, and the good faith of the acquiring legal entity, are presumed when the information mentioned in this article, provided by the seller, is duly filed at the headquarters of the institution legally authorized to purchase gold."[362]

According to conversations with experts interviewed for this Article, this presumption had the effect of immunizing unknown quantities of gold of dubious provenance; so long as the original buyer and seller cooperated with each other, illegally mined gold could be registered as legal gold.[363] And with this presumption in place as to the first transaction, every subsequent sale and purchase benefited too, inoculating the entire supply chain against questions as to the gold's legality.

On balance, the Federal Supreme Court's decision to excise the presumption of legality and good faith is plainly helpful in the fight to prevent illegally mined gold from reaching the marketplace—and it may even help to reduce illegal gold mining in the first instance.

e. Criminal Penalties, Forfeiture and Destruction of Illegal Mining Equipment, Pollution Laws, and IP&LC Rights

Over the years, Brazil has built important legal infrastructure to address several other aspects of mercury-based gold mining. These include criminal penalties for illegal mining, pollution, and the unauthorized use of toxic substances; laws that authorize the forfeiture and destruction of illegal mining equipment; and protections for IP&LCs and the ecosystems they call home.

As concerns penal law, although Brazil doesn't maintain a law specifically criminalizing (as opposed to prohibiting) the use of mercury in unauthorized mining, it has criminalized illegal

[359] Lei No. 12,8444 (2013), https://www.planalto.gov.br/ccivil_03/_ato2011-2014/2013/lei/l12844.htm.
[360] *Id.*
[361] Lei No. 12,8444 (2013), art. 39.
[362] *Id.*
[363] Interview with Professor Maria Elena Crespo López (March 20, 2025).

mining, pollution offenses, and the unauthorized use of toxic substances.[364] Beginning with mining, Article 55 of Law No. 9605 provides for six months to one year of detention, plus a fine, for anyone who "min[es] or extract[s] . . . mineral resources without the appropriate authorization, permission, concession or license, or in contravention" of the same.[365]

Though this penalty is rather low compared to other countries in the region, real-life alluvial gold mining scenarios with mercury would almost always include other crimes and the possibility of additional penalties. More concretely, while a typical gold mining operation with mercury would certainly meet the elements of illegal mining under Article 55, it would also seem to qualify for penalties under Article 56 (unauthorized use of a "product or substance that is toxic, dangerous or harmful to human health or the environment"), consisting of a fine and one to four years' imprisonment,[366] as well as the same penalties under Article 54 ("causing pollution of nature at levels that result or may result in harm to human health, or that cause the death of animals or the significant destruction of flora").[367] Moreover, Law No. 9605 contains a list of aggravating circumstances, several of which could be applicable in many illegal gold mining scenarios (e.g., committing the crime for pecuniary gain, causing environmental harm that reaches human settlements, recidivism, etc.).[368] Finally, as is standard in the region, the law contemplates seizure and permanent loss of the proceeds and instruments of crime.[369]

Regarding forfeiture and destruction of machinery and other implements, Decree 6514 of 2008 establishes that products used in environmental infractions, including but not limited to mining violations, may be destroyed or rendered inoperable when necessary to prevent their improper use.[370] As in Peru, this provision applies in cases where transportation and storage are unfeasible, as is often the case in remote regions of the Amazon, as well as when the items pose a risk to public safety and health.

To limit the ability of federal officers to destroy equipment seized during environmental operations, the mining stronghold State of Roraima passed a law in 2022 purporting to prohibit destruction within the State's territory. In 2023, the Federal Supreme Court held the Roraima State law unconstitutional, with the Chief Justice opining that the state law clashed with the fundamental right to an ecologically balanced environment, as it increased the likelihood of additional environmental offenses using the seized equipment.[371]

With respect to IP&LCs, the Brazilian Constitution recognizes the rights of Indigenous peoples and Afro-Brazilian *quilombolas* (communities originating from escaped slaves). As Brazil is also party to ILO Convention 169 and the American Convention on Human Rights, both peoples have important additional protections, including the right to traditional territories, use and management of renewable natural resources, the right to a healthy environment, and the right to legal recourse.

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[364] Lei No. 9,605 (1998), https://www.planalto.gov.br/ccivil_03/leis/l9605.htm.
[365] *Id.*, art. 55.
[366] *Id.*
[367] *Id.*
[368] *Id.*
[369] *Id.*
[370] Decreto 6,514 (2008), https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/decreto/d6514.htm.
[371] *STF Derruba Lei de Roraima que Proibia Destruição de Bens Apreendidos em Operações Ambientais*, Supreme Federal Court (Feb. 22, 2023), https://portal.stf.jus.br/noticias/verNoticiaDetalhe.asp?idConteudo=502827&ori=1

Incorporated into national law through Decree 5.051/2004 (and then Decree 10.088/2019), the norms of ILO Convention 169 in Brazil apply not only to Indigenous peoples and *quilombolas*, but also to other traditional communities, such as *ribeirinho* (riverine) communities. If interpreted comprehensively and implemented with conviction, these provisions should protect IP&LCs from the impacts of gold mining using mercury.

Notably, Brazil is not yet a Party to the Escazú Agreement despite signing the convention text in 2018.[372] Its obligations are certainly germane to gold mining using mercury, and ratification would provide an important boost to IP&LCs struggling with informal and illegal gold mining.

f. Closing Thoughts

Brazil should be urged to complete its NAP under Article 7 of the Minamata Convention with all due speed. Fortunately, in July 2026, Brazil opened a public consultation on its draft NAP, seeking input from stakeholders under a comment period ending on August 7, 2026.[373]

Brazil should also be supported and encouraged in its efforts to implement and enforce IBAMA Normative Instruction No. 26-2024. This is an exemplary approach to regulatory control and tracking of mercury, from import and export to domestic transport, purchase, and use. Although robust implementation may require a sizeable budget allocation, the subject matter warrants as much.

Brazil should strengthen cooperation with Bolivia to fight mercury trafficking across the countries' shared border. This could include joint border patrols, joint interdiction operations, and even a permanent joint task force made up of Bolivian and Brazilian police and customs agents, among others. Similar efforts should be made to strengthen cooperation with Colombian, Ecuadorian, and Peruvian authorities. Although the primary source of mercury flowing illegally into Brazil appears to be Bolivia, organized crime groups involved in illegal gold mining frequently operate in Amazonian border zones that span Brazil's borders with other countries.[374]

Brazil should ratify the Escazú Agreement, as its provisions on access to courts and environmental defenders are especially relevant to Brazilian IP&LCs facing incursions and threats from illegal and informal gold miners. Notably, ratifying the Escazú Agreement would align well with Brazil's recent efforts, in collaboration with the UNODC, to train young Indigenous communicators to effectively denounce illegal mining in the Amazon.[375] Many high-profile NGOs (e.g., Human Rights Watch) have urged Brazil to ratify the treaty.[376]

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[372] Escazú Agreement, *supra* n. 159.
[373] *Brazil Seeks to Curb Mercury Use in Small-Scale Gold Mining*, BRAZIL STOCK GUIDE (July 13, 2026), https://www.brasil247.com/brazilstockguide/insights/brazil-seeks-to-curb-mercury-use-in-small-scale-gold-mining/.
[374] Rodrigo Pedroso, *Organized Crime Goes International: Links to Illegal Mining in Brazil, Colombia and Peru*, OJO PUBLICO (April 14, 2024), https://ojo-publico.com/5059/organized-crime-groups-behind-new-amazon-illegal-mining-enclaves.
[375] *UNODC Brazil Trains Young Indigenous Communicators to Confront Illegal Mining in the Amazon,* UNODC (Feb. 2025), https://www.unodc.org/cofrb/en/noticias/2025/2/unodc-brazil-trains-young-indigenous-communicators-to-confront-illegal-mining-in-the-amazon.html.
[376] Andrea Carvahlo, *Brazil's Turn to Ratify Landmark Environmental Treaty*, HUMAN RIGHTS WATCH, https://www.hrw.org/news/2024/09/26/brazils-turn-ratify-landmark-environmental-treaty.

Finally, Brazil should consider whether it would be helpful to amend its criminal legislation to more effectively target high-level operatives in illegal mining and mercury trafficking cases. As noted above, Brazil's criminal penalties are not particularly strong in isolation (although they can pack a punch in the case of multiple charges). Brazil may find review of Peru's Law Against Organized Crime instructive to ensuring investigators and prosecutors have the tools they need to secure truly deterrent penalties for the beneficiaries, organizers, and financiers of sophisticated illegal mining and mercury trafficking operations.

4. Bolivia

Bolivia has become South America's hub for import and contraband export of mercury. The bulk of Bolivia's mercury imports, approximately 200 tons per year, come from Mexico.[377] As these imports far exceed use within Bolivia, much of the mercury imported to Bolivia in recent years has been smuggled to neighboring countries, especially Peru and Brazil.[378]

Within Bolivia, mercury pollution and other environmental harms from ASGM have become a major problem, including in highly biodiverse protected areas.[379] The country hosts more than 1,000 ASGM operations engaged in deforestation, waterway diversion, and the literal change of the landscape.[380]

Bolivia's mercury use has raised the level of mercury concentration in the bodies of members of local populations, especially IP&LCs.[381] Multiple studies have revealed abnormal levels of mercury in downstream IP&LCs,[382] especially among communities with fish as the basis of their diet.[383]

As explained below, most of Bolivia's gold mining occurs under a system of semi-formal mining cooperatives (co-ops) that wield great political and economic power and are increasing in number. The number of mining co-ops jumped from around 800 in 2006 to approximately 1,900 by 2019, carrying out 94% of gold production in Bolivia.[384] Numerous reports describe the laws favoring co-ops, especially a measure in the general mining law that reduces royalties from 7% to 2.5% in the case of "marginal" deposits mined by "small scale" operations.[385] Local experts observe that

[377] Maxwell Radwin, *supra* n. 34.
[378] *Id.*
[379] Thomas Graham, *supra* n. 30.
[380] *Id.*
[381] *Id.*
[382] *Id.*
[383] Miguel Arriaza, *Bolivia's Mercury Dilemma: The Metal that Both Feeds and Poisons the Country's Amazon Region*, EL PAIS (May 6, 2023), https://english.elpais.com/international/2023-05-06/bolivias-mercury-dilemma-the-metal-that-both-feeds-and-poisons-the-countrys-amazon-region.html. *See also* Dan Collyns, *How Bolivia's Gold Rush is Poisoning Indigenous Communities*, NEWSCIENTIST (Jan. 10, 2024), https://rainforestjournalismfund.org/stories/how-bolivias-gold-rush-poisoning-indigenous-communities.
[384] Miguel Arriaza, *supra* n. 383.
[385] Ley 535 de Minería, art. 227 (2014), https://mineria.gob.bo/juridica/20140528-13-6-11.pdf; Miguel Arriaza, *supra* n. 383.

the co-ops use this provision despite not genuinely fitting within the "marginal" and "small-scale" parameters.[386]

Co-ops operate in a largely unrestricted fashion. Indeed, mining concessions have been given in protected areas without inspections to confirm that mining is limited to assigned 25-hectare areas.[387] Moreover, approximately 85% of co-ops function without an environmental license.[388] Through "non-enforcement, legal ambiguity, and pervasive informality," Bolivia's co-ops have market advantage.[389]

Enforcement in Bolivia's alluvial mining zones is a difficult task, which often falls to under-resourced park rangers "who have to balance upholding the law with maintaining relations with the communities and the cooperatives so as to be able to conduct inspections and administrative processes."[390] In some protected areas, rangers have found themselves barred from entry.[391]

a. Introduction to Law and Policy Response

Despite being Party to the Minamata Convention, Bolivia has thus far failed to develop a NAP and, except for a limited Supreme Decree on registering and approving the import, export, and marketing of mercury,[392] Bolivia has done little to reduce, much less eliminate, use of mercury. While national law provides for significant penalties for illegal mining, pollution, and other associated crimes, there is scarce evidence these provisions are regularly applied to mining co-ops and their members. In fact, Bolivia continues to be one of the world's largest importers of mercury.[393]

In a more recent development, Bolivia effectively incentivized gold mining through a law directing the Central Bank to purchase gold from domestic co-ops to strengthen its international reserves.[394] While perhaps understandable as a response to the country's acute shortage of dollars, this law creates more demand for gold mining, often with mercury. It is unclear how or whether the Bolivian Central Bank screens gold to ensure it is not purchasing illegally mined gold or gold processed with mercury.

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[386] *Cooperativas que Explotan Oro Aportan 2.5% en Regalías y No Pagan Impuestos*, OPINION (Sept. 11, 2023), https://www.opinion.com.bo/articulo/pais/cooperativas-que-explotan-oro-aportan-25-regalias-pagan-impuestos/20230910224402920382.html.
[387] *La Amazonía Saqueada: Las Raíces de los Delitos Ambientales en Bolivia*, INSIGHT CRIME (April 2024), p. 32, https://insightcrime.org/wp-content/uploads/2023/08/2024_05_02_V6_InsightCrime-La-Amazonia-Saqueada-Bolivia_ES-mod-PDF.pdf.
[388] *Id.*
[389] Fritz Brugger et al., *The State and the 'Legalization' of Illicit Financial Flows*, UNU-WIDER (Dec. 2022), https://www.wider.unu.edu/publication/state-and-'legalization'-illicit-financial-flows.
[390] Thomas Graham, *In a Bolivian Protected Area Torn Up for Gold, Focus is on Limiting Damage,* MONGABAY (May 2, 2023), https://news.mongabay.com/2023/05/in-a-bolivian-protected-area-torn-up-for-gold-focus-is-on-limiting-damage/.
[391] *Id.*
[392] *See* Supreme Decree 4959 (2023).
[393] *La Amazonía Saqueada, supra* n. 387, p. 37.
[394] *See* Law 1503 (2023).

How is it possible the co-ops hold so much power and operate above the law? The cynical answer seems to be correct: The co-ops generate extraordinary sums and corruption abounds.[395] Combined with significant membership numbers, strict syndical discipline, powerful organizing capacity, and a penchant for shows of force (marches on La Paz punctuated with the occasional dynamite blast are the go-to move), it becomes easy to see how the co-ops have emerged as a difficult sector to regulate and control.

b. Supreme Decree 4959: Toward Control of Import, Export, and Commercialization of Mercury in Bolivia

Supreme Decree 4959 of 2023 is one of few forceful actions Bolivia has taken in response to its obligations under the Minamata Convention. This decree creates a system to regulate and track imports, exports, and domestic commerce in mercury. Although it does nothing on its face to reduce such imports, exports, and commerce, effective implementation of this system could make a difference in taming Bolivia's mercury market.

The decree establishes a Single Mercury Registry (RUME) and a regime of prior authorization for import and export of mercury.[396] The Ministry of the Environment and Water is tasked with establishing the requirements, conditions, and procedures for granting these prior-authorization permits.[397] The prior-authorization permit "is the document through which the National Customs [Service] may carry out the respective control at the time of entry or exit of this substance into/from national territory."[398] The National Customs Service has issued instructions with respect to obtaining prior authorization for import and export of mercury, suggesting that the mandate has at least made its way to frontline customs agents.[399]

Overall, Decree 4959 is limited in scope. It establishes a process for registering mercury importers, exporters, and marketers and for obtaining prior authorization. Although this process doesn't expressly aim to reduce mercury import, export, sale, and use in the country, the establishment of a special permit system is an important first step.

c. The Mining Co-ops: Law 356 of 2013 and How Co-ops Operate on the Ground

As noted above, mining co-ops dominate the gold mining sector in Bolivia. Law 356 of 2013 (the General Law of Cooperatives) establishes the basic contours of cooperative law but does little to elucidate the specifics.[400] This may be a case of strategic ambiguity, where both the state and co-

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[395] *See, e.g.,* Jacqueline Maydana, *Bolivia Sufre Aprietos Económicos y la Explotación 'Informal' del Oro Está en Auge*, URGENTE (July 18, 2024), https://www.urgente.bo/noticia/bolivia-sufre-aprietos-económicos-y-la-explotación-informal-del-oro-está-en-auge.
[396] Supreme Decree 4959 (2023), art. 1.
[397] *Id.*, art. 3; *see also* Ministerial Resolution 325 (2023).
[398] *Government Approves Supreme Decree 4959 that Regulates the Importation of Mercury in Bolivia*, Ministry of the Environment and Water (June 15, 2023), https://www.mmaya.gob.bo/2023/06/15/gobierno-aprueba-decreto-supremo-n-4959-que-regula-la-importacion-de-mercurio-en-bolivia/.
[399] Minute of Instruction re: Application of Supreme Decree 4959 of 2023, National Customs Agency (July 12, 2023), https://www.scribd.com/document/927474354/Minuta-de-Instruccion-AN-PE-MI-2023-0230-Aplicacion-del-Decreto-Supremo-N-4959-de-14062023.
[400] *See generally* Law 356 (2013), https://www.afcoop.gob.bo/wp-content/uploads/2017/06/Ley_general_de_cooperativas_y_reglamentacion.pdf.

ops benefit from indeterminate rules. In practice, the National Federation of Mining Cooperatives (FENCOMIN) exists as the intermediary between the state and mining co-ops, exerting significant power over this critical relationship.[401]

Apart from the bare bones of Law 356, Bolivia's regulatory landscape has been said to "erase[] the lines between the legal and the illegal."[402] In the face of limited regulations and enforcement, co-ops have moved further into the Amazon and have developed associations with illegal actors from Colombia and China.[403]

d. Other Laws Related to Mercury Use, Hazardous Waste, and Environmental Harm

A handful of older laws and regulations remain relevant to mercury-based gold mining. A pair of these even speak to mercury explicitly. Others address mercury through broader terms like "hazardous waste" and "environmental harm."

1. Supreme Decree 24782: Environmental Regulation of Mining Activities

Supreme Decree 24782 of 1997 directly addresses mercury use and provides significant restrictions vis-à-vis mining. It states that "use of mercury in mineral concentration processes is only permitted" if accompanied by "mercury recovery equipment[.]"[404] The decree specifies that "[a]malgam treatment must be carried out in retorts or other equipment that prevents the release of mercury into the environment."[405]

Enforcement of this decree, which has the virtue of clear and highly policeable strictures, seems critical to reducing mercury emissions from ASGM. However, the government seems to be carrying out few enforcement actions under this provision.

2. Law 1333: Law of the Environment

Bolivia's 1992 Law of the Environment has several relevant provisions related to environmental harm, hazardous substances, and sanctions. Article 21 requires all persons engaged in activities that may degrade the environment to take "appropriate preventive measures" to avoid harm to human health, population, the environment, and property.[406] While the precise meaning of this clause may be somewhat nebulous, there is little question that using mercury in alluvial gold mining fails the test, at the very least when conducted without retorts.

Furthermore, Article 30 provides the state "shall regulate and control the production, introduction, and marketing of . . . substances that are hazardous and/or harmful to health and/or the

[401] *See, e.g.*, Antonio Villegas, *Gobierno "Reconoce" a FENCOMIN como la "Unica" Representante de los Tres Sectores de Mineros Cooperativistas*, EJU (Jan. 13, 2026), https://eju.tv/2026/01/gobierno-reconoce-a-fencomin-como-la-unica-representante-de-los-tres-sectores-de-mineros-cooperativistas/
[402] *La Amazonía Saqueada, supra* n. 387, p. 27.
[403] *Id.*
[404] Supreme Decree 24782 (1997), art. 27, https://www.lexivox.org/norms/BO-DS-24782.html.
[405] *Id.*
[406] Law 1333 (1992), art. 21, https://www.lexivox.org/norms/BO-L-1333.html.

environment."[407] Under any standard reading, this gives the government broad authority and even a mandate to regulate mercury.[408]

As to water pollution and environmental degradation, Article 39 provides that "[t]he State shall regulate and control the discharge of any liquid, solid, or gaseous substance or waste that causes or may cause water pollution or environmental degradation."[409] Similarly, Article 70 provides that the exploitation of mineral resources should be managed with an eye to both the "comprehensive use of raw materials" and "the treatment of waste materials[.]"[410] Here, too, Bolivia's lax enforcement approach to the mercury crisis clashes with both the spirit and text of its laws.

Regarding incentives to promote cleaner forms of industrial activity, including mining, Article 90 provides that the state "shall establish mechanisms to promote and incentivize . . . technologies and processes aimed at achieving environmental protection and sustainable development."[411] In the gold-mining context, it is unclear whether or how this norm has been implemented. One could imagine a mandate to use gravimetric tables in place of mercury, for example, but because the provision's terms are so general, a separate decree or regulation to this effect might be required.

The Law of the Environment further establishes a hierarchy of violations of environmental norms and regulations, including: (1) administrative infractions; (2) violations subject to civil actions; and (3) environmental crimes.[412] This creates a pyramid of responses that coincide with the severity of illegal actions.

In the case of administrative infractions, the principal consequence is the requirement to repair harm caused.[413] This is a profoundly important requirement in cases involving mercury contamination, but, again, it is not clear that Bolivia is prioritizing this remedy. It should.

Regarding environmental crimes, the Law of the Environment identifies (1) water pollution, with a criminal penalty of one to four years' imprisonment;[414] (2) industrial waste disposal or commercialization, with a penalty of two years' imprisonment;[415] and (3) toxic waste import or transport, with a penalty of ten years' imprisonment.[416] The penalty gulf between water pollution and industrial waste disposal (both of which would appear applicable in ASGM using mercury) and toxic waste import or transport (which would likely not be applicable in most cases) suggests a disconnect with the prevalence and severity of mercury problems and illegal ASGM in contemporary Bolivia. Today, mercury contamination and illegal gold mining is a much bigger problem than import of toxic waste, yet the latter triggers steeper penalties.

3. The Role of the Central Bank

[407] *Id.*, art. 30.
[408] *Id.*, art. 31.
[409] *Id.*, art. 39.
[410] *Id.*, art. 70.
[411] *Id.*, art. 90.
[412] *See generally id.*, arts. 99-115.
[413] *Id.*, arts. 99-101.
[414] *Id.*, art. 107.
[415] *Id.*, art. 112.
[416] *Id.*, art. 113.

To strengthen its international reserves, Bolivia has passed laws relevant to the purchase of gold by the government.[417] However understandable these laws may be from a monetary perspective, they may work at cross-purposes with the Minamata Convention by incentivizing gold mining and, by extension, mercury use.

Law 1503 of 2023 was specifically passed to authorize the Bolivian Central Bank to purchase more locally mined gold to strengthen international reserves.[418] Notably, the law provides for the refinement outside the country of gold mined in Bolivia for purposes of meeting international quality standards, as refinement capacity in Bolivia remains limited[419] and foreign purchases like Turkey have both advanced refineries and demand for Bolivian gold.[420] Yet the law says little to nothing on how the Bolivian government vets and ensures gold purchased by the Central Bank comes from fully legal mining operations.

Previously the government also issued Supreme Decree 1327 of 2012 to encourage the purchase of gold from mining co-ops.[421] In addition, the Ministry of Mining and Metallurgy passed Ministerial Resolution 118 of 2018, raising the limits of the amount of gold that mining co-ops can sell.[422] Together with Law 1503, these laws arguably incentivize Bolivian ASGM, as they provide a guaranteed buyer for gold produced by Bolivia's co-ops, which may often be extracted illegally and with the use of mercury.

The problem of central banks purchasing gold of dubious origin is hardly limited to Bolivia or other developing countries. As discussed earlier, the U.S. Mint indirectly purchased gold from illegal mining operations managed by drug cartels in Colombia,[423] with a disturbing lack of due diligence by the federal government.[424] Even if traceability remains a challenge in many instances, government purchasers have the sophistication and moral responsibility to avoid contributing to the problem.

4. General Mining Laws and Regulations Relevant to Mercury Use

Although relatively comprehensive, the general mining code in Bolivia, Law 535, does not speak directly to gold mining or to the use of mercury. Still, it contains a handful of relevant provisions. First, Law 535 includes in its "principles" the requirement of "social responsibility in the use of mining resources within the framework of sustainable development," as well as "protection of

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[417] Bolivia is suffering through an economic crisis that has depleted reserves. *See, e.g., Crisis in Bolivia: The Government Had to Sell Gold to Guarantee Fuel Imports and Maintain Subsidies*, INFOBAE (Feb. 6, 2025), https://www.infobae.com/america/america-latina/2025/02/07/crisis-en-bolivia-el-gobierno-debio-vender-oro-para-garantizar-las-importaciones-de-combustible-y-mantener-los-subsidios/.
[418] *See generally* Law 1503 (2023), https://www.lexivox.org/norms/BO-L-N1503.html
[419] *Id.*, art. 7.
[420] *See, e.g.*, *Bolivia Operations: Processing Plant Jacha Kollo*, GRUPO MINERO BONANZA https://grupominerobonanza.com/en/bolivia-operations/.
[421] Sergio Mendoza, *A Chaotic Gold Rush Is Helping Bolivia Prop Up Its Finances*, BLOOMBERG (Aug. 14, 2025), https://www.bloomberg.com/features/2025-bolivia-central-bank-gold/.
[422] Ministerial Resolution 118 (2018).
[423] *See* Scheck, *supra* n. 268.
[424] *Id.*

indigenous nations and peoples[.]"[425] Second, it provides for prior consultation for Indigenous and Afro-Bolivian communities when miners seek to operate in their traditional territories.[426]

To administer these and other components of the regulatory framework, Law 535 created the Mining Administrative Jurisdictional Authority (AJAM) and invested it with responsibility to manage and oversee all mining in Bolivia,[427] including approving and revoking mining licenses.[428] Of special significance to mercury-based gold mining, AJAM National and Regional Directors are made responsible for "monitoring compliance with environmental obligations and sanctions for non-compliance."[429]

Regarding sales of gold, Law 535 created the National Service of Registration and Control of Commercialization of Minerales and Metals (SENARECOM).[430] SENARECOM is in turn charged with monitoring compliance with regulations governing the domestic and foreign marketing of minerals and metals, including gold.[431] It can issue administrative sanctions and "denounce and send" to the Public Prosecutor's Office suspected crimes.[432] Thus, SENARECOM has an important role in the identification and penalization of miners who sell or market gold illegally.

Regarding environmental protections and with the exception of pre-existing mining operations, Law 535 states: "In the vicinity of watershed headwaters, lakes, rivers, springs, and reservoirs, restrictions will be implemented in accordance with Environmental Studies with a multi-sectoral approach."[433] In practice, it is unclear how often these "Environmental Studies" are conducted and whether they lead to meaningful restrictions around alluvial mining. Furthermore, the exception for pre-existing mining rights amounts to a major loophole.

Regarding illegal mining, Law 535 defines "illegal exploitation" as extraction without "authorization or right[.]" Apart from criminal penalties (which must, according to the law, include payment of evaded royalties), Law 535 authorizes the state to carry out "confiscation or destruction of the machinery used."[434] Finally, the law provides for the extinction of mining rights.[435]

5. Mining in Protected Areas

As of the enactment of Law 535 (the general mining code) in 2014, Bolivian law establishes the possibility of "productive mining activities" within protected areas.[436] This has, unsurprisingly, sparked many a debate. Although the General Regulation of Protected Areas (2010) also

[425] Law 535 (2014), Title I, Ch. II, art. 5.
[426] *See generally id.*, Title VI.
[427] *Id.*, art. 39.
[428] *Id.*, art. 40.
[429] *Id.*, art. 56.
[430] *Id.*, art. 85.
[431] *Id.*, art. 87.
[432] *Id*.
[433] *Id.*, art. 93.
[434] *Id.*
[435] *See generally id.*, Title III, Ch. II.
[436] Law 535, art. 2020.

contemplates this possibility, it treats the subject less enthusiastically, providing for indemnification, relocation, and compensation for harm caused.[437] Illegal occupation of protected areas is prohibited under the General Regulation, and violation of this prohibition can result in confiscation as well as other measures.[438] The General Regulation also delineates administrative infractions, including unauthorized mineral extraction, that can result in fines and confiscation.[439]

Because Law 535 was promulgated after the General Regulation of Protected Areas (2014 versus 2010) and a "Law" is juridically superior to a "Decree or Regulation," there is no question that Law 535 controls in the event of a conflict. In general, allowing mining in protected areas is controversial and runs afoul of IUCN standards in many instances.[440] Thus, we would encourage Bolivia to revisit what may be an overly permissive approach.

6. Additional Criminal Penalties for Illegal Mining

In addition to the penalties contained in the relevant laws discussed above, Bolivia's Criminal Code contains several provisions addressing illegal mining and related activity. On the positive side, Bolivia's progressive amendments of the Criminal Code (with a tranche in 2013 and another in 2018) show a concerted effort to impose higher punishments. On the troubling side, these amendments, made at different times, arguably create ambiguities that could lead to inconsistent judicial outcomes.

In 2013, Law 367 incorporated three new crimes into the criminal code.[441] First, Law 367 contemplates imprisonment of four to eight years for anyone who "carries out mineral resource exploitation activities without authorization[.]"[442] This would seem to apply where a group or individual has been caught extracting gold without a license. The second crime added in 2013 called "subjugation," authorizes four to eight years' incarceration for "[a]nyone who, for any reason, occupies a mining area through violence, threats, deception, or any other means, preventing the exercise of mining activities" by third parties.[443] When analyzed alongside the crime of illegal exploitation, the crime of subjugation criminalizes the forceful takeover of mining zones, which often precedes and facilitates illegal exploitation. Finally, the 2013 reforms added a crime aimed at keeping illegal gold out of the supply chain, authorizing three to six years' incarceration for "[a]nyone who sells or purchases mineral resources resulting from subjugation in a mining area or the illegal exploitation of mineral resources[.]"[444]

Next, Law 1093 of 2018 introduced five new crimes including theft of minerals, robbery of minerals, aggravated robbery of minerals, criminal association for the commission of crimes

[437] Decree 24781 (2010), arts. 8-10, https://www.lexivox.org/norms/BO-DS-24781.xhtml.
[438] *Id.*, art. 12.
[439] *See generally id.*, Chs. II-IV.
[440] *See Responsible Mineral Governance*, IUCN, https://www.iucn.nl/en/our-work/value-chains/responsible-mineral-governance/.
[441] Ley No. 367 (2013), https://faolex.fao.org/docs/pdf/bol124031.pdf.
[442] *Id.*
[443] *Id.*
[444] *Id.*

related to extraction of minerals, and receiving illegally extracted minerals.[445] Distinguishing these crimes from those previously discussed is not always easy. For example, while the criminal association provision clearly breaks new ground (effectively criminalizing an important organizational aspect of illegal mining), it is not entirely clear how "theft" of minerals is legally distinct from the crime of illegal exploitation of mineral resources under Law 367, the latter of which triggers a higher penalty. The differing terms probably suggest a distinction based on the precise conduct at issue: If one is caught illegally mining, that is illegal exploitation, whereas theft of minerals seems to only target stealing or embezzling minerals from a third party (presumably an authorized miner) *following* extraction.[446] Similar interpretive problems arise when attempting to parse the difference between the sale or purchase of illegal mineral resources under the 2013 amendments and receiving illegally extracted minerals under the 2018 provisions. Absent clear and well-understood distinctions, defense attorneys might argue for the lesser penalty under the rule of lenity.

7. Formalization of Mining Activities

So far, the government hasn't made this a true priority. The challenge is enormous: even setting aside gold mining, informal employment is the norm. According to ILO data, Bolivia has the largest percentage of informal workers in Latin America, topping out over 80%.[447] With gold mining a notoriously informal sector nested within a largely informal national economy, the task is daunting.

In a nod to some degree of formalization, Supreme Decree 3405 of 2017 created the Single Miner Registry based on the premise that "it is necessary for the mining and metallurgical sector to have a registry and computer systems aimed at streamlining the procedures carried out by mining operators in public entities and companies under the supervision of the Ministry of Mining and Metallurgy."[448] To that end, the decree established a single registry obligatory for all mining actors.[449] Nevertheless, it is unclear whether this registry has been able to attract a critical mass of previously unregistered and informal gold miners. Because informal gold miners sell gold to co-ops—and gold subsequently sold by co-ops seems to be treated as legal by the government—there may be insufficient incentives for individual gold miners to participate, particularly if they operate in remote regions.

More recently, FENCOMIN has worked with the Ministry of Mining and Metallurgy to develop a "Plan of Cooperative Mining Formalization."[450] However, the timeframe for the plan has been

[445] Ley No. 1093 (2018), https://www.lexivox.org/norms/BO-L-N1093.html; *see also* https://www.fiscalia.gob.bo/marco-legal/leyes/codigo-penal (showing amendments); *Delitos Vinculados a la Explotacion de Minerales*, Rigoberto Paredes & Asociados, https://www.rigobertoparedes.com/es/delitos-vinculados-a-la-explotacion-de-minerales/ (explaining 2018 reforms).
[446] Rigoberto Paredes & Asociados, *supra* n. 445 (providing examples of new crimes codified in 2018).
[447] Carla Canelas & Miguel Niño-Zarazúa, *Informality and Pension Reforms in Bolivia: The Case of Renta Dignidad*, 58 THE JOURNAL OF DEVELOPMENT STUDIES 1436 (2022).
[448] Supreme Decree 3405 (2017), p. 1, https://www.lexivox.org/norms/BO-DS-N3405.html.
[449] *Id.*, art. 2.
[450] *See* Ministerial Resolution 209 (2024).

extended on multiple occasions since 2021,[451] so it is difficult to discern how much progress has been made.

8. Closing Thoughts

Bolivian gold mining policy, especially regarding the use of mercury, suffers from several profound problems. These include: (1) lack of sufficiently demanding laws and regulations; (2) lack of enforcement of the laws and regulations that do exist; and (3) a status quo that seems to recognize as legal that which has operated informally or semi-formally for years (especially the dominant system of mining co-ops).

While Bolivia has taken an important step forward with the issuance of Supreme Decree 4959 regarding registration of import, export, and commercialization of mercury, it has not done enough to reduce the flow of mercury into the country and to reduce the use of mercury in gold mining in the ASGM sector.

Bolivian law contains provisions that could be used to punish the use of mercury, including laws and decrees related to pollution, the use of mercury as an amalgamating agent without retorts, and illegal use of toxic substances. In addition, Bolivia has a series of provisions regarding completely illegal mining (without a permit or concession) that could be used against the large portion of mining done beyond the shadow of the law.

Nevertheless, the dominance of mining co-ops and the power they wield makes reduction and progressive elimination of the use of mercury in gold mining a tall order. Moreover, Law 1503, authorizing increased purchase of gold by the government to strengthen international reserves has only made matters more challenging. Compounding the issue further, Bolivia's laws on mining in protected areas seem too permissive.

Given Bolivia's lack of action, a more aggressive approach to achieving change and to encourage the reduction and eventual elimination of mercury use in gold mining are needed. This could include litigation to enforce existing laws that are not being observed, some of which is already occurring.[452]

Arguably, though, what is needed is new, sweeping legislation. An across-the-board prohibition of mercury import, export, commercialization, and use could force Bolivia to finally confront this out-of-control problem. Such a law could be done either as an immediately effective prohibition or as a phase-out.

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[451] *See, e.g., Gobierno Amplía por 18 Meses Contratos Administrativos de la Minería Cooperativizada*, ERBOL (Dec. 20, 2025), https://erbol.com.bo/economía/gobierno-amplía-por-18-meses-contratos-administrativos-de-la-minería-cooperativizada.

[452] *See, e.g.,* Plurinational Constitutional Sentence 0616/2023-S2 (July 4, 2023) (upholding judgment against mining operation in Rio Blanco and in favor of an indigenous community for environmental damage, including from the use of mercury, due to gold mining); Departmental Tribunal of Justice, Palo Blancos, La Paz, Bolivia Sentence 004-2023/AP (July 25, 2023) (recognizing, *inter alia*, the rights of nature of the Beni River with respect to mining activity).

At the international level, Bolivia should be encouraged to develop its NAP as soon as possible in compliance with Article 7 of the Minamata Convention. Bolivia faces manifold problems with mercury and gold mining, and the NAP process provides an important opportunity for holistic—and realistic—planning, including law and policy reform.

5. Ecuador

In Ecuador, mercury is synonymous with the illegal and informal sectors, in particular in the provinces of Azuay, Sucumbíos, Zamora Chinchipe, and El Oro.[453] The growth of mercury-based gold mining in these areas has coincided with a rise in armed drug-trafficking groups which increasingly play an outsized role in gold mining.

Criminal gangs, like the *Lobos*, have evolved to include gold mining as a major part of their portfolios. Originally concentrated in the south of the country, these gangs have moved into eastern and northern Ecuador. Violence has followed, including multiple massacres and even the murder of a mayor.[454] These problems led former-President Guillermo Lasso to declare illegal gold mining in the Amazon a threat to national security.[455] In at least one province, a study to determine the baseline of ASGM activity could not be carried out due to security concerns and armed conflict surrounding mining activity.[456]

In lockstep with rising gold prices, informal and illegal gold mining has expanded exponentially. For example, in the Napo River region, mining activity based on geographical metrics ballooned by over 200 times, rising from 2.6 hectares in 1996 to 556.8 hectares in 2020.[457] In these areas, most activity is artisanal and semi-mechanized, and miners rarely comply with regulations.[458] Neither have parks been spared, with miners operating in protected areas like the Podocapus National Park.[459]

Despite or perhaps because of the challenges, some Indigenous communities have begun to act against illegal mining.[460] For example, in the Putamayo River region, an "Indigenous Guard" patrols on the lookout for alluvial gold miners,[461] taking enforcement into its own hands through confiscation and destruction of equipment.[462]

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[453] Carlos Mestanza-Ramon, et al., *Gold Mining in Ecuador: Innovative Recommendations for the Management and Remediation of Mercury-Contaminated Waters*, 4 GREEN WORLD JOURNAL (2021).
[454] Austin, *supra* n. 27.
[455] Dan Collyns, *"Leave the Gold in the Ground": Ecuador's Forest Guardians Mobilise Against Illegal Mining in Amazon*, THE GUARDIAN (Nov. 13, 2023), https://www.theguardian.com/global-development/2023/nov/13/illegal-gold-mining-ecuador-amazon-ai-cofan-indigenous-guardians-mobilise.
[456] Mestanza-Ramon, et al., *supra* n. 453.
[457] Allen Panchana, *Illegal Gold Mining 'Mafias' Threaten Life in an Ecuadorian River*, DIALOGUE EARTH (Nov. 8, 2022), https://dialogue.earth/en/pollution/60366-ecuador-illegal-mining-gold-mafias-threaten-river/.
[458] *Id.*
[459] Mestanza-Ramon, et al., *supra* n. 453. *See also MAAP #221: Illegal Mining in Protected Areas of the Ecuadorian Amazon*, MONITORING OF THE ANDES AMAZON PROGRAM (Oct. 11, 2024), https://www.maapprogram.org/mining-protected-areas-ecuador/.
[460] Dan Collyns, *supra* n. 455.
[461] *Id.*
[462] *Id.*

a. Introduction to Law and Policy Response

Ecuador's legal response to the use of mercury in ASGM reveals a complex interplay between explicit prohibition and persistent illegal activity. While the country enacted a comprehensive ban on mercury use in mining operations through its 2013 Mining Reform, national assessments acknowledge the significant gap between this legal mandate and the reality of continued clandestine use.[463]

Notably, Ecuador's effort to eliminate the use of mercury in mining has occurred within a distinct constitutional framework established in 2008, which recognizes the rights of nature and robust IP&LC rights, in harmony with international standards like those in ILO Convention 169.[464] Building on this foundation, Ecuador has employed a multi-pronged strategy that includes but extends beyond a mercury-use ban, leveraging administrative sanctions like the revocation of mining rights, substantial criminal penalties for illicit mining and environmental damage, stringent controls over mercury imports, and comprehensive environmental liability frameworks.[465] Ultimately, this legal architecture both (1) reflects Ecuador's objective to minimize mercury-based gold mining through deterrence, supply restriction, and accountability; and (2) tacitly acknowledges, as evidenced in extensive formalization plans in Ecuador's 2020 NAP and elsewhere, that punitive measures alone may be insufficient without addressing the socio-economic drivers of informal and illegal mining and use of mercury.[466]

b. Ecuador's Prohibition on the Use of Mercury in Mining

Ecuadorian law prohibits the use of mercury in all mining operations, including subsistence gold mining.[467] This ban was passed in July 2013 as part of several reforms to Ecuador's Mining Law, and it cited by way of justification mercury's toxicity to human health and its impact on the environment.[468]A transitory provision in the law provided a two-year period for the adoption of alternative methods to eliminate the use of mercury in mining,[469] Thus, the prohibition of mercury in mining came into full effect in 2015; however, it is still legal to use for select purposes, subject to strict regulations.[470]

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[463] *See generally* Ministerio del Ambiente y Agua, *Plan de Accion Nacional sobre el uso de Mercurio en la Minería Artesanal y de Pequeña Escala de Oro en Ecuador* [hereinafter "2020 Ecuador NAP"] (May 2020), https://minamataconvention.org/en/documents/national-action-plan-ecuador-2020.
[464] Constitución de la República del Ecuador (2008), arts. 57.7, 71–74; ILO Convention 169.
[465] *See, e.g.*, Ley de Minería, Registro Oficial Suplemento 517 (2009), art. 17 (prohibiting mercury use and providing for revocation of mining rights as a sanction); Código Orgánico Integral Penal (2014), art. 260 (establishing criminal penalties for illicit mining activity), art. 251 (establishing criminal penalties for crimes against water); Reglamento en el que se Establecen los Requisitos y Procedimientos para la Obtención de Licencias de Importación y Autorizaciones para la Transferencia y Consumo de Mercurio [hereinafter "Import and Transfer Regs for Mercury"] (2013), https://www.ambiente.gob.ec/wp-content/uploads/downloads/2013/12/Reglamento-importaci%C3%B3n-y-transferencia-de-mercurio-25_11_2013.pdf (establishing requirements and procedures for import licenses and transfer/consumption authorizations); Constitución de la República del Ecuador, arts. 14, 71-73, 396-397 (establishing the right to a healthy environment, rights of nature, and duties regarding environmental damage and restoration); Decreto 121 (2009) (establishing environmental rules for mining activities).
[466] 2020 Ecuador NAP, §§ 2.5.1 & 3.1.
[467] Ley Orgánica reformatoria a la Ley de Minería, art. 17 (2013), https://faolex.fao.org/docs/pdf/ecu140400.pdf
[468] 2020 Ecuador NAP, 16.
[469] Ley Orgánica reformatoria a la Ley de Minería, Third Trans. Prov. (Ecua. 2013).
[470] *See generally* Import and Transfer Regs for Mercury, *supra* n. 465.

c. Ecuador's Regulatory Framework Governing Imports and Permitted Uses of Mercury

Ecuador regulates the import of mercury, use, and transfer through a licensing and authorization system overseen by the Ministry of Environment, Water and Ecological Transition.[471] To obtain an import license, importers must provide notarized copies of identification documents, proof of legal representation, contracts with authorized transportation and storage companies, and designation of a qualified technical manager.[472] Importers must also have an updated Single Taxpayer Registry and an environmental license or proof of environmental compliance.[473] A maximum of 1 ton per import license can be requested, and the license is valid for two months and a single shipment.[474] And, recall, any mercury so imported cannot be used for mining.

Still, although mercury is used in several non-mining applications, the one-ton limit does raise questions. It is possible that mercury imported for non-mining purposes is siphoned off to illegal use in gold mining. Tight controls over the supply chain, from the moment of import to ultimate use, are necessary to mitigate this risk. With this vulnerability in mind, the regulations establish a process for obtaining authorizations for the transfer and use of mercury, including providing a copy of the environmental license for the activity in which the mercury will be used.[475]

d. Civil and Administrative Penalties for Illegal Mining and Violations of Ecuador's Mercury Regime

Ecuadorian law contemplates administrative and civil penalties for the unauthorized use of mercury, including the revocation of mining rights.[476] Furthermore, the Mining Law grants the Mining Regulation and Control Agency the authority to impose sanctions for illegal or unpermitted mining, including administrative fines as well as the confiscation, seizure, immobilization, or destruction of machinery, equipment, vehicles, and minerals.[477] Other violations of the Mining Law not leading to the revocation of mining rights can also incur administrative fines.[478] Similarly, violating the Import and Transfer Regulations for Mercury can result in seizure of the mercury in question and suspension or annulment of handling authorizations, alongside fines and remediation orders in select cases.[479]

Beyond these administrative penalties tied to mining norms, significant civil liabilities exist, particularly concerning environmental damage. It is the legal responsibility of mining operators to prevent environmental harm and to restore affected ecosystems.[480] This includes the obligation to repair and provide compensation for damages caused by pollution, including any resulting from

[471] *See generally id.*
[472] *Id.*, arts. 3.1(a)-(d).
[473] *Id.*, arts. 3.1(e)-(f).
[474] *Id.*, Disp. Gen. Sexta.
[475] *Id.* arts. 4.1, 4.3(b).
[476] Ley Orgánica Reformatoria a la Ley de Minería, art. 17.
[477] Ley de Minería, art. 57.
[478] *Id*., Disp. Gen. Segunda.
[479] Código Orgánico Integral Penal, arts. 251-54, 282; Import and Transfer Regs for Mercury, arts. 12, 13, 14, 15 (2013); Disp. Gen. Decima Segunda (2013).
[480] Ley de Minería, arts. 86, 109; Decreto 121 (2009), arts. 5, 51, 105.

mercury use, reflecting responsibilities under the constitutional provisions concerning rights of nature and the right to a healthy environment.[481]

Finally, Ecuador has overarching norms like the strict prohibition of child labor in any mining activity and laws banning forced or coerced labor regardless of sector.[482]

e. Criminal Penalties for Illegal Mining and Violations of Ecuador's Mercury Regime

While Ecuador's Penal Code does not explicitly criminalize unlawful use of mercury in so many words, it effectively does so through its various provisions concerning unlawful mining and unlawful use of hazardous chemicals. Specifically, Article 260 sanctions unauthorized mining activities (including extraction, exploitation, processing, transport, etc.) without required permits, which covers operations illegally using prohibited substances like mercury.[483] The unauthorized management of dangerous chemical substances, like mercury, is further penalized under Article 254, with higher penalties applying in the case of serious environmental damage.[484]

Penalties under Ecuador's Penal Code include both deprivation of liberty (imprisonment, house arrest, or probation) and criminal fines. The penalties differ significantly depending on whether the offender is an individual or a company.

For individuals, the specific prison terms vary by offense, ranging from one to seven years.[485] And the accompanying fine is calculated based on the prison term length.[486]

In contrast, companies face different sanctions in place of imprisonment, including substantial criminal fines, and potentially other measures like temporary or permanent closure, dissolution, or prohibition from contracting with the government.[487] The legal framework assigns responsibility not only to those directly conducting illegal activities but also to title holders if they permit illegal mining by others within their concession areas.[488]

f. Ecuador's Formalization Strategy

Ecuador's strategy to formalize ASGM miners, which is detailed in its 2020 NAP and advanced by the Mining Law and associated regulations, focuses on simplifying legal pathways and providing targeted state support.[489] To understand Ecuador's formalization strategy, it's helpful to

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[481] Constitución de la República del Ecuador, arts.14, 71-74.
[482] Ley de Minería, art. 69; Decreto 121, art. 2.
[483] Código Orgánico Integral Penal, art. 260.
[484] *Id.*, art. 254.
[485] *Id.,* art. 260 (providing penalties for illicit mining, illicit artisanal mining, and illicit mining causing environmental damage), art. 261 (financing illicit mining), art. 254 (unauthorized handling of dangerous substances).
[486] *Id.*, art. 70.
[487] *Id.* arts. 71, 258, 267 (providing, for example, fines of 100-1000 "Unified Basic Salaries" for certain environmental crimes under article 258, fines of 500-1000 "Unified Basic Salaries" for certain resource crimes under article 267, and other measures like closure under article 71).
[488] Ley Orgánica reformatoria a la Ley de Minería, art. 12.
[489] Ley de Minería; Reglamento del Régimen Especial de Pequeña Minería y Minería Artesanal, Decreto No. 120, Registro Oficial, Suplemento 67 (2009) [hereinafter Decreto 120] https://www.gob.ec/regulaciones/reglamento-regimen-especial-pequena-mineria-mineria-artesanal-decreto-ejecutivo-no-120; 2020 NAP, § 2.5.1 & 3.1.

understand that Ecuador's Mining Law establishes distinct categories for mining activities, principally determined by operational scale, considering factors such as production volumes, investment levels, technology, and deposit characteristics.[490] "Artisanal mining" includes permitted operations in authorized areas where equipment with limited capacity is used to generate revenue with the primary aim of covering the miners basic needs. While exempt from royalties, these miners are subject to taxes.[491] Conversely, "small-scale mining" operations require a formal concession granted to individuals or companies for direct exploitation at a higher production capacity and involve heightened reporting requirements.[492] Both artisanal and small-scale mining stand apart from the "medium" and "large-scale" categories, which are defined by substantially greater production capacities, progressively higher royalty rates, and, more comprehensive exploitation contracts.[493]

According to its 2020 NAP, Ecuador aims to improve formalization through promotion of simple and no-cost artisanal mining permits and small mining concessions.[494] This includes plans to automate processes, update the national mining registry, and conduct a comprehensive census to better understand the informal sector, as well as efforts to formally recognize and integrate vulnerable groups like *jancheras* (female miners, often engaged in collecting mineral waste).[495] Another pillar of Ecuador's strategy, involves technical assistance and training programs covering legal compliance, mercury-free techniques, environmental management, safety, and business skills.[496]

Several incentives encourage participation. Formalized artisanal miners benefit from exemptions from mining royalties and annual patent fees, coupled with simplified permit application processes.[497] For both artisanal and small-scale miners, the state aims to improve access to finance by identifying suitable financial products, potentially creating accreditation systems linked to formal status, implementing financing plans via public banks, and piloting competitive funds like "*Fondos Concursables*."[498] Additional incentives include state support for simplified environmental compliance processes and efforts to enhance market access through the promotion of fair trade practices and socio-environmental certifications for responsibly mined gold.[499] Receiving these benefits is linked to miners demonstrating compliance with legal requirements and improved operational practices.[500]

g. Traceability Efforts

Ecuador does not currently have an established national traceability mechanism, but it is promoting certifications and control commercialization within the mining sector. The 2020 NAP outlines a strategy to improve formalized miners' access to markets, which includes identifying existing

[490] Ley de Minería, art. 138; Ley Orgánica reformatoria a la Ley de Minería, art. 23.
[491] Ley Orgánica reformatoria a la Ley de Minería, art. 24.
[492] Ley de Minería, art. 139; Ley Orgánica reformatoria a la Ley de Minería, arts. 26-27.
[493] Ley de Minería, art. 41; Ley Orgánica reformatoria a la Ley de Minería, arts. 18, 23, 27
[494] Ley de Minería, arts. 134, 139; 2020 NAP, §§ 2.5.1 & 3.1.
[495] 2020 NAP, §§ 2.5.1 & 3.1.
[496] Ley de Minería, art. 136; Decreto 120, art. 27, 51; NAP 2020, §§ 2.5.1, 2.5.2.
[497] Ley de Minería, art. 134.
[498] Decreto 120, art. 30; 2020 NAP, §2.5.1.
[499] Decreto 120, arts. 31-33; 2020 NAP, §2.5.1.
[500] Decreto 120, art. 8.

voluntary certifications for responsibly produced gold and promoting their adoption.[501] Importantly, the 2020 NAP also proposes studying the feasibility of establishing a national certification for sustainably produced gold, which would inherently require traceability.[502]

While a dedicated traceability system hasn't been created, existing regulations provide some foundation for tracking mineral flows. Ecuador's Mining Law requires licenses for the commercialization and export of minerals, and it mandates that these licensed sellers and exporters report semi-annually on the origin, volume, and value of their transactions.[503] Furthermore, the Central Bank of Ecuador plays a role in the commercialization of gold from small-scale and artisanal mining.[504] While these measures contribute in part to tracking legal gold sales, they do not amount to a specific mechanism designed to trace and verify gold as "mercury-free" throughout the supply chain.

The establishment of the Andean Observatory is also increasingly relevant to Ecuador's efforts to ensure mercury-free gold. As discussed earlier, this observatory aims to collect and track information on the production, import, export, commercialization, transport, and use of mercury.[505] This may help track and control the trade of mercury and ensure it is not being diverted for illegal use in gold mining.

Finally, developments under the Minamata Convention should assist Ecuador by spurring importing countries to crack down on imports of gold extracted illegally or with the use of mercury. Decision 6/8 from the 2025 COP urged Parties to "strengthen[] accountability throughout the full life cycle of gold supply chains, including buyer and intermediary due diligence, traceability and verification of origin[.]"[506] This clearly implies major importing countries have a duty to screen imports of gold, exercising reasonable efforts to ensure that such imports are not in effect underwriting illegal gold mining and gold mining with mercury.[507] In short, incidents like those described in the *New York Times*, regarding the U.S. Mint's purchase of illegally mined gold, should become few and far between. Ecuador, along with all other Amazon Basin countries, deserve this help.

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[501] 2020 NAP, § 2.5.1.
[502] *Id.* § 2.5.1(d)(3).
[503] Ley de Minería, arts. 50, 53.
[504] Ley Orgánica Reformatoria a la Ley de Minería, art. 49 (2013).
[505] Andean Comm. Dec. 844 (2019); Andean Comm. Res. 2197 (2021).
[506] Decision MC-6/8, *supra* n. 84.
[507] On the topic of traceability, significant efforts have been made in connection with other complex supply chains associated with environmental crime and human-rights violations. Regionally, for instance, Brazil has seen a traceability effort emerge around the cattle industry, with a focus on beef and leather. In the state of Pará, where at least 50% of the cattle are reared on illegally deforested land, TNC serves as a key government ally. In 2023, the Pará Governor introduced the Pará Sustainable Cattle Program, with support from TNC. The program uses electronic ear tags, so that each cow may be "tracked throughout its life cycle[.]" https://www.nature.org/en-us/what-we-do/our-insights/agriculture/brazil-cattle-traceability/. Significantly, consumer countries—not just for cattle products but also for timber goods and gold—have the potential to play a strong role in assisting source countries to clean up supply chains that rely on forced labor. For example, Section 307 of the Tariff Act of 1930 prohibits importing to the U.S. any product mined, produced, or manufactured wholly or in part by forced labor. 19 U.S.C. § 1307. Under this law, U.S. officials have the authority to seize and seek civil forfeiture of offending products. Although this law does not address mercury or other environmental issues in mining, it embodies the basic logic of consumer countries doing their part.

h. Closing Thoughts

Ecuador's legal approach to mercury in gold mining largely hews to the Minamata Convention's call to "take measures to reduce and, where feasible, eliminate the use of mercury and mercury compounds from [ASGM] and the emissions and releases of mercury into the environment resulting from [ASGM]."[508] Its unequivocal ban on the use of mercury in mining represents a best practice. On the other hand, the Ecuadorian experience underscores that aggressive laws are only as strong as the state's capacity to enforce them. Ecuador is heading in the right direction with its legal architecture, but implementation and enforcement are simply not up to par.

If the major takeaway is the need for enhanced enforcement of existing norms, not only vis-à-vis the ban on mercury use but all relevant mining and environmental regulations, opportunities for improving the legal framework remain. For example, Ecuador should consider reducing import allowances to better align with its prohibition on use of mercury in mining. The current limit (a maximum of 1 ton per import license) may be exploited by bad actors to provide gold miners with mercury. As concerns permitted imports (i.e., for non-mining uses), Ecuador should continue to invest in improved monitoring and tracking to minimize the risk of mercury being siphoned off, for use in gold mining. Here, the Brazilian approach to monitoring commerce in mercury could be instructive, as Brazil's current system contains more cross-checks on the movement and use of mercury, as well as on gold moving through the market.

III. Implications for Law and Policy in the Amazon and Beyond

So far, we have examined the legal approaches of five countries in the Amazon Basin to reduce mercury-based ASGM. Some have been more successful than others. In many cases, countries have deployed laws and policies that are sound in design but fail in practice due to insufficient resources, corruption, or other factors external to design. In other cases, the laws and policies themselves fail to align with the benchmarks outlined in Part II.A.[509]

Based on this review, we offer a set of observations and recommendations for civil-society stakeholders, governmental authorities, academics, and the international community alike. We ground our ideas within the broader rubric of benchmarks set forth earlier, as well as the reality of region-wide, cross-cutting challenges. Cognizant of differences in legal systems and other contextual realities, we aim to identify system-agnostic features capable of improving design and implementation of law and policy concerning mercury and ASGM. We intend our commentary in this section to complement, not duplicate, the more granular observations made in Part II's country-by-country discussion.

We have divided this Part into two main sections. The first section analyzes cross-cutting challenges (i.e., problems present in each of the Amazon Basin countries). The second section probes the areas in which the studied countries have succeeded and failed as a matter of law and policy. The measuring stick for this analysis is the complex of goals outlined in Part II.A.

A. Cross-Cutting Challenges and Regional Findings

[508] Minamata Convention, Art. 7, para. 2.
[509] *See supra* Pt. II.A.

At the macro level, all five countries face similar challenges in taming widespread illegal gold mining, formalizing reluctant ASGM sectors, and controlling rampant mercury use and trade. The Basin-wide challenges underscore the fundamentally *regional* nature of the problem; and point to the need for greater legal harmonization, cross-border collaboration, and collective work in spaces like the Minamata Convention itself or within regional bodies such as OTCA and CAN.

Formalization remains an ongoing task in all five countries. More specifically, the scale of informal gold mining in each country continues to manifest as a multi-faceted conundrum, wherein government must (a) carefully discern between informal mining that ought to be brought into the fold and illegal mining that calls for outright elimination; (b) for informal ASGM, strike a balance between sufficiently incentivizing formalization and requiring behavioral change significant enough to improve its fundamental character; and (c) accomplish all this in economic and political contexts characterized by limited alternative jobs, high levels of corruption, organized crime, and an often scarce presence of official institutions.

Regionally, more needs to be done to reduce the availability of mercury, whether imported and sold legally or illegally. Bolivia's role as a regional entrepot for mercury imports is a major problem, as is Mexico's role as the main supplier. And while most of the focus countries have taken significant steps to reduce legal imports, contraband distribution remains prevalent across the region. This underscores the risks of unharmonized laws and policies vis-à-vis the mercury trade. Even if most of the Amazon Basin countries take a hard line on mercury imports and use—prohibiting mercury imports for mining and ramping up interdiction of smuggling—a single laggard jurisdiction can blunt the effectiveness of the majority approach.

Relatedly, the focus countries should augment cross-border collaboration to reduce illegal mercury imports from beyond the region and smuggling within the region. Such collaboration should take the form of intelligence-sharing, coordinated interdiction efforts, and, in the context of investigation and prosecution of concrete cases, both formal MLA and informal cooperation. As members of the CAN, Bolivia, Ecuador, Peru, and Colombia should continue to support the work of the Andean Mercury Observatory. The OTCA, too, is a natural forum for all Amazon Basin countries, including Brazil, to collaborate on reducing and mitigating mercury-based gold mining.

All five focus countries should treat illegal gold mining as a form of organized crime, leveraging specialized investigation techniques and financial investigations to build cases against the intellectual authors and chief beneficiaries of illegal mining organizations, including organized crime groups and any corrupt officials who profit from illegal gold mining,[510] rather than simply prosecuting the more visible miners who may work for criminal groups but not enjoy the obscene profits generated from illegal gold. Prosecutorial authorities should, in appropriate cases, seek maximum penalties, with a particular emphasis on forfeiture of proceeds and environmental restoration orders. Peru's Law Against Organized Crime is a helpful model in this regard.

[510] In some cases, "intellectual authors and beneficiaries" would clearly include major organized crime groups. For example, EIA's work around a mercury trafficking ring pointed to involvement by the Jalisco New Generation drug cartel. ENVIRONMENTAL INVESTIGATION AGENCY, *supra* n. 87. In less dramatic circumstances, "intellectual authors and beneficiaries" could include "legitimate" mining and gold-refining firms that collaborate with illegal gold miners or corrupt government authorities who look the other way in exchange for bribes or favors.

Although each of the focus countries maintains legal provisions imposing a duty upon persons who damage the environment to restore or support the restoration of the affected ecosystems, the extent to which restoration orders are issued and satisfied is unclear. Fresh empirical research is crucial to understand (a) whether courts routinely order restoration, with what frequency, and in what manner, and (b) the extent to which parties comply with such orders.

Broadly speaking, IP&LCs opposed to gold mining with mercury could use support in implementing their own ideas and policy agendas. A July 2025 conference held with IP&LC leaders from Peru, Colombia, and Brazil produced a Joint Declaration on Gold Mining and the Use of Mercury in the Amazon.[511] This declaration urged national authorities to, *inter alia*, work to demarcate and formalize IP&LC territories where such processes are incomplete; facilitate direct access to financing for conservation projects designed and implemented by IP&LCs; establish a health network throughout the Amazon Basin to monitor mercury exposure; and support IP&LC food sovereignty in light of mercury contamination of local fisheries.[512] These are important lines of work, and they should receive the full support of national and international authorities.

Continuing on the topic of IP&LCs, a robust body of international law already stands primed for stronger deployment in the context of mercury-based gold mining, particularly as such mining disproportionately affects these peoples and communities In fidelity to commitments made under the American Convention on Human Rights, ILO Convention 169, UNDRIP, and the Escazú Agreement (acknowledging that Brazil and Peru are not yet Parties to the latter), all focus countries should make concerted efforts to furnish meaningful opportunities for legal recourse when gold mining using mercury impairs the human right to a healthy environment, the right to water, and the rights of IP&LCs to their territories, renewable natural resources, and cultural identity. And Brazil and Peru should ratify or accede to the Escazú Agreement immediately.

Finally, as all five countries are Parties to the CBD, they should consider including mercury- and gold mining-related measures in their NBSAPs, especially under the KM-GBF targets related to reduction of pollution from hazardous chemicals, restoration of degraded terrestrial and freshwater ecosystems, cessation of further losses of biodiverse rich areas, and preservation of sustainable livelihoods for IP&LC communities.[513]

B. Revisiting Goals and Best Practices

When measured against the consensus goals set forth in Part II.A., the focus countries display a mixed scorecard. Without meaning to cast anything approaching a final judgment, it is possible to discern exemplary or at least noteworthy practices, misfires, and even approaches that aggravate the problem. Here, we explore these nuances one goal at a time. Along the way, we offer further recommendations for improving law and policy vis-à-vis each consensus goal.

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[511] *Pronuncamiento Conjunto de Pueblos Indigenas y Comunidades Locales de Colombia, Peru y Brasil sobre la Mineria de Oro y el Uso de Mercurio*, FCDS (July 31, 2025), https://fcds.org.pe/publicaciones/pronunciamiento_indigenas_col-pe-bra/.

[512] *Id.*

[513] *See* UNEP/MC/COP.6/INF/27, *Integrating Action to Reduce Mercury Pollution from Artisanal and Small-Scale Gold Mining into the Kunming-Montréal Global Biodiversity Framework National Biodiversity Strategies and Action Plans: Technical Support Document* (Aug. 22, 2025).

1. Goal 1: Reduce Legal Imports of Mercury for Gold Mining and Otherwise

This first broad goal flows from Article 7 of the Minamata Convention and its directive for Parties to "take measures to reduce and, where feasible, eliminate the use of mercury and mercury compounds from [ASGM] and the emissions and releases of mercury into the environment resulting from [ASGM]."[514] If a Party with a large ASGM sector allows more than *de minimis* imports of metallic mercury, it becomes difficult if not impossible to significantly reduce emissions from that sector. In the Amazon Basin, at least, mercury is far too entrenched in ASGM to expect otherwise.

As a matter of law, the best practice to reduce legal imports of mercury is straightforward. Countries should ban mercury imports to the fullest extent possible, as soon as possible. Ideally, this would mean banning all imports of metallic mercury for use in mining (going above and beyond the letter of Article 7), all imports for manufacturing processes in which mercury or mercury compounds are used (going beyond Article 5), and all imports of mercury-added products (going beyond Article 4). More realistically, Parties in the Amazon Basin should at least ban imports for use in mining. Colombia, Ecuador, and Brazil have passed laws to this effect. If Parties elect a phase-out period, such period should be no longer than necessary (e.g., one year rather than five years), particularly given the risk of opportunistic stockpiling.

Any laws allowing imports should be crafted to permit only the most necessary of transactions, for quantities no greater than necessary, and subject to strict tracking and reporting requirements. Given the risks inherent in mercury, the precautionary and prevention principles counsel as much and, in general, point towards import laws erring on the side of greater restrictions.

2. Goal 2: Reduce Illegal Imports of Mercury

Law may seem less relevant to this goal than enforcement. The experiences of Amazon Basin countries vis-à-vis mercury reveal a significant mismatch between prohibitions and regulatory frameworks, on the one hand, and available resources and political will, on the other. The solution seems as obvious as it is elusive: Amazon Basin countries need more officers working more control points and conducting more investigations focused on preventing and punishing mercury smuggling. But as true this may be, law and policy design can also influence the likelihood of enhanced enforcement.

For example, elevating the penalties assigned to certain offenses may both (1) enhance deterrence,[515] and (2) motivate law-enforcement officers and prosecutors to pursue deeper investigations and bring charges.[516] As concerns offenses germane to mercury-based gold mining, all such offenses should qualify as "serious crimes" under UNTOC. In other words, all such offenses should trigger penalties capable of resulting in custodial sentences of four years or more. And because unlawful import of mercury is one of the key predicate crimes for illegal gold mining

[514] Minamata Convention, Art. 7, para. 2.
[515] Joshua Ozymy & Melissa Jarrell Ozymy, *The Green Police: Criminal Enforcement in the Era of Climate Change*, 52 Envtl. L. Rep. (ELI) 10526, 10527 (2022).
[516] David M. Uhlmann, *Prosecutorial Discretion and Environmental Crime*, 38 HARV. ENV'T L. REV. 159 (2014).

in the Amazon Basin—and because it generally implies a sophisticated operation with a corresponding *mens rea*—still higher penalties seem warranted. Here, Peru's treatment of "illicit trafficking of chemical and machinery inputs destined for illegal mining" is instructive.[517] Peru has singled out this offense for heightened punishment, authorizing incarceration of between seven and nine years as the baseline penalty.[518]

Other law and policy initiatives capable of reducing illegal imports include offering incentives for whistle-blowers and informants. For example, if a customs official is aware that a colleague is facilitating unlawful imports of mercury, the law should provide that official with an incentive to report the misconduct. The incentive can take the form of immunity, protection from reprisals, and even monetary rewards or career advancement. Importantly, if such programs are codified in law or policy, they need to be advertised.

Institutionally, too, countries can achieve more consistent results through specialized training and the development of inter-agency protocols. Just as many Amazon Basin countries have built up specialized law-enforcement units and cross-ministerial working groups around drug trafficking, so too can they do the same around illegal gold mining and the mercury trade. And because illegal gold mining and mercury trafficking are transnational in nature, regional enforcement plans and permanent cross-border collaboration are equally critical. To name only one tool, MLA under UNTOC and the Inter-American Convention on Mutual Assistance in Criminal Matters is a perfect fit for building out more impactful transnational investigations and prosecutions of the organized groups behind these crimes.

3. Goal 3: Ensure that Remaining Legal Imports of Mercury Do Not Fuel Unauthorized Gold Mining Operations

If a Party allows mercury imports for select non-mining uses, several complications remain: the nature of the use for which mercury imports are authorized, the quantity allowed, and the need for tracking and management of authorized imports.

The Minamata Convention addresses the problem of "diversion" of mercury from permitted to dubious uses within Article 7.[519] Here, a NAP under the Convention should include the development of "strategies for managing trade" of mercury "and preventing the diversion of mercury" from authorized uses to illegal mining.[520]

Best practices begin with limiting the universe of lawful imports of mercury. This will reduce the amount possibly subject to diversion to a less worrisome quantity.

Assuming a ban on imports of mercury for mining as well as the other import restrictions mandated by the Minamata Convention and its Appendices, the next step lies in building a permit system for those imports that are still allowed. Advance permits should be required for all imports of mercury, and such permits should be limited to critical, non-mining sectors and paired with strict import

[517] Código Penal del Perú, Art. 307-E.
[518] *Id.*
[519] Minamata Convention, art. 7.4(a).
[520] *Id.*, Annex C, 1(f).

quotas. Permit systems like this are common in trade regimes governing sensitive sectors (e.g., the wildlife trade under CITES) and therefore should not require any great innovation.[521] All the countries analyzed in this Article already have special registration systems for mercury importers. In addition to registration for importers, such systems should apply to all transporters, vendors, and users of mercury, with digitized handling permits that allow for quick verification anywhere in the country.

To further control imports, countries might consider designating only certain ports as authorized to receive mercury imports. Again borrowing from the world of wildlife trade, where designated ports have long been a part of the U.S. anti-trafficking scheme,[522] a system of designated ports can serve to funnel mercury towards authorities specially equipped and experienced in mercury trade and compliance regulations.

More ambitiously but still realistically, countries might consider requiring use of GPS tracking devices on all authorized imports, thus facilitating monitoring and control of movement from import to authorized end user. Such technology is widely available and common in shipments of sensitive items, such as clinical samples.[523] Consistent with the user-pays principle and the Minamata Convention's philosophy of treating mercury as a controlled substance, the costs for GPS trackers should be paid for by importers and included as a cost of acquiring an import permit. Note that such practice also serves as a helpful enforcement tool vis-à-vis smuggling operations; if a shipment lacks a tracking device, it is presumptively an illegal import.

4. Goal 4: Distinguish Between Informal Mining and Illegal Mining

The sometimes-nebulous distinction between informal mining and illegal mining is the subject of a raft of academic articles and policy papers.[524] Above, we offered our take: At the most important level, 'informal' mining is mining that *could* be legal through operational changes that, while significant, remain feasible without altering the basic character of the operation. Homing in on a subjective element, others have remarked that a miner's "will" or desire to formalize stands as the key line of demarcation.

Irrespective of the precise dividing line, what is most important is that jurisdictions codify the distinction. In the Amazon Basin, unauthorized gold mining is simply too varied and too prominent, especially relative to state resources, to treat as criminal and subject to repression across the board. Many people involved in unauthorized gold mining could, in fact, be brought into compliance with the most important environmental, social, and fiscal norms. Whatever the percentage may be, working with this sub-set of gold miners—facilitating and incentivizing compliance—is good policy.

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[521] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Mar. 8, 1973, 27 U.S.T. 1087.
[522] 50 C.F.R. § 24.12.
[523] *Shipping with GPS Trackers*, Mercury (April 30, 2025), https://www.shipmercury.com/glossary/gps-trackers.
[524] *See, e.g.,* Tracy Walsh, *Why It Doesn't Make Sense that All Informal Mining Is Deemed Illegal*, THE CONVERSATION (April 12, 2016), https://theconversation.com/why-it-doesnt-make-sense-that-all-informal-mining-is-deemed-illegal-57237.

Best practices in this area depend on at least two key factors: definitions and consequences. If possible, countries throughout the Amazon should strive to approach these factors in similar ways, thereby limiting the risk of illegal miners seeking out a more accommodating jurisdiction.

Definitionally, the law should define "illegal mining" and "informal mining" in such a way that both subject-matter experts and laypersons can easily understand the difference. Perhaps more importantly, the definitions should be easily applicable by law-enforcement personnel and concerned citizens alike; ambiguity should be minimized, as definitional grey areas can allow illegal mining to prosper, improperly claiming the status of informal mining.

This brings us to the matter of consequences. Informal mining should be but a waystation on the road to fully formal, legal mining. The law should encourage informal miners to make steady progress towards obtaining permits and eliminating bad practices (like the use of mercury). On the other hand, fully illegal operations should be subject to severe penalties—and if putative "informal" miners fail to follow through with formalization plans, they should be treated as illegal miners.

Here, Peru's approach is instructive, serving simultaneously as an example of both helpful and erroneous policy. On the positive side, Peruvian law clearly distinguishes "informal" from "illegal" mining. Although the definitional criteria could perhaps be expanded to include use of mercury, which would automatically make the operation "illegal," at least the criteria are clear. On the not-so-positive side, Peru has failed to encourage informal miners to do much beyond mere registration, which is essentially tantamount to raising one's hand for inclusion in the formalization process. A huge benefit—immunity from prosecution for illegal mining—is offered for registration. But then the incentives, whether carrots or sticks, seem almost entirely absent for the real point of the process: *achieving* formalization, with the environmental and other legal compliance that entails.

As to the end goals of formalization, we wish to be as clear as possible: The best approach—what we hope will become regional if not global practice—is to include abandonment of mercury as an essential prerequisite for formalization. Miners should be encouraged to move from illegal to informal (if possible), and then from informal to formal, but they should not be considered formal (and at least some benefits must be withheld) until they have verifiably moved beyond mercury.

5. Goal 5: Deter the Worst Forms of Illegal Gold Mining with Mercury and Effectively Punish the Worst Offenders

Not all illegal gold mining is created equal. Whether we consider the matter from the perspective of *mens rea*, the scale or sophistication of the operation, the harm produced, recidivism, or the illegal benefits obtained, some cases of illegal gold mining with mercury are worse than others. Punishment regimes should reflect this differentiation. Specifically, while all illegal acts associated with ASGM and mercury merit some official consequence, lesser offenses committed by less culpable actors should undoubtedly receive lesser penalties (and sometimes alternative remedies that do not even punish in the classic sense) compared to sanctions applicable to the worst offenders. In short, the principle of proportionality should apply here as strongly as in any other criminal context.

Although empirical data on the matter is scarce, many observers claim that in the context of environmental crime, the most exposed and hierarchically inferior actors (e.g., those involved in the actual labor of dredging and sifting through sediment on a riverbank) are disproportionately punished, while higher-ups evade indictment or manage to secure favorable outcomes. Criminal law can be designed to prevent this pattern. Peru's laws are exemplary in this regard: the criminal code establishes a strong but reasonable baseline of five to eight years for illegal mining but then goes on to specify downward adjustments for negligent illegal mining, and upwards adjustments for aggravating factors (such as endangering human health or causing serious environmental damage).[525] Perhaps more impressively, Peru has separately criminalized financing illegal mining[526] and trafficking of chemicals and equipment destined for use in illegal mining.[527] These provisions show Peru is cognizant of the different roles played by different persons within illegal mining and mercury networks. And, based upon the higher penalties corresponding to these offenses (financing illegal mining triggers between four and twelve years' imprisonment, a maximum one-third higher than the penalty corresponding to illegal mining),[528] Peru displays further cognizance of the often-greater culpability of these actors and, as a corollary, the greater disruptive effect prosecution of such individuals can achieve.

Of course, deterring the worst forms of illegal gold mining with mercury and effectively punishing the worst offenders requires more than just intelligent codification of crimes and corresponding penalties. It also requires capable law enforcement and prosecutorial units with access to procedural tools fit for purpose. Procedurally, some of the most important tools are related to specialized investigation techniques, including wire taps, undercover agents, and access to financial records and financial analysis (the latter of which is often the domain of Financial Information Units). Here, too, Peru's Law Against Organized Crime is instructive.[529] This law explicitly includes illegal mining and money laundering connected to illegal mining as forms of organized crime, authorizes the use of special investigative techniques, and, critically, contemplates longer-term investigations without the target's knowledge.[530] In many Latin American countries, this last element—investigation without the target's knowledge—is traditionally difficult to achieve given strong protections around the suspect's "right to know" they are under investigation.

6. Goal 6: Encourage the Formalization of Informal Miners Without Encouraging New Entrants into the Mining Sector

To recognize that the ASGM sector is an important piece of the various Amazon Basin economies is not to conclude that the sector should grow. Even with full formalization and complete abandonment of mercury, ASGM would continue to represent one of the most environmentally harmful sectors in the Basin. This is because alluvial mining by its very nature disrupts riverine

[525] Código Penal del Perú, art. 307-A.
[526] *Id.*, art. 307-C.
[527] *Id.*, art. 307-E.
[528] *Compare id.*, art. 307-C *with* art. 307-A.
[529] Ley No. 30077, Ley Contra el Crimen Organizado, https://img.lpderecho.pe/wp-content/uploads/2022/11/Ley-30077-Ley-contra-el-Crimen-Organizado-Lp-Derecho.pdf, as modified by Decree No. 1695, https://busquedas.elperuano.pe/dispositivo/NL/2478557-2.
[530] *Id.*

ecosystems, and the sheer numbers of individuals already involved in this activity is excessive. Thus, while formalization of currently informal miners is important and may require incentives, policymakers must guard against the unintended consequence of rendering ASGM more attractive than it already is.

Countries should refrain from granting any subsidies or economic preference to ASGM actors unless such benefits are directly tied to verifiable operational improvements. Here, Bolivia's tax and royalty policy towards co-ops stands as a clear example of what *not* to do. Most informal gold miners in Bolivia, working within the co-op system, benefit from a low, 2.5% royalty rate (as opposed to the default 7%).[531] Under Bolivia's Law 535, this low rate is to apply only to "marginal" gold deposits from "small scale" operations. According to local expert observers, however, almost all co-op mined gold receives this favorable rate, even when the operations do not meet the legal criteria. This effectively subsidizes co-ops, which account for over 90% of Bolivian gold production. Preferential treatment like this should only occur if tethered to verifiable abandonment of mercury. Otherwise, policies like this simply make ASGM even more lucrative.

Similarly, if countries use amnesty provisions to lure informal miners into beginning the process of formalization, they need to be wary of abuse. Such abuses can be avoided, for example, by offering immunity for only minor offenses (e.g., for operating without a license, but not for operating in a protected area); running the registration period for only a few months to create urgency; or requiring completion of formalization, including obtention of an operating permit and mercury-free environmental license within a year, after which immunity lapses.

Here, the experiences of Colombia and Peru offer some lessons. Peru extended the registration period and completion deadline multiple times over several years, damaging the deadlines' credibility. In contrast, Colombia's Law 2250 of 2022 focused on a defined group of miners, creating a formalization regime for persons engaged in "traditional mining" who had engaged in such activity informally for at least ten years as of the law's effective date.[532] The law provided a 90-day period to begin the formalization process. By opting into this process, such miners gained the benefit of an immunity provision during the pendency of formalization, shielding them from prosecution for illegal mining.[533] As for miners who failed to opt in, such omission resulted in a legal "understanding" that they had no intention to formalize, opening exposure to penalties. While not perfect, the Colombian system is stingier with benefits and reflective of the notion that the "will" to formalize separates the informal miner, who wishes to formalize, from their illegal counterpart.

7. Goal 7: Ensure that Formalization Processes Produce Verifiable Improvements, Especially Reduction of Mercury

Formalization must mean improved legal compliance if it is to mean anything at all. Formalization programs boasting high enlistment numbers have little to celebrate if this does not translate to verifiable compliance improvements, particularly as concerns mercury use and other environmental factors.

[531] Ley de Mineria 535, art. 227; Miguel Arriaza, *supra* n. 375.
[532] Law 2250 (2022), art. 2.
[533] *Id.*, art. 4.

We have already discussed the need to tether any incentives (e.g., amnesty periods, tax breaks) to meaningful formalization milestones, such as acquisition of an environmental license. We have also at least implied that miners who fail to follow through on formalization commitments should face some kind of consequence; depending on the degree of non-compliance, this could range from criminal prosecution for illegal mining, to administrative fines, to warnings and assistance to get back on the formalization track.

A threshold to all this is a reliable verification program. Without suggesting that the bulk of informal miners in the process of formalization are dishonest, the sheer numbers of miners involved, the remote areas in which they operate, and the loose relationship with the law inherent in informality all combine to make *in situ* audits and other verification tools necessary. Furthermore, voluntary reporting by miners cannot form the basis of credible data; it must be verified.

Audits, and probably audits of the auditors, represent essential architecture, but there are other options too. Pulling from various natural-resource contexts where self-reporting is notoriously unreliable, such as the marine fisheries context, *in situ* random audits can be complemented with video monitoring and deployment of neutral observers (distinct from auditors) at mining sites. And as an additional layer of verification, regular monitoring of mercury levels in nearby ecosystems (hair, fish, water, and soil sampling) may provide circumstantial evidence of false reporting or practices inconsistent with formalization commitments.

8. Goal 8: Foster Community Participation in the Fight Against Illegal Gold Mining and Mercury, Especially Among IP&LCs

IP&LCs in the Amazon Basin are front-line communities in the gold and mercury crisis. They bear a disproportionate share of the ills of mercury-based gold mining, and while they may sometimes participate in such activity, they have the potential and often a natural incentive to mitigate the problem. Among other actions, IP&LCs can play a crucial role in preventing the expansion of illegal and informal gold mining with mercury by (1) using municipal and territorial law to create mining-free zones, (2) monitoring and denouncing irregular activity, and (3) initiating litigation and participating in judicial remedies. In all instances, national governments can lend their support to such initiatives.

Though at least initially opposed by the national government, Bolivia provides a powerful example of the first practice. In 2021, two municipalities in an area of northern Bolivia engulfed in ever-expanding illegal gold mining passed local mining bans.[534] Not simply the work of altruistic minds, the bans were largely the brainchild of *El Ceibo*, Bolivia's leading organic cacao cooperative. Fearful of the environmental harm from mercury-based mining and possible jeopardy to *El Ceibo*'s organic certification and international markets, local cacao farmers worked with the municipalities to enact the mining bans and then defend them against lawsuits.[535] While this approach may not

[534] Benjamin Swift, *How Bolivia's Cacao Farmers Took on the Gold-Mining Industry*, THE GUARDIAN (April 22, 2026), https://www.theguardian.com/global-development/2026/apr/22/mining-agriculture-cacao-farmers-resisting-bolivia-gold-rush.
[535] *Id.*

work in every Amazonian community facing incursions by illegal and informal gold miners, it certainly seems replicable in areas where mining has yet to fully take over and local economies and livelihoods still depend upon healthy ecosystems. As one civil-society leader put it, municipal bans may not be capable of stopping illegal and informal mining everywhere, but they can serve as a "wall to prevent the cancer from spreading[.]"[536]

In a different vein, civil-society and governments can partner with IP&LCs in monitoring and interdiction. Here, monitoring should include both regular monitoring of mercury contamination in fish and human populations—enabling IP&LCs to modify their diets and simply to fight for their right to human health—and, in a different sense of the term, territorial monitoring to prevent and respond to illegal mining. On the latter point, policy options range from establishing hotlines and web applications designed for local community members to submit denouncements to, more ambitiously, creating limited deputization programs akin to the "Indigenous Guards" in Ecuador.[537] If the latter option is chosen, governments must think very carefully about balancing interdiction authority, even if limited to temporary detentions pending arrival of state forces, with the risk of violence.

Finally, courts throughout the Amazon Basin represent a potential partner for IP&LCs experiencing harm from gold mining and mercury pollution. As a threshold matter, national law should provide a clear pathway for IP&LCs and other interested citizens to sue both (a) governmental entities for unlawful action or failure to discharge legal duties (e.g., for granting unlawful mining concessions or for failing to secure protected areas from illegal mining), and (b) private actors for illegal gold mining and mercury use resulting in harm to ecosystems or human health. Ecuador's constitutional provision on citizen power to enforce the Rights of Nature provides one example of how this can be accomplished. When courts rule in favor of plaintiff communities, the judiciary should be authorized to incorporate community participation into any remedies. Here, Colombia's *Rio Atrato* case is instructive, at least as a starting point. The court's decision to conform a committee of river stewards, including IP&LC representatives, to advise on future management decisions points to the creativity that courts can exercise when fashioning remedies in specific litigations.

9. Goal 9: Promote Mercury-Free Alternatives for Gold Mining

This goal implicitly acknowledges that the current scale and long history of ASGM in the Amazon Basin preclude eliminating the activity altogether. Instead, recognizing ASGM will likely remain an important sector for years to come, the goal is to promote technologies and practices that don't rely on mercury for amalgamation. As a heavy metal, gold production is well-suited to gravity-based separation methods, and proven technologies exist.[538] Although not a mercury-free

[536] *Id.*
[537] Dan Collyns, *supra* n. 447.
[538] *See, e.g.,* Jonatan Mario Soto Villegas, *Installation and Operation of Gravimetric Plants for Mercury-Free Gold Recovery*, UNDP (2024) https://www.planetgold.org/sites/default/files/Practical_Guide-Installation_Operation_Gravity_Plants_Hg_Free_Gold_Recovery_0.pdf.

technology per se, we could also include retorts (devices capable of recycling mercury in gold extraction and thus reducing overall mercury inputs) as a beneficial technology.[539]

The major challenge to encouraging these technologies at scale is a combination of cost, insufficient awareness among miners of the environmental and human health risks of mercury, and a sort of cultural path dependency favoring mercury.[540] Law and policy can help to overcome each of these obstacles.

Insofar as gravity-based systems may be relatively expensive (at least in terms of upfront costs), governments can provide access to credit for purchasing this equipment. Colombia has acted in this direction, with Law 1658 of 2013 contemplating the extension of "soft loans" that provide preferential treatment to finance the acquisition of new technologies that don't rely on mercury.[541] Credit programs of this nature can operate in several different ways, including as public-private partnerships, wherein governments serve as the guarantor to mitigate default risks and thus incentivize banks to provide loans they might not otherwise offer.

Of course, national governments struggling with ASGM will not always have sufficient financial resources or technical know-how to execute programs of this nature. This is where the international community becomes crucial. At the international level, planetGOLD, a Global Environment Facility initiative, has developed a significant portfolio of financing programs in recognition that ASGM miners typically "struggle to access formal financial services" and such services are necessary to "achieve the goal of making mercury history[.]"[542] Working with governments, the private sector, and ASGM communities, planetGOLD has developed financing programs that attempt to distinguish between responsible ASGM actors, who would use the benefits of these programs to move away from mercury, and their irresponsible counterparts. For instance, in Peru, the program is only available to miners who have not only begun formalization through registration with REINFO but who also "have the legally obligated Environmental Management Certificate[.]"[543] Similarly, in Mongolia, "applicants needed to have a mercury-free management plan" to be eligible for planetGold assistance.[544]

Taking a different tack, countries may also consider reducing taxes and royalties for ASGM actors using mercury-free methods. For example, rather than extending reduced royalty rates to gold mining co-ops that work in so-called "marginal" deposits using "small scale" operations,[545] Bolivia could consider granting this preferential treatment to co-ops that move to mercury-free, gravity-based systems.

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[539] Jesper Bosse Jønsson, et al., *Toxic Mercury Versus Appropriate Technology: Artisanal Gold Miners' Retort Aversion*, 31 RESOURCES POLICY 60 (2013), https://www.sciencedirect.com/science/article/abs/pii/S0301420712000645?via%3Dihub.

[540] *See id.* ("Despite the seemingly obvious advantages from adopting retorts or other mercury-reducing techniques . . . miners continue to use mercury haphazardly[.]").

[541] Law 1658, art. 10.

[542] *Analysis of Financial Access Interventions,* planetGOLD (2024), https://www.planetgold.org/cross-programme-analysis-asgm-financial-access.

[543] *Id.*

[544] *Id.*

[545] Ley de Mineria 535, art. 227, https://mineria.gob.bo/juridica/20140528-13-6-11.pdf; *supra* n. 375.

10. Goal 10: Facilitate Alternative Livelihoods

Informal and illegal gold mining flourish in part thanks to a dearth of viable job opportunities and increasing threats to traditional ways of life. It is not enough to focus only on formalization and eradication; government, civil society, and private partners must also foment alternative livelihoods and local economies less dependent on mining. While some scholars argue that alternative livelihoods are a "myth" and not even desirable because ASGM "presents a unique opportunity for the world's poor,"[546] we disagree.

Across the spectrum of illicit economies, from drug cultivation to wildlife trafficking, much has been written on the need for alternative livelihoods and corresponding policy approaches.[547] This literature and experience is largely applicable to the ASGM sector.

The first point is to recognize that in the areas where ASGM currently thrives in the Amazon Basin, gold mining is not the only game in town. For instance, in Peru's Madre de Dios region, the national government in 2019 allocated over $7.5 million USD "for projects related to logging, Brazil nuts, cocoa, fishing, and aquaculture."[548] In Brazil's Roraima state, Brazil nuts and livestock have gained importance even as ASGM grows apace.[549] And in Bolivia, cultivators of organic cacao in northern La Paz have been increasingly vocal about the threats that ASGM poses to their livelihoods.[550] What's more, almost all these locations have the potential for growth as tourism destinations.

Here, it is important to note that many of the alternative livelihood options are not simply "alternatives," peacefully co-existing with ASGM, but in fact *rivals* to ASGM. The tension between organic coffee production and mercury-contaminated water is one example; freshwater fisheries another. Whether the catch is for subsistence purposes or for market sales, mercury-based ASGM directly prejudices the fisheries sector. Not only are fish contaminated by mercury potentially dangerous to human health, but their market value drops as word circulates that a certain species bioaccumulates more mercury than others. Perhaps even more disruptive from the fisher's perspective, alluvial ASGM often destroys entire reaches of riverine habitat for fish. There are simply no fish, contaminated or otherwise, to catch in some areas.

To be sure, ASGM may often appear the more lucrative opportunity in many Amazon Basin communities. But that is due to forces that, if not entirely controllable, can be influenced by state and civil-society action. If access to affordable credit is a barrier, governments and international financial institutions (e.g., the Inter-American Development Bank) can support grants and low- or no-interest credit lines for development of small businesses and cooperatives that work in harmony with the lands and waters most affected by alluvial gold mining (e.g. coffee cultivation, ecotourism, sustainable fishing, sustainable forestry, apiculture with native bees). To the extent

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[546] Shefa Siegel & Marcello M. Veiga, *The Myth of Alternative Livelihoods: Artisinal Mining, Gold, and Poverty*, 41 INT. J. ENV'T & POLLUTION 272 (2010).
[547] *See, e.g.,* White House Office of Nat'l Drug Policy, National Drug Control Strategy 55-56 (2013) (discussing alternatives for opium and coca growers).
[548] Iris Peng*, Sustainable Livelihoods as an Alternative to Illegal Mining (Part II)*, THE CARAVEL (July 6, 2026), https://www.thecaravelgu.com/blog/2022/7/5/sustainable-livelihoods-as-an-alternative-to-illegal-mining-part-ii
[549] *Id.*
[550] Smith, *supra* n. 515.

that technical know-how is lacking, that too can be addressed through government-supported vocational training. And governments, working with private industry and NGOs, can facilitate a market advantage for select sectors by creating certification programs that reward producers from certain regions (e.g., single origin coffee) and producers using certain methods (e.g., organic certifications, sustainable forestry certifications). Such ideas are hardly academic; they exist and are growing.[551]

Other policy and legal interventions often conducive to alternative livelihoods include formalization of land tenure rights (especially in community tenure situations), so that IP&LCs have clear legal rights to use their lands and natural resources in economically viable ways—and, critically, a stronger legal basis to prevent incursions by third-party miners.

11. Goal 11: Advance Traceability of Gold in the Global Market

Although an entire topic unto itself, we would be remiss not to mention a few best practices, even if rudimentary, related to traceability of gold. Traceability is an "all hands on deck" proposition. Market actors across the entire supply chain, from ASGM producers to smelters to gold merchants and finally buyers, should be involved in traceability. Likewise, public institutions in both source and importing countries should develop programs designed to reduce operating room for illicit gold and gold processed with mercury.

For smelters and purchasers, best practices revolve around the concept of due diligence. The OECD Due Diligence Guidance on mineral sourcing provides a useful framework.[552] Central Banks, in particular, should be held to the highest of standards.

For countries with large import markets, import bans on illegally mined gold and/or gold processed with mercury should be considered. Models of this nature exist in the fisheries sector (e.g., the EU IUU Regulation, the U.S. Seafood Import Monitoring Program) and the timber sector (e.g., the EU Timber Regulation, the U.S. Lacey Act), among others. In the context of gold, the EU Conflict Minerals Regulation begins to move in this direction, but it does not capture illegally mined gold writ large, much less gold processed with mercury.[553] Amendments should be considered.

Similarly, U.S. legislation banning the imports of products, including minerals, produced with forced labor, could be amended to include illegally mined gold or gold amalgamated with mercury.[554] Ultimately, though, frameworks in importing countries must rely on traceability programs implemented in source countries. Best practices here include moving to digital traceability tools and reporting requirements for every movement along the supply chain up to and including export. Critically, information reported by miners (and verified by third parties) should include precise geographical coordinates, concession and other authorization data, and, ideally, a sworn statement attesting to legal extraction and the mercury-free nature of the operation. Audits must be frequent and searching, and the law should punish both negligent and intentional

[551] *See, e.g., Brazil Nuts: An Emblematic Crop of Sustainability*, Amazon Conservation, https://www.amazonconservation.org/what-we-do/empower-people/food-agriculture/.
[552] OECD DUE DILIGENCE GUIDANCE, *supra* n. 81.
[553] Conflict Minerals Regulation, *supra* n. 78.
[554] *See* 19 U.S.C. § 1307.

misreporting. Further, as seen in Brazil, presumptions of legality should be avoided.[555] Every purchaser or handler along the supply chain should be required to conduct reasonable levels of due diligence, and this should certainly include all purchasers, transporters, and refiners prior to export.

12. Goal 12: Secure Remediation and Restoration of Contaminated Ecosystems

Continuing in the vein of judicial action, it is critical the law authorize courts to impose and enforce remediation and restoration orders. Here, we use the term "remediation" to mean the process of stopping or reducing mercury pollution and physical disruption of riverine environments from alluvial ASGM, while we use "restoration" to mean actions, normally post-remediation, to restore or enhance habitat so that it is better suited to its pre-mining status as a healthy natural environment for people and wildlife.[556]

Best practices here are three-fold. First, laws should authorize (and perhaps even mandate) remediation and restoration for at least the more serious cases involving illegal gold mercury and mercury contamination, with associated costs to fall on offending parties whenever possible. Second, judges must impose such remedies in a fair, regular, and predictable fashion. Third, to ensure that parties subject to remediation and restoration orders in fact comply with such measures, countries should develop clear protocols to verify compliance and correct any deficiencies.

The good news is that each country analyzed in this Article possesses legislation authorizing remediation and restoration, at least under certain circumstances. The bad news: there is a common perception among legal practitioners and academics that restoration and remediation are, in practice, an exception to the rule. As Drs. Caiza Cruz and Molina Torres put it in their recent article on this topic in the Ecuadorian context:

> [D]espite Ecuador having a robust legal framework that recognizes nature as a subject of rights and establishes the principle of comprehensive reparation for environmental damage, the practical implementation of this principle is limited and largely symbolic. Significant gaps are evident between the law and operational practice, including persistent institutional weaknesses, limited execution of defined ecological restoration plans, and a judicial approach that often prioritizes punitive sanctions over environmental restoration.[557]

To overcome this gap between the *de jure* and the *de facto*, we encourage governments to develop written protocols and guidance materials that specifically address remediation and restoration in cases of mercury-based gold mining. Such materials can help to create a common understanding for prosecutors and judges alike.

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[555] Duda Menegassi, *STF põe fim definitivo na presunção de boa-fé no comércio de ouro*, ((O))ECO (March 21, 2025) https://oeco.org.br/noticias/stf-poe-fim-definitivo-na-presuncao-de-boa-fe-no-comercio-de-ouro/.

[556] Jon Inslee, *Remediation vs. Restoration: A Tale of Two Terms*, NOAA (Dec. 27, 2016), https://response.restoration.noaa.gov/remediation-vs-restoration-tale-two-terms,

[557] Jhonatan Caiza Cruz & María Molina Torres, *El Princípio de Reparación Integral en Delitos Ambientales y Su Aplicación en la Legislación Ecuatoriana*, 5 RESOFRO (2025), https://doi.org/10.59814/resofro.2025.5(5)919

Although offenders should ultimately be responsible for financing remediation and restoration, the reality is that these actors may sometimes be insolvent. In such instances, the state should not condition remediation and restoration actions on payments from violators but should instead proceed apace. To offset the costs unfinanced by offenders, policymakers should consider introducing legislation to create a standing fund for remediation and restoration. Following the polluter-pays and user-pays principles, this could be financed through taxes and royalties collected from the mining sector. Likewise, criminal and civil penalties in illegal mining cases could be deposited in this specialized fund or assigned to locally affected municipalities to incentivize municipal action against illegal gold mining. Insurance regimes may also hold some promise, although their utility could be limited in the context of informal and illegal actors.

Finally, countries might consider expanding liability, at least for purposes of remediation and restoration, to cover purchasers and other supply-chain actors, including foreign entities, who knowingly or negligently purchase, process, or re-sell illegally mined gold.

IV. Conclusion

The Amazon Basin is awash in mercury amidst a 21st century goldrush. Throughout the region, riverbanks are increasingly littered with mining equipment, from expensive excavators to ramshackle, homemade suction dredges and sluices. Indigenous peoples and local communities face mounting health risks from mercury contamination and, increasingly, armed groups and criminal organizations call the shots.

Thankfully, the international community has taken note of the enormous damage flowing from mercury-based gold mining. Under the Minamata Convention, over 150 countries have pledged to "protect the human health and the environment from anthropogenic emissions and releases of mercury[.]"[558] Reducing emissions from ASGM, which uses more mercury than any other sector and represents some 37% of global emissions, is integral to this objective.[559] Accordingly, Article 7 commands Parties to reduce and where possible eliminate mercury emissions from ASGM.

Our examination of the laws and public polices of five Parties in the Amazon Basin reveals a patchwork of approaches that are not always consistent with either the objective of the Minamata Convention or the realities of mercury-based gold mining. To improve policymaking, we encourage these Parties and other countries struggling with mercury-based gold mining to ground their visions and regulatory frameworks around a common set of subsidiary goals and best practices. As we have described them, these goals and practices are at once flexible enough to accommodate differing national contexts and firm enough to yield meaningful, measurable action. The Amazon Basin, its peoples, and its natural environments deserve no less.

[558] Minamata Convention, art. 1.
[559] Artisanal and Small-Scale Gold Mining (ASGM), UNEP-Global Mercury Partnership, https://www.unep.org/globalmercurypartnership/what-we-do/artisanal-and-small-scale-gold-mining-asgm.