



CASE STUDY: ARTISANAL AND SMALL-SCALE MINING IN MADRE DE DIOS, PERU

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Courtesy: USAID/PERU

Introduction

The uncontrolled expansion of artisanal and small-scale gold mining (ASGM) sector is a significant threat to biodiversity across many Amazonian countries (The CADMUS Group 2019). The effects of the ASGM sector can range from local habitat degradation or destruction to larger-scale pollution, sedimentation, and mercury bioaccumulation in watersheds. These environmental impacts are often accompanied by a suite of negative social effects, including health issues from mercury exposure, high incidence of anemia among exposed children, increased prevalence of tropical diseases such as malaria, and a lack of access to health, education, and sanitation services in mining camps (Weinhouse et al. 2017). Illegal mining is also associated with organized crime, narcotrafficking, trafficking in persons, child labor, and sexual exploitation, all of which are prevalent at illegal mining sites (DOL 2018; GIATOC 2016). Yet both sectors, the artisanal and small-scale mining (ASM) more broadly and the ASGM specifically, offer the promise of reducing poverty for many populations with few livelihood options.

Globally, 40 million people participate in the ASM sector, and in Latin American countries, the sector supports tens to hundreds of thousands of workers (Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development 2017). Despite the profound socio-environmental impacts generated by the uncontrolled expansion of these activities, economic gains make addressing illegal ASGM a challenge.

The legal and illegal ASGM sector is widespread in Peru, the largest producer of gold in Latin America and the sixth-largest in the world (OECD 2016). In 2019, the ASGM sector generated 22 percent (27.7 metric tons) of gold production in Peru (MINEM 2020). The number of miners directly involved is uncertain, but government reports suggest between 300,000 and 500,000 miners were involved in Peru's ASGM sector as of 2014 (Defensoría del Pueblo 2014).

Informal ASM and ASGM in Peru are widespread. The government is working to formalize these sectors, resulting in more than 51,000 miners and 8,000 miner associations in the process of formalization in Peru as of April 2020 (REINFO 2020). While the ASGM sector is present across the country, the department of Madre de Dios is the epicenter of illicit alluvial gold extraction and the accompanying deforestation. For this reason, it is the focal point of the Peruvian government's attempt to control the environmental and human rights abuses of the illegal ASGM sector.



This case study examines the complex drivers behind ASGM sector expansion, the devastating impacts on biodiversity in the region, and the strategies implemented to address the impacts of ASGM in Madre de Dios by the Government of Peru, with support from the United States Agency for International Development (USAID).

Artisanal and small-scale gold mining: A threat to biodiversity in Peru

The ASM sector is a prevalent and growing economic activity worldwide. Forty million people in more than 80 countries participate in it, often as an informal subsistence economic activity (IGF 2018; Villegas et al. 2012). The sector is characterized by low levels of mechanization and capitalization, coupled with high-labor intensity. In Latin America, the number of ASM operators more than doubled between 1999 and 2014, from approximately 642,000 workers to 1.4 million (IGF 2018). While the ASM sector provides an important livelihood in rural areas, it poses a significant threat to biodiversity and protected areas through land clearing that leads to habitat loss and fragmentation; pollution from harmful chemicals, such as mercury and cyanide; and changes in hydrological regimes and sedimentation, among other impacts (Ibid).

Peru is the largest producer of gold in Latin America and the sixth-largest in the world (OECD 2016). In 2014, total mining output constituted about half of Peru's exports and about 14 percent of the nation's gross domestic product (GDP). Approximately 85 percent of ASM in Peru is gold production (Pineiro et al. 2016). As a large producer of gold on a global

BOX I: Definitions

Artisanal and small-scale mining: Mining activities that meet the conditions set forth in article 91 of the Single Ordinary Text of Peru's General Mining Law, approved by Supreme Decree No. 014-92-EM.

In general, artisanal scale miners meet the following criteria:

1. Consists of person or group of natural persons, legal persons made up of natural persons, mining cooperatives or mining cooperative centers.
2. Engage in mining as a livelihood.
3. Use manual methods and/or basic equipment.
4. Have a title for up to one thousand hectares or have signed agreements or contracts with the mining owners.
5. Have, under any title, an installed production capacity and/or processing of no more than 25 metric tons per day.
6. In the case of placer-type metal deposits, the maximum limit of installed capacity for production and/or processing is 200 cubic meters per day.

Small scale miners meet the following criteria:

1. Consists of person or group of natural persons, legal persons made up of natural persons, mining cooperatives or mining cooperative centers.
2. Have title for up to 2,000 hectares, including claims, petitions, and mining concessions.
3. Have, under any title, an installed capacity of production and/or processing of not more than 350 metric tons per day.
4. In the case of placer-type metal deposits, the maximum limit of the installed capacity of production and/or processing is 3,000 cubic meters per day.

Illegal Mining: As described in Legislative Decree No. 1100, is the mining activity exercised by a person, natural or legal, or group of people using unauthorized equipment and machinery that does not comply with the administrative, technical, social, and environmental laws that govern these activities, or that is carried out in prohibited areas.

Informal Mining: As described in Legislative Decree No. 1336, is the mining activity carried out in non-prohibited areas by a person, natural or legal, who is registered in the Integral Registry of Mining Formalization (REINFO), complying with the administrative norms and also with the conditions provided for in article 91 of the Single Ordered Text of the General Mining Law, approved by Supreme Decree No. 014-92-EM. Miner associations can register in the REINFO as a legal person.

Formal Mining: As described in Legislative Decree No. 1336, is the mining activity carried out by a person, natural or legal, that has authorization to initiate or restart mineral exploration, extraction, and/or processing activities and/or has a concession title issued by the competent authority (Legislative Decree 1336).



scale, the sector supports a significant workforce in Peru, involving many as 500,000 miners. (Defensoría del Pueblo 2014). The ASGM sector is present throughout Peru (Figure 1), and the departments of Madre de Dios and Puno have the greatest proportion of ASGM workers (UNEP 2012).

Peru is a mega-diverse country with abundant ecosystems and natural resources, hosting about 10 percent of worldwide flora species. According to the Sixth National Report to the Convention on Biological Diversity, Peru is home to the following species: 2,231 fish, 1,857 bird, 621 amphibia, 559 mammal, and 469 reptile (MINAM 2019). Ninety-four percent of forests in Peru are tropical, with a high diversity of flora and fauna that provide important ecosystem services such as carbon sequestration, timber, water, and medicines (Convention on Biological Diversity, n.d.).

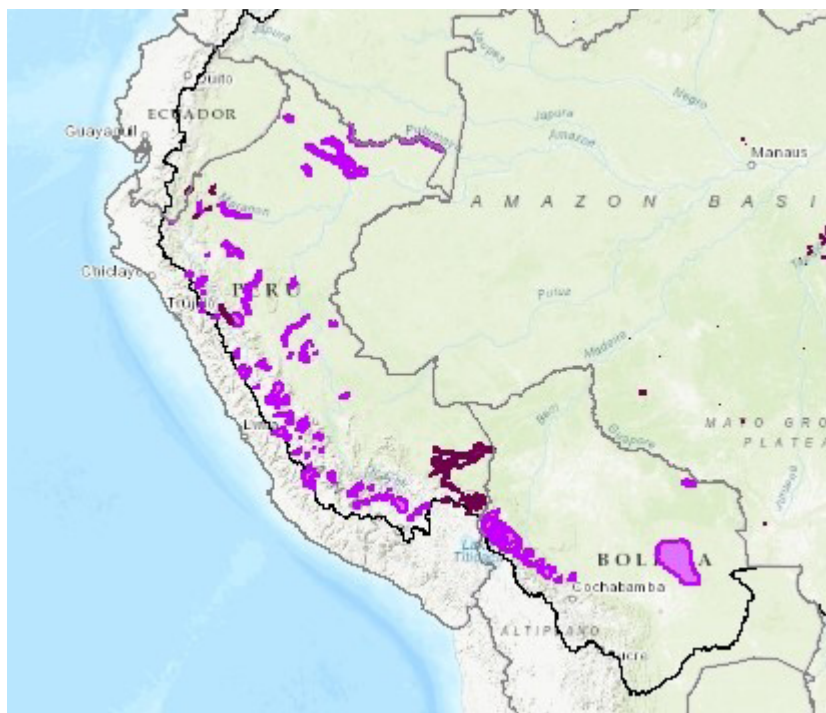


Figure 1. Areas with illegal ASGM activity in Peru (purple) (RAISG 2020).

The Peruvian Amazon, covering 260,000 square miles, is one of the world's largest carbon sinks and among the areas most threatened by forest degradation and deforestation (Ibid). For example, Manu National Park, a UNESCO World Heritage Site in Madre de Dios, lies in the transition zone between the tropical Andes and Amazon Basin. It is one of the most biodiverse national parks in the world, home to flourishing populations of top predators, such as jaguars, pumas, giant otters, and harpy eagles (UNESCO, n.d.). The pollution and habitat devastation generated by the uncontrolled expansion of ASGM in the Peruvian Amazon threatens these areas of biological significance.

AGSM in Madre de Dios

Madre de Dios Context

The department of Madre de Dios is located in the southeastern Peruvian Amazon (Figure 2). Madre de Dios shares borders with Brazil and Bolivia and, in addition to its rich biodiversity, is an important water capture area for the Madre de Dios and Colorado Rivers in the Amazon Basin. The area's standing forests are part of the Vilcabamba-Amboro biological corridor, a 30 million hectare passage connecting biologically significant areas between Peru and Bolivia. Protected areas comprise about 50 percent of the department (IIAP 2002). With a population of 141,070 people, Madre de Dios is the least populated department of Peru but, by 2017, had a population growth rate of 2.6 percent, the country's highest (INEI 2018). As a result of relative prosperity from the gold rush, the population of Madre de Dios' capital, Puerto Maldonado, grew by almost 50 percent between 2007 and 2017, with nearly 28,000 people moving to the city (Chique et al. 2018).

Gold mining is the main economic activity in Madre de Dios, representing 39.4 percent of the department's gross value added and generating 772 direct, formal jobs in 2017 (Chique et al. 2018). Other reports suggest half of the department's population is involved in the gold mining sector or related services (Global



Environment Facility 2018), including thousands of miners operating informally or illegally. The tourism, agriculture, and service provision sectors offer other important economic activities and livelihood opportunities. Given the importance of gold mining to the economy of Madre de Dios, efforts to tackle illegal gold production in the past have correlated with changes in the department's GDP. In 2018, following efforts to reduce illegal gold production, Madre de Dios' GDP decreased by 9.8 percent (BCRP 2018). At the national level, reduced gold production from Madre de Dios contributed to a decrease of about 6 percent of total gold production that year (Ibid). While official gold production reports showed a reduction in 2018, deforestation from gold mining was higher than in previous years, likely due to increased illegal mining (Finer & Mamani 2018). The decrease in reported gold production in 2019 will likely exceed 2018 levels. Official reports already show a reduction of 30.5 percent in the gold produced from January through October 2019, compared to the same period in 2018 (Chique et al. 2019). This decrease was the result of the Government of Peru issuing a State of Emergency Declaration (DS 028-2019-PCM) in illegal mining-impacted districts in Madre de Dios. This interagency effort, Operation Mercury, was aimed at eliminating illegal mining from La Pampa.

Drivers of illegal mining

In Peru, both legal and illegal ASGM sector activities have been practiced for decades. However, several drivers have influenced the rapid expansion of the sector since 2002, including increases in gold prices and demand, improved accessibility from road construction, weak institutional and management capacity at the local government level, policies favoring extractive activities, lack of alternative economic opportunities, and organized crime and corruption (Pineiro et al. 2016; Salo et al. 2016).

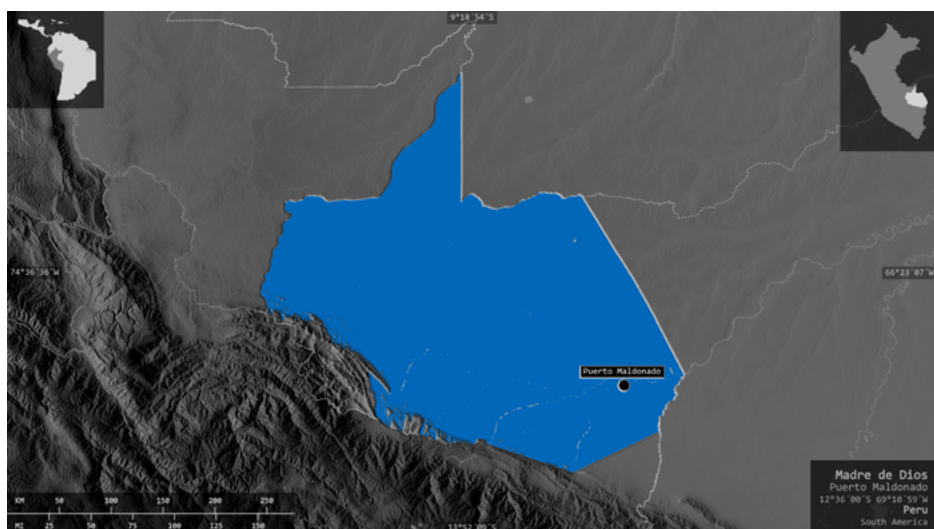


Figure 2. Location of the department of Madre de Dios.

Completion of the Interoceanic Highway increased access to Madre de Dios, where it is estimated thousands of miners are operating, mostly without legal permits (GIATOC 2016; Pineiro et al. 2016). About 250 mechanized dredges were operating illegally in Madre de Dios in 2011—most of which typically produce enough gold to qualify as medium-sized mines (Brack et al. 2011; Pineiro et al. 2016). In 2014, the Global Initiative against Transnational Organized Crime reported 112 of the 290 total tons of Peruvian gold exports (about 38 percent and worth \$3 billion) were likely from illegal gold mining in Madre de Dios (GIATOC 2016).

Caballero et al. (2018) analyzed the relationship between the expansion of both legal and illegal gold mining in Madre de Dios and its drivers—such as the price of gold, interdiction operations, and the Interoceanic Highway—and found the largest expansion occurred during highway construction when gold prices increased to about \$1,600 per ounce. However, even when the price decreased by 26 percent from 2012–2017, gold mining expanded by 53 percent (Caballero et al. 2018). As Salo et al. (2016) note, the presence of the Interoceanic Highway combined with the increase in the price of gold and weak governance opened the door to illegal mining growth in Madre de Dios.



A legacy of corruption in Madre de Dios also fueled the uncontrolled expansion of illegal ASGM in the region. Over the past years, high-level government authorities have reportedly had ties to the ASGM sector (Ojo Publico 2016). Corruption, profitability, and informality of gold mining in Madre de Dios make local communities and workers vulnerable to exploitation by criminal organizations. In 2019, Peru's Operation Mercury focused on eradicating illegal mining in areas such as La Pampa. These illegal activities were largely driven by criminal groups with links to international money laundering and narco-trafficking networks (GIATOC 2016, GIATOC 2017). The ASGM sector is one of the most profitable ways criminal organizations can launder money (Ibid).

In addition to corruption, the limited capacity of the local government for effective territorial management further exacerbates illegality and conflicts in Madre de Dios. As the Organization for Economic Co-operation and Development (2016) reports, "lack of legal certainty increases the likelihood of predatory behavior in search of immediate profits, eschewing long-term investments that would boost productivity while conserving natural capital." According to a Regional Government of Madre de Dios (GOREMAD) diagnostic, 48.4 percent of privately-owned rural lands do not have property rights (GOREMAD 2019). Further, overlapping land uses are widespread across Madre de Dios. For example, mining concessions overlap with Indigenous territories and more than 120,000 hectares of timber concessions (GOREMAD 2014), generating conflict over superficial and subsurface rights. Clear land title and property rights are required for ASGM formalization.

Mining-induced environmental and social stressors

Despite the significant contribution of legal and illegal ASGM to the department's economic growth, unregulated mining operations have drastically affected the highly biodiverse ecosystems, resulting in

mercury contamination, alteration of river channels, loss of 25 percent of wetlands, and deforestation of nearly 100,000 hectares since 1981 (Caballero et al. 2018). According to the Center for Amazonian Scientific Innovation (CIN CIA) and the Amazon Basin Conservation Association, 2017–2018 had the highest two-year deforestation total on record at 45,565 acres (Finer and Mamani 2018). With a loss of 4,164 acres from 2017–2018, ASGM activity has most altered the La Pampa area located in the buffer zone of Tambopata National



August 2020, satellite image of damage from AGSM in Madre de Dios.



Reserve. Most of the mining in the area is illegal. At a larger scale, the expansion of ASGM in Madre de Dios—coupled with the opening of the Interoceanic Highway in 2011, the related expansion of rural roads, and small-scale agriculture—threatens the connectivity of the Vilcabamba-Amboro biological corridor and the movement of its fauna (Vanthomme et al. 2019).

ASGM creates a multi-stressor scenario (Brack et al. 2011), including:

- Deforestation, loss of topsoil, sedimentation, changes to riverways, and loss of aquatic and terrestrial habitats.
- Fragmentation of the landscape due to secondary and tertiary road development as well as due to alteration of riverways.
- Contamination from mercury and fuels.

In addition to land clearing and forest loss, the ASGM sector is generally associated with impacts such as alteration of landscape morphology; erosion in exploited areas; sedimentation; deterioration in water quality; mercury contamination; siltation of riverbeds; noise pollution; and potential declines in aquatic flora and fauna due to aquatic habitat pollution and loss (Brack et al. 2011). The ASGM sector alters the landscape significantly and creates new hydrological regimes, such as new bodies of water or pools in abandoned mining sites. In Madre de Dios, approximately 15,000–20,000 hectares of new ponds have been created due to mining (Araujo et al. 2018). These pools accumulate mercury in the sediment, producing mercury hotspots in areas of high fish abundance and bird habitat (Ibid).

Mercury is a persistent, bioaccumulative toxin that is highly mobile and can cause significant impacts throughout ecosystems and food chains. Artisanal gold mining is the largest source of mercury pollution globally and accounts for 38 percent of total anthropogenic emissions of mercury (UNEP 2018). The main issues associated with ASGM and mercury include (Telmer and Veiga 2009):

- Mercury emissions to the atmosphere, which move locally, regionally, and globally, ultimately lead to aquatic food chain contamination and human health impacts through fish consumption.
- Health impacts through direct mercury vapor exposure.
- The consequential development of mercury hotspots that persist for centuries.

Total mercury releases to the environment from ASGM in Peru were estimated to be as high as 180 metric tons annually (Defensoría del Pueblo 2019). High levels of mercury have been found in both fish from local rivers and in the hair of residents, including within Indigenous communities located far from ASGM sites (Diringer et al. 2014, Weinhouse et al. 2020). In a recent study by Duke University, 42 percent of the women of childbearing age and 20 percent of children analyzed along the Interoceanic Highway had mercury levels above the World Health Organization weekly tolerable intake (Feingold et al. 2020). Peru is a signatory to the Minamata Convention, an international treaty on mercury, and efforts are underway to regulate the use of mercury in ASGM and to reduce the contraband mercury trade (Andina 2019).

Due to lack of regulatory oversight, contamination of waterways and soils from chemicals used in the mining process present added risks to biodiversity and human well-being (Defensoría del Pueblo 2019; Pineiro et al. 2016; Brack et al. 2011). In addition to mercury releases, diesel and gasoline spills in Madre de Dios are estimated to exceed 547,000 gallons per year (Pineiro et al. 2016).

The social impacts of illegal gold mining in Madre de Dios are also multidimensional, often driven by corruption and criminal organizations (Valdes et al. 2019). In 2017, the National Police discovered a mass grave with 20 burned bodies believed to be the victims of armed groups operating in the La Pampa area (El Comercio 2017a). Human trafficking for forced labor and sexual exploitation is rampant in illegal mining camps. In 2010, the local NGO Huarayo reported more than 2,000 sex workers were laboring in 100



brothels in one mining town (cited in GIATOC 2016). As part of interdiction efforts in 2019, Peruvian authorities rescued about 60 victims and prosecuted about 30 people, including the director of the National Policy Criminal Investigation Office in Madre de Dios (El Comercio 2019a).

Extortion of local landholders for access to their lands was common, and those who confronted miners often faced violence and death. In 2015, a local landowner was killed for alerting the local police about miners invading his reforestation concession. Years later, his son is still threatened by groups wanting to exploit his land (El Comercio 2017b). Similarly, in September 2020, illegal miners shot an environmental defender while he was patrolling his family's forest concession in Madre de Dios. Invasion of Indigenous lands has also been reported, with miners frequently threatening indigenous leaders (El Comercio 2019b).

Government efforts to tackle illegal mining in La Pampa have taken a toll on the economic growth of Madre de Dios, affecting formal businesses, including tourism operators. The economy of Madre de Dios has decreased, largely due to reductions in gold production and, consequently, demand for associated services.

The Government of Peru's response to illegal ASGM in Madre de Dios

The Government of Peru, at the national and sub-national level, has employed numerous strategies to address the expansion of illegal ASGM in Madre de Dios, including mining formalization, economic

incentives for the introduction of cleaner technologies, new policies to regulate mining activity, monitoring, and enforcement of protected areas with the use of police and military force. Other efforts to manage the ASGM sector in protected areas and critical ecosystems include eviction, negotiated access, the introduction of responsible mining techniques where mining is permissible, market-based approaches, alternative livelihood programs, selected de-gazettement of degraded areas, conversion to formal protected status, and "mining mindful" conservation strategies (Villegas et al. 2012). The national government has led most of these efforts.



Gold extracted using mercury-free gravimetric methods.

Past efforts to address illegal gold mining were largely considered inefficient, inconsistent over time, and resulted in social unrest. In 2013, the Government of Peru appointed a high-level commissioner to oversee the interdiction of illegal mining operations, formalization, and remediation of impacted areas (Ministerial Resolution N° 234-2013-PCM, 2013). According to OjoPúblico investigative journalists, from 2013–2016, about 106 raids were conducted in Madre de Dios with an estimated budget of \$27 million (OjoPúblico 2019). During the same period, illegal and informal mining operations led to the deforestation of about 75,000 acres (Ibid). In 2014, civil unrest protests erupted in Madre de Dios against national government efforts to counter illegal mining (El Comercio 2014). The Peruvian military carried out numerous raids; however, in the La Pampa area, the illegal mining groups had technologically advanced surveillance equipment, and the police, military, and park rangers were outnumbered and under-equipped (New York Times 2016).



BOX 2: Government of Peru strategies to fight illegal mining in Madre de Dios building on Operation Mercury 2019 (Actualidad Ambiental 2019):

- Eviction of illegal mining operations
- Formalization of legal mining in limited areas with cleaner practices
- Addressing social problems like human trafficking and child labor
- Investment and development in sustainable alternative livelihoods

In an effort to reinstate the rule of law and reduce the encroachment of illegal mining into the Tambopata National Reserve, the Government of Peru issued a State of Emergency Declaration (DS 028-2019-PCM) in illegal mining-impacted districts in Madre de Dios and launched Operation Mercury, an interagency effort to eliminate illegal mining from La Pampa in February 2019 (Box 2). Operation Mercury marked a new chapter in the fight against illegal mining in Madre de Dios and in

the promotion of better practices in areas where mining is allowed. Political will at the highest levels of government was key to mobilize the human and financial resources needed to implement the operation. In contrast to prior interdiction efforts, Operation Mercury was designed to provide for a longer-term state presence in the area of intervention, and the Government of Peru committed to investing about \$62.5 million. The operation's initial phases included the mobilization of 1,500 police and military and 300 troops to the department for six months (Reuters 2019). The third phase of the operation is now focusing on sustainability and provides for a two-year state presence in the intervention area (El Comercio 2019c). Deforestation due to illegal gold mining decreased 92 percent from 2018 (900 hectares) to 2019 (67 hectares)—representing the situation before and after the start of Operation Mercury (Villa and Finer 2019). Illegal gold mining is still occurring in Madre de Dios, but at a slower rate due to sustained efforts under the operation, even during the COVID-19 state of emergency (Finer and Mamani 2020).

In addition to the interdiction efforts led by the Ministry of Defense, the Ministry of Energy and Mines is supporting the formalization of mining operations, and the Ministry of Agriculture is leading reforestation efforts in areas devastated by illegal mining. There is also an increased presence of environmental prosecutors and environmental police in Madre de Dios to strengthen law enforcement and prosecution efforts (El Comercio 2019c). Recognizing the need for coordinated actions against corruption, in August 2019, national and sub-national authorities signed a Declaration of Integrity and Fight Against Corruption (El Peruano 2019). These efforts signal a commitment to increase state presence in the department. However, at the subnational level, concerns exist about the slow speed at which resources have been mobilized to promote economic opportunities in the La Pampa area and about the effectiveness of the formalization process (Radio Madre de Dios 2019). Furthermore, the COVID-19 state of emergency is also delaying the formalization process (MINEM 2020).

U.S.–Peru cooperation to combat illegal gold mining and promote better practices

In February 2017, the U.S. Government and the Government of Peru signed a Memorandum of Understanding (MOU) to strengthen their partnership and collaborate on activities to promote the formalization of ASM, with an emphasis on legal ASGM and the fight against illegal gold mining and related crimes. The [MOU](#) has five objectives:

1. Protect human health and the environment by reducing or eliminating the use and release of mercury.
2. Strengthen and increase transparency in the gold supply and commercialization chains.
3. Promote sustainable alternative development in areas where mining is prohibited.



4. Effectively prevent, investigate, and prosecute crimes associated with illegal gold mining and related trade.
5. Prevent and stop the encroachment of illegal mining into protected areas, territories inhabited by Indigenous peoples, and archeological zones.

The MOU provides a framework for interagency coordination and cooperation, helping increase the political will needed to address the impacts of illegal mining on the environment, human health, global financial systems, and national security. The U.S. Department of State and Peru's Ministry of Foreign Affairs lead the implementation of the MOUs through a mutually agreed-upon action plan. Efforts under the MOU, including study tours and high-level meetings, have helped mobilize the Government of Peru's efforts against illegal mining. After participating in an aerial tour of affected areas, officials from Peru's Ministry of Interior issued a press release highlighting the government's commitment to increasing resources to stop illegal mining (Stearns 2017). U.S. Government-funded interventions have also helped strengthen the capacity of environmental prosecutors, generate data on the environmental impacts of the ASGM sector in Madre de Dios, assess remediation and reforestation of closed or abandoned mined lands, and promote value chain approaches to reduce mercury use (Stearns 2017).

Aligning efforts to address illegal gold mining

The MOU between the U.S. and Peru grew from years of interagency coordination and a commitment to address the pervasive impacts of illegal mining on the environment, vulnerable communities, financial systems, and U.S. national security. Increased awareness and evidence about the illegal mining situation in Madre de Dios and leadership within Peruvian and U.S. Government agencies helped mobilize actions against illegal gold mining. Investigative journalism reports about links to organized crime (GIOATOC 2016), timely deforestation alerts such as the ones generated by GEOBOSQUES and those published by the Amazon Basin Conservation Association/Monitoring Andes Amazon Project reports, and films such as Amazon Gold, contributed to awareness-raising about the impacts of illegal gold mining. In 2017, efforts under the MOU helped align more than 40 different U.S. Government interventions toward common objectives, an effort that includes the development of a yearly action plan (Stearns 2017).

Strengthening scientific capacity for evidence-based decision making about ASGM in Madre de Dios and raising awareness of its impacts

In 2016, USAID, in partnership with Wake Forest University, World Wildlife Fund, Amazon Aid Foundation, and the Peruvian Amazon Research Institute, established CIN CIA. The center serves as a research hub for national and international scientists interested in generating solutions to the social and environmental impacts of gold mining in Madre de Dios. CIN CIA established the first laboratory in the region dedicated to the study of environmental mercury and conducted the largest study on ecological restoration of mining sites in the region. Studies conducted by the CIN CIA team helped generate information on:

- Mercury contamination levels in fish, wildlife, air, sediments, and vulnerable populations.
- Biochar use for the restoration of degraded areas.
- Methodologies for reforestation of closed or abandoned mining sites, including the use of state-of-the-art satellite and drone images and machine learning approaches to characterize the impacted landscapes.

CIN CIA has helped generate evidence and procedures for the physical and ecological restoration of post-ASGM landscapes, now available to the Government of Peru and recently formalized local mining organizations. Several ministries and their agencies, including the Ministry of Environment's National Service of Natural Areas Protected by the State and the Institute for the Investigation of the Peruvian



Courtesy: CINCIA

CINCIA is using new scientific methods to establish a network of 42 hectares of experimental plantations along an ecological and socioeconomic gradient covering the jungle of Cuzco and Madre de Dios.

Amazon, the Ministry of Agriculture's National Forest Service and Wildlife, and the Ministry of Production National Fisheries Health Agency have expressed interest in adopting CINCIA's recommendations as part of the sustainability phase of Operation Mercury. Peru's Ministry of Environment requested CINCIA's assistance for compliance and implementation of the Minamata Convention on Mercury. In partnership with CINCIA staff, USAID has developed digital audiovisual materials about the impacts of the ASGM sector and mitigation solutions of these impacts to share with broad audiences. USAID Prevent and CINCIA projects recently signed an MOU with the Government of Peru Centers for Productive Innovation and Technology Transfer to promote technical innovations, including the use of mercury-free alternative methodologies in ASGM and build capacities among formalized miners in environmental and social safeguards.

Strengthening capacities to combat conservation crimes and human trafficking

Combating trafficking in persons is an important component of USAID's portfolio in Peru. In partnership with NGO Capital Humano y Social Alternativo, USAID supports advocacy, policy development, and capacity building to strengthen services provided to victims in areas such as Madre de Dios. These efforts include training prosecutors to improve the development of cases and convictions. In 2019, USAID's Mission in Peru launched the Prevent initiative to build local capacity among law enforcement and administrative agencies to tackle conservation crimes, with a focus on halting the spread of illegal gold mining in Madre de Dios. Through this initiative, the Mission will work with the Government of Peru to build capacities to develop and operationalize necessary mining formalization processes and strategies. USAID supports the Satellite Monitoring Unit in Madre de Dios. The work of the Special Prosecutor in Environmental Matters is key to organizing and executing illegal mining raids, even during COVID-19.



Consolidating efforts against illegal mining in Madre de Dios: Challenges and opportunities

Operation Mercury 2019 marked a new phase in the fight against illegal mining in Madre de Dios. While interdictions and law enforcement efforts are focused on the La Pampa area, the government's commitment to invest \$62.5 million is expected to more broadly promote legal, economic activities, such as tourism and formalized mining in areas where it is legal. Key to sustaining and advancing the gains made through Operation Mercury 2019 is the promotion of the political will of the Government of Peru and regional authorities to address land tenure issues, the strengthening of local institutions, and the promotion of incentives for legal economic activities.

Strengthening land tenure, property rights, and territorial management

With almost half of the agricultural lands lacking property rights and overlapping land rights on thousands of hectares (GOREMAD 2019), addressing land tenure and resource rights is critical to reduce conflicts and promote investment in areas affected by illegal mining. Furthermore, active territorial management is expected to provide higher economic performance than unmanaged development through 2040 in Madre de Dios (Vanthomme et al. 2019). Political buy-in and strong intersectoral and interinstitutional coordination are needed to address land tenure and property rights issues and promote active territorial management (Vanthomme et al. 2019). This is indeed a big challenge amidst the COVID-19 pandemic, economic crisis, political instability, and an upcoming election period.

Monitoring and oversight: Strengthening local organizations

The initial phases of Operation Mercury proved successful at eliminating most of the illegal mining activities in the La Pampa area. However, adequate monitoring and control are needed to prevent re-incursion into the area and the expansion of illegal mining into new areas. Ensuring local agencies and communities have the resources and capacities needed to promote good governance of their territory remains a challenge.



Courtesy: USAID/PERU

Local wildlife in restoration site.



Active monitoring of critical areas is essential for civil society to report and law enforcement officials to act against illegal activity. Furthermore, adequate monitoring and oversight of formalized mining operations are needed to ensure miners follow the social and environmental laws and regulations. Building on current efforts led by government institutions, civil society organizations (including Indigenous Peoples organizations), universities, investigative journalists, formalized miners, and organizations such as CINCIA and the Amazon Basin Conservation Association, opportunities exist to generate the needed evidence for decision-making to respond to the environmental and social challenges Madre de Dios is facing.

Monitoring and investigation efforts to inform the prosecution of illegal mining cases at the national and international levels are also needed to generate information about the dynamics of criminal organizations and promote more successful prosecution efforts.

Incentives for promoting better ASM practices

With the recent formalization of more than 100 mining operations in areas of Madre de Dios where mining is allowed, opportunities exist to mitigate the environmental impacts of legal ASGM while also promoting the adoption of better practices through incentives. Improving legal ASM practices requires a deep understanding of miner and community needs. Miners are unlikely to adopt new methods unless they prove to be as efficient and economically viable as traditional methods (Buccella 2014). A study in the highland town of Relave, Ayacucho, found the deprioritization of mercury pollution as a public health issue and mineral processors' minimal control over the distribution, use, and emission of mercury are significant barriers to the adoption of more environmentally friendly practices (Smith 2019). In Relave, gold buyers often have more control over mercury emissions than miners since they control the mercury supply chain and the purchase of gold. Access to finance is also important, so miners can acquire new and safer equipment and can adopt environmental safeguards in legal ASGM operations (IGF 2018).

While finding tangible and adequate incentives for miners in Madre de Dios is a challenge, opportunities exist to build on successes in other departments of Peru. The Global Environment Facility's GOLD program, in partnership with the United National Development Programme and the Government of Peru, promotes the adoption of sustainable production technologies and the development of sustainable ASM supply chains in the departments of Puno, Arequipa, and Piura. The demand-driven program leverages the power of the private sector to create incentives to improve practices along the supply chain, with a focus on mercury-use reduction. The Better Gold Initiative, a public-private partnership funded by the Swiss Government, has also helped the Government of Peru progress with mining formalization. Through the Better Gold Initiative, Oro Puno was the first Peruvian ASGM mining company to earn the Fairmined Ecological Gold Certification, which includes the use of mercury- and cyanide-free extraction and production. Addressing the supply chain and rewarding cleaner gold practices with premium prices are methods to create incentives for cleaner, more responsible gold production in Peru. A thorough understanding of community needs and the needed environmental safeguards are essential to ensure the long-term adoption of cleaner practices and achieve expected environmental gains.

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