



# ARTISANAL MINING IN CRITICAL ECOSYSTEMS:

A LOOK AT GABON, LIBERIA, AND MADAGASCAR



*The Minkebe gold mining pit in the bufferzone of Minkebe National Park, Gabon. Around 3,000 miners worked here before the camp was evicted in 2011.*

*Photo by Gustave Mbaza, WWF Gabon.*

*Cover Photo: Small scale mining of sapphires near Anstiranana, Madagascar, April 2012.*

*Cover Photo by Rupert Cook.*

## FOREWORD

This publication is a summary of several larger reports, which were produced by ASM-PACE in collaboration with the Program on Forests (PROFOR) and the World Bank. ASM-PACE is a multipartner program that began as a partnership between Estelle Levin Limited and World Wide Fund for Nature (also known as the World Wildlife Fund) to address the environmental impacts of artisanal and small-scale mining (ASM) in some of the world's most important ecosystems, particularly protected areas and critical ecosystems (PACE).

With support from PROFOR and the Oil, Gas, and Mining Unit (SEGOM), the World Bank's Africa regional staff contracted the ASM-PACE Program to analyze the impacts of artisanal mining activities on high-value natural landscapes and the people who live nearby. The case studies, a global solutions study, and a methodological toolkit offer recommendations on how to reconcile socioeconomic development based on artisanal mining and preservation of important ecological sites. The global study looked at 36 countries and found that artisanal and small-scale mining was taking place either inside or along the borders of 96 out of 147 protected areas in those countries. In the end, the project looked in more depth at experiences in five African countries. This report focuses on three of these: Gabon, Liberia, and Madagascar.

The publication acknowledges and thanks Fauna & Flora International (FFI) for being a research partner on the Liberia Case study and The Tiffany & Co. Foundation, for its generous funding for the ASM-PACE project.

The full reports of these studies can be found at: [www.asm-pace.org](http://www.asm-pace.org)

or: [www.profor.info/knowledge/impact-artisanal-and-small-scale-mining-protected-areas](http://www.profor.info/knowledge/impact-artisanal-and-small-scale-mining-protected-areas)



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*A gold rush in March 2012 resulted in 1,000 miners panning across about 2 hectares within the Soamahamanina urban commune near Antananarivo, Madagascar, which will cause sedimentation and silting. Photo by Rupert Cook*



*There are an estimated 20 million artisanal miners in more than 80 countries around the world today.*



## OVERVIEW

An estimated 20 million people around the world rely on artisanal and small-scale mining (ASM) for their livelihood, working in more than 80 countries. They produce some 10 percent of the world's mined gold, 15 to 20 percent of mined diamonds, approximately 20 to 25 percent of mined tin and tantalum, and a staggering 80 percent of colored gemstones.

Many people engage in ASM because it brings them more income and faster economic returns than other locally feasible livelihoods, such as agriculture. Some turn to ASM when displaced by conflicts and instability. ASM can allow people to escape absolute poverty or improve their lives. It often offers high incomes for unskilled or illiterate individuals.

The increasing price of precious minerals has launched rushes worldwide. These rushes are attracting people to previously untouched places that are important conservation sites, including within protected areas. A global study found ASM is occurring in protected areas and critical ecosystems in 32 of the 36 countries studied and in or around 96 of the 147 protected areas evaluated. Affected sites include at least seven natural World Heritage Sites and a range of critical ecosystems—arctic landscapes (Greenland), tropical rainforests (Brazil and Gabon, among many others), and coral reefs (Philippines).

ASM poses a growing threat to biodiversity and the integrity of protected areas. Environmental impacts of mining methods—such as clear-cutting forests, river dredging, or use of toxic chemicals—are compounded by livelihood practices that support mining populations—gathering firewood or hunting for food or trade. ASM activities in protected areas are frequently the precursor for even more destructive impacts, opening up areas to illicit exploitation. On a global scale, ASM of gold is the

biggest challenge in terms of negative environmental impacts, although other minerals have significant localized impacts.

## MARGINALIZATION OF ASM AND ITS LINK WITH ENVIRONMENTAL DEGRADATION

The political marginalization of the ASM sector worsens the environmental degradation caused by artisanal mining. This is coupled with the lack of appropriate incentives and capacity to mine in a more environmentally sensitive manner. ASM's marginalization within the mining industry primarily stems from many governments believing that large-scale mining should be prioritized whenever possible over ASM, which does not contribute as much direct (tax) revenue to the state as industrial mining. Many governments see ASM as an informal or illegal activity, making reforms economically unattractive and politically challenging. Moreover, some unscrupulous middlemen involved in gemstone or gold markets have ties to those with the political means to perpetuate the marginal and informal condition of ASM so crucial for their businesses.

Environmental education for artisanal miners has focused largely on programs for increasing yield, rehabilitating mined out areas, and managing mercury, but there is much more that ASM miners could do to operate in ways that are less environmentally damaging. These miners could use training in such subjects as tailings management, use of local resources to make tools, and managing fuel and fuel containers to prevent water and air pollution on site. There is also an education need among ASM on conservation, ecology, and the importance of ecosystems to local communities.

The next sections focus on ASM in Gabon, Liberia, and Madagascar, exploring the complexity of ASM in these country studies.

## DANGERS OF MERCURY IN MINING

Mercury, a highly toxic metal, poses a real danger to mining communities when used to extract gold from ores. After the gold ore is ground up, mercury is added to bind the gold into an amalgam; this is then heated to evaporate the mercury and the gold is left behind.

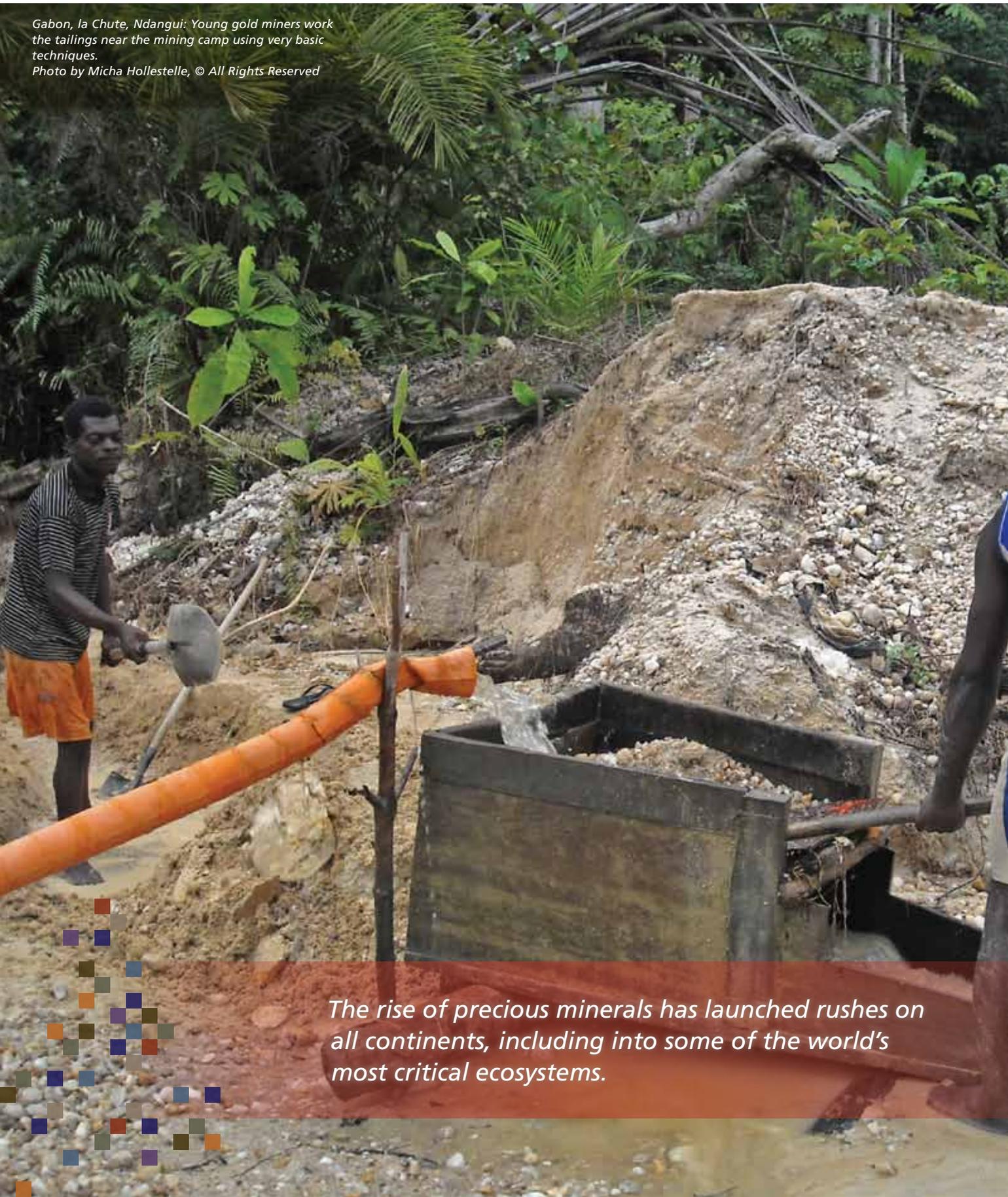
Artisanal gold mining is one of the most significant sources of mercury release into the environment in the developing world. The use of mercury in small-scale mining techniques has health and environmental consequences. Mercury is discharged into the environment when miners fail to recover mercury tailings, either by dumping waste directly into rivers or by releasing mercury vapors into the atmosphere when the mercury-gold compound is burned. Mercury settles into the surrounding environment or circulates globally for future deposition far from the site, thereby contaminating the food chain and fisheries.

Exposure to mercury can cause kidney problems, arthritis, memory loss, miscarriages, psychotic reactions, respiratory failure, neurological damage, and even death. Children exposed to mercury are at risk for developmental problems.

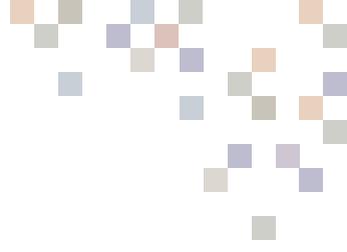


*Small scale miners operate within a forest concession in Liberia. They work in an uneasy relationship with the forest concession owners who view their activities as detrimental to the trees. Although they do not use chemicals, the miners acknowledge that their activities are bad for the rivers and trees. They use a separate creek for drinking water. Photo by Flore de Preneuf/ PROFOR*

*Gabon, la Chute, Ndangui: Young gold miners work the tailings near the mining camp using very basic techniques.*  
*Photo by Micha Hollestelle, © All Rights Reserved*



*The rise of precious minerals has launched rushes on all continents, including into some of the world's most critical ecosystems.*



# GABON

As in many other countries, Gabon faces the challenge of doing ASM in a manner that helps local development, but does not harm sensitive environments. The environmental stakes are particularly high in Gabon, which has the highest tropical forest cover as a proportion of national surface area of any African country. The forest hosts gorillas, chimpanzees, and the largest density of elephants outside Kenya.

ASM in Gabon is a long-practiced but frequently informal activity that can play a significant role in local development. There are between 5,000 and 10,000 artisanal and small-scale miners in Gabon who primarily mine gold and, to a lesser extent, diamonds.

While those aiming to protect Gabon's precious resources may view ASM with suspicion, there is space for pragmatism. The Gabonese government has expressed an interest in developing ASM in alignment with its "Green Gabon" vision.

## CHALLENGES AND OPPORTUNITIES REGARDING ASM AND CRITICAL ECOSYSTEMS IN GABON

It is a complex situation regarding artisanal miners and the laws affecting them. A major concern from a miner's right perspective is that miners can be evacuated from their pits without compensation and without clear motivation or clarity on their legal rights. An environmental concern is that legal artisanal miners are not bound by environmental regulations. An economic concern is that the government requires artisanal miners to sell mined gold at fixed prices that may be uncompetitive with the black market rates available.

Regarding miners' rights, those miners who wish to organize have the legal option of a cooperative available to them. In buffer zones of parks, artisanal mining is explicitly allowed by law. By law, the Ministry of Mines

can support small-scale operators to improve existing technologies or to introduce new techniques with regards to artisanal mining.

In terms of artisanal mining impacts on critical ecosystems in Gabon, the main effects relate to biodiversity, forests, and water. The impact on biodiversity and forest degradation stems from human pressure and from ASM activity. Human pressure, both from artisanal miners and other economic activities attracted by the presence of miners, results in clearing of lands for agriculture and housing. In addition, the occurrence of ASM in Gabon has attracted non-ASM practitioners to engage in other, illegal, economic activities around or adjacent to ASM sites, in particular ivory hunting. As a result, the linkage between ASM activity and elephant poaching has arisen as a critical issue, although researchers believe elephant poaching is not directly related to artisanal miners.

The impacts of ASM to the researched artisanal mining sites of Longo and Ndangui, close to Ivindo National Park, are generally mild as the zone is not overpopulated and ASM practices are not mechanized. The concerns are effects of ASM on watercourses: derailing watercourses to bring water to the pits; cluttering waterways by debris, and by mud hosed away to find gold; affecting groundwater levels as pits are kept dry; and changing turbidity levels of the water, which affects water flora and fauna.

## RECOMMENDATIONS

### Improving Mining Laws and Code

The law in Gabon could be strengthened to incorporate realistic and manageable environmental demands on ASM. This should be paired with an approach toward ASM in the new mining code that emphasizes its rationalization and professionalization.

### Developing Partnerships with Natural Resource Extractive Companies

There is an increasing overlap between traditional ASM locations and the concessions of larger-scale commercial mining and forestry companies, which will lead to the displacement of ASM most likely to existing or new ASM sites in sensitive ecosystems. Gabonese authorities and companies could address the impacts of displacement and improve community relations via partnerships that would allow artisanal miners to work in parts of the logging or mining concession, with suitable terms that would be mutually agreed between the company and artisanal mining communities (and government, where applicable). Cooperation and potentially cohabitation between industrial and artisanal mining entities should be part of the companies' community engagement strategy.

### Adopting Mining-Mindful Land Use Planning across Government Ministries

When Minkébé Reserve became a national park, the new borders of the park took into account the presence of large mineral reserves. (See text box for more information on Minkébé). It is important to take ASM activities into account in future land use planning processes to prevent similar conflicts.

### Planning Evictions Well

While evictions are the most common strategy worldwide to address ASM in protected areas, they are very prone to failure. In order for an eviction to succeed in the long-term there needs to be a sustained security presence. Depending on the structure, this can be a costly endeavor and risks the corruption of the security forces if they become involved in illegal mining. The permanent establishment of an effective law enforcement regime in ASM zones could be a more effective and less risky, yet very expensive, alternative to evictions. If established in the early stages of ASM

site development, the need for evictions may be avoided altogether.

### Considering Policy Measures to Enable a Sustainable Supply Chains Approach

Sustainable supply chains have increasingly become one of the cornerstones of multi-pronged strategies in other contexts around the world to effectively professionalize, manage, regulate and increase benefits from ASM and work toward ecologically and socioeconomically responsive ASM. Making ASM ecologically and socioeconomically responsive involves the organization and formalization of both ASM and the downstream trading chain; the introduction of environmentally responsible and socially beneficial production methods; financial benefit sharing and enhancement of the sector's economic contributions.

### IDENTIFYING MODELS FOR RESPONSIVE ASM

It could help Gabon deal better with ASM and critical ecosystems by identifying a “model mine” site in the country—a site where the social, economic, and political risks are managed, and opportunities enhanced. The site could be used to develop models for ecologically and socioeconomically responsive ASM around the country, giving the miners a role in environmental stewardship. Given the right trade and export conditions, the model mine could become part of a sustainable supply chain initiative, too.

### Studying and Monitoring the Impacts of ASM on Forest Degradation in Gabon

The government could use aerial footage to monitor ASM impact. This information could help establish the amount of deforestation resulting from ASM.

### MINKÉBÉ

Minkébé National Park is located within the larger Minkébé Forest. Minkébé refers to the national park by that name as well as to a large artisanal mining settlement just outside of the park perimeters.

The government evicted all miners from Minkébé on June 1, 2011, because of local discontentment with foreigners financially benefitting from uncontrolled illegal ASM, concerns by the State as to the illegality and lack of revenues from the gold sector in Minkébé, and concerns that poaching for bushmeat, ivory, and other illegal activities were increasing at an alarming rate. The purge led to between 2,000 and 5,000 (mainly Cameroonian illegal immigrants) leaving the Minkébé ASM zone. The military have remained in the area, also evicting illegal fishing and hunting camps. Camps are still occupied by the military to prevent the miners from returning.

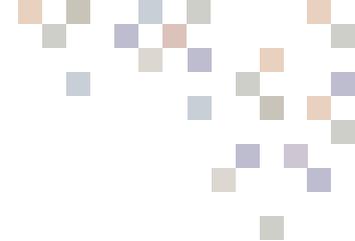
There is government and local interest in re-opening the Minkébé camps to local Gabonese miners. Throughout the last decade reports on Minkébé and other mining camps consistently show a desire of Gabonese miners for their trade to be formalized and for the government to address the influx of foreigners. Combined with the government's desire to control the gold trade and coupled with the Park Authorities' desire to safeguard the conservation purposes, the notion of ecologically and socioeconomically responsive ASM gold seems appealing to all parties as a viable solution. The time may be ripe to begin work towards a win-win, shared vision.

*Panning for gold in forest concession in Liberia. Small-scale miners say the gold is "hard to find" and wish "as many people as possible" would come to the site to help find more gold.*

*Photo by Flore de Preneuf/ PROFOR*

A close-up photograph of a person's hands holding a large, shallow metal pan. The pan is filled with water and a thick layer of sediment, likely sand and silt. The person is wearing blue jeans and brown boots. The background is slightly blurred, showing more of the person and the ground. The lighting is bright, suggesting an outdoor setting.

*Miners are often mining blind—mining on hunch and hope. Updated geological data can guide mining activity and prevent unnecessary destruction of lands.*



# LIBERIA

A biodiversity hotspot, Liberia abounds in richness of species and endemism. Sapo National Park (SNP), the only national park, is at the center of one of the largest intact blocks of the Upper Guinea Forest, with high rates of endemism. National legislation forbids any economic activity from taking place in SNP, including mining.

The ASM sector for gold and diamonds in Liberia is estimated to involve as many as 100,000 artisanal miners. For the past century, ASM activities have been taking place in Liberia. The miners, who are mainly Liberian nationals, are attracted to ASM as a primary source of livelihood, because agricultural production often does not serve to be a viable income-generating activity for many Liberians. Agriculture declined heavily during the civil war because of a lack of inputs, capacity, and technical know-how in the sector.

## CHALLENGES AND OPPORTUNITIES REGARDING ASM AND CRITICAL ECOSYSTEMS IN LIBERIA

The Ministry of Lands Mines and Energy (MLME) focuses on large scale mines, viewing ASM as an impediment to progress in the mining sector. The ASM provisions in the mining code are unsupportive of its realities, making it extremely difficult and unrealistically expensive for an artisanal miner to be legal. Furthermore, the mining code neglects the dispersed, alluvial, easy-access nature of most artisanally mined diamond and gold deposits.

Artisanal gold miners working close to SNP borders pose a growing threat to the park. Mercury is currently not used by mining communities to the north of SNP. Maintaining this situation will become increasingly difficult, especially if, as suspected, legal ASM will continue to grow north of the Park. Siltation is a major issue affecting drinking water

in the area. Researchers noticed only one small creek with clear water; all the others were highly disturbed, potentially from ASM activity. Other major environmental issues observed were forest clearance for mining and no backfilling or reclamation of abandoned sites.

Illegal miners within SNP were successfully evicted in 2010, but it is not known how long the eviction will hold. With regard to the eviction strategies, researchers have concluded: eviction alone is not sustainable unless investment in improved national park governance is made. Since a typical artisanal digger at legal sites adjacent to SNP is estimated to earn equal to or more than the average local income, it is unlikely that miners would be willing to abandon mining and move into another livelihood activity for economic reasons alone.

## RECOMMENDATIONS

### Improving ASM Governance and Coordination

An important way to improve ASM-sector governance and coordination in the SNP-area is to implement feasible mineral rush-mining response plans. These plans should contain on-site monitoring, infrastructure, community health, and control measures.

### Managing and Mitigating Environmental Impacts

ASM has been found to be conducted in a strict hierarchical system in Liberia, with the miner being the central point for establishment of mining rules. Environmental interventions would be best organized from this control point. Miners and other community members should receive training in environmental management, environmentally responsible methods and related guidance through education and

demonstration projects. They need to be sensitized on legal and regulatory environmental requirements.

On the official side, government officers need adequate resources for support, monitoring, and enforcement. There needs to be collaboration among authorities, miners, communities and others to develop and implement strategies for ASM in biologically sensitive areas.

### Formalizing and Improving the ASM Sector

To formalize the ASM sector, the Liberian government needs multiple agencies to commit to improved economic, environmental and social performance of ASM. Gender concerns need to be built into formalization efforts.

To improve the development performance of ASM in the region, ASM should be mainstreamed within poverty reduction and development strategies. ASM should be included within national budgets through collaboration between Ministries of Finance and other relevant line ministries. Value chain development can also improve ASM, whereby linkages can be established between miners and markets through collaboration with investment authorities, other government agencies, and registered buyers.

### Improving Social Performance of ASM

The social performance of ASM in Liberia can be improved by identifying and eliminating barriers to the empowerment of women working in conjunction with ASM communities. Other concerns are eliminating child labor and implementing mechanisms to ensure the fair distribution of mining benefits. Overall, it is important to get the community involved in initiatives to monitor and improve the social and environmental performance of Liberia's ASM.



*George Davis, in a red T-shirt, has been mining at a site inside a forest concession in Liberia since 2007. Small scale miners at this site say they have licenses and pay fees to the Ministry of Lands Mines and Energy, although the land has also been awarded by the Forestry Development Authority to a logging company. "There's nothing to do, that's why we're here," he said. "It has an impact on trees, but I want to grow up and make a living." Photo by Flore de Preneuf/ PROFOR*

## GOLD BOYS

Artisanally mined Gold in Liberia is produced through the physical labor of “gold boys” or diggers, most of who are Liberian men or boys, ranging in age from teenagers to those in their mid-40s. The men and boys organize themselves into groups of four to six people who dig and wash in a particular pit. The groups of diggers share the gold produced among themselves and sell predominantly to the miner on whose claim they are working, to the sponsor that has pre-financed their food and equipment, or (less often) directly to a visiting gold broker.

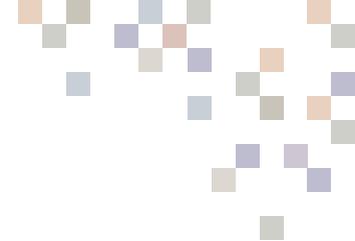
The gold boys live in the mining camp run by the miner who owns the claim on which they work. Some gold boys are investing their returns from digging for the payment of their children’s school fees or funding small market businesses.

An example of a typical gold boy at an ASM site is a man from Tapita, in Grand Gedeh county, who began gold mining in early 2011. The Tapita man has a wife and two young children who live in Zwedru, the county capital, 60 km north of the mining site. He was encouraged to take up mining after the success of his brother who had moved to the site to mine in 2010 and saved enough to buy his own water pump. The man, who had previously worked for nongovernmental organizations in Zwedru, feels ASM is a more profitable source of work. He was in the process of building his own house at one of the mining camps but now plans to send remittances to his family. He doesn’t think that his mining work has any impact on the environment, especially as the national park is a long way away (it is actually three km away). He is positive about the gold business and feels it offers the best form of income available to him.

*Mining site in the north of Madagascar near Ambanja, where a rush of 2,000 small-scale sapphire miners took place in April 2012. This area is not a protected site. Photo by Rupert Cook*



*Protected areas are increasingly vulnerable to mineral rushes because of the escalating price of certain minerals (especially gold).*



# MADAGASCAR

Madagascar is an island of exceptional biological importance, hosting a remarkable number of endemic animal and plant species. Among the island's many unique species are the baobab (bottle) tree, 97 different types of lemurs, and the Madagascar flying fox.

Concomitant with Madagascar's status as a biodiversity hotspot has been the country's emergence, especially over the last 20 years, as a significant locus for ASM activity. An estimated 500,000 miners are involved in ASM, with about 350,000 artisanal gold miners. Artisanal miners produce significant quantities of gold and gemstones (including sapphires, rubies, aquamarine, tourmaline, topaz, amethyst, and emerald). Rubies and sapphires are the country's major gemstone exports.

## CHALLENGES AND OPPORTUNITIES REGARDING ASM AND CRITICAL ECOSYSTEMS IN MADAGASCAR

Over the last 20 years, ASM activity in Madagascar has been marked by a succession of rushes, sometimes with miners in the tens of thousands converging on specific areas. Many, if not most, ASM rushes have taken place in or very near to protected areas and critical ecosystems. This has resulted in serious environmental impacts on key conservation sites, besides the socioeconomic ramifications of mass migration in a country already beset by problems of limited infrastructure.

The rise in ASM activity and rushes has coincided with a series of three major political crises, over the last two decades. These crises have enfeebled an already fragile state, with deteriorating economic conditions also contributing to the expansion of ASM activity. Given Madagascar's status as resource rich but economically poor, ASM in protected areas provides a rare opportunity for people to engage in entrepreneurial and independent income generation without having to worry about the



property holder. Political instability, with its impact on the capacity of the country's institutions of governance, has exacerbated the problem.

In theory, the artisanal gold panners or prospectors should possess a permit. However, this formal value chain is largely academic in that most gold passes through an informal value chain without formal payment to the state or commune. It is generally accepted that the difficulty of regulatory compliance effectively invites actors in the gold value chain to operate informally, rather than formally.

The vast majority of gems exported from Madagascar are informally mined and traded. The enforcement of governing laws is usually not applied until the export stage. The gemstones are usually exported to Asia in a rough, unprocessed state.



Gold mining site in Soamahamania urban commune, Itasy, near Antananarivo. Photo by Rupert Cook

## RECOMMENDATIONS

### Establishing Regional or Centralized System for Mining Rush Surveillance

A competent and fast-reacting system for the surveillance of ASM rush activities is critical to prevention and mitigation of ASM rush impacts on protected areas and other biodiversity-rich areas. Without such a system, it is almost impossible for the state authorities to mobilize sufficient resources to intervene decisively before a critical mass of ASM miners have gathered at the site, whether protected areas or otherwise.

### Setting up Formal Local Purchase Offices

In interviews, miners and local government figures requested installing a system of formal local purchase offices. These offices would provide miners with a more equitable transaction, as well as allow the commune and government authorities to monitor more efficiently the payment of royalties.

### Enforcing and Applying Relevant Laws

Madagascar's laws proscribing mining in protected areas are rigorous and strict, on paper. However, these theoretical penalties bear little connection to the reality on the ground. Enforcing and applying relevant laws would help preserve critical ecosystems. Currently, when the forces of law and order do on occasion intervene against illicit mining in protected areas, they sometimes detain a number of artisanal miners. The most common scenario is that the arrested miners will have to endure a short-term imprisonment before being transferred to the remit of the courts and judicial authorities. At that point, the cases tend to disappear from the judicial system.

### Dealing with Corruption Arising from Mining Rushes

Corruption is one of the most critical challenges in terms of preventing, or at least limiting, the damage

wrought by ASM rushes on critical ecosystems. In late 2005, a Sri Lankan company announced on television that they had paid corrupt park and government officials so as to be able to mine unimpeded in the Zombitse-Vohibasia National Park. These types of corruption need to be dealt with through monitoring and effective measures.

### Promoting Value-added in Madagascar

To enable improved generation of added value in Madagascar, the Institute of Gemology of Madagascar (IGM) was set up as a training center for gemologists, lapidary artists and cutters of stones. Currently, almost all the value-added for gemstones is done overseas, benefiting neither Malagasy artisans nor the state. Most students at IGM study gemology, rather than specializing in the key value-added subjects, like lapidary cutting. While the advantages of adding value in Madagascar, rather than overseas, may be self-evident, the statutory regime does nothing to encourage its taking root. More needs to be done to promote training in key value-added subjects and support for efforts to keep the work in country.

## **GOLDEN LOCAL DEVELOPMENT: BUILDING CAPACITY TO BETTER MANAGE MINERAL WEALTH**

As in other mining countries around the world, thousands of artisanal miners in Madagascar are in dire need of technical assistance and capacity building to make sure that the subsoil riches drive local development. In Madagascar's Maevatana area, the joint efforts of artisanal miners and local authorities have paid off: quarterly production jumped from 13.8 kg of gold in November 2005 to 53.5 kg in November 2007. At the same time gold prices went up from 17,000 Ariary (about \$7.70) per gram to 35,000 Ariary (about \$15.84/gram). This allowed much needed social infrastructure and services to be put in place.

How did artisanal mining catalyze local development? The government of Madagascar together with the World Bank Communities and Small Scale Mining (CASM) initiative supported a project aimed not only at bringing artisanal miners into the formal economy but also at strengthening the management and technical capacity of the municipal authorities so that the revenues from artisanal mining were integrated into the local development plans.

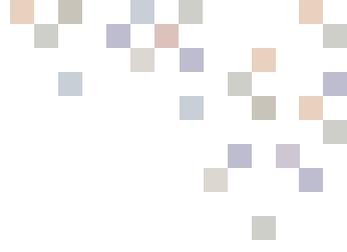
During the project's implementation (led by a national NGO), dozens of municipal officers, council members, and village leaders were trained to facilitate the formalization of some 1,500 artisanal miners. Programs focused on increasing awareness about how to enforce recent artisanal mining legislation. Artisanal miners and gold traders were then officially registered and encouraged to pay small fees to the local administration.

As a result, the local administration developed a strong commitment toward active management of the sector and formalization of the informal artisanal mining activities. The financial return from fees and levies were then invested into development projects, such as schools and health centers and into social infrastructure to expand access to electricity and public lighting. This initiative shows how having local government and ASM miners work together can provide financial returns, promote local development, and support social infrastructure. The lessons learned from this project can be applied to ASM situations near and in critical ecosystems.



*High quality rubies and sapphires attracted large numbers of miners (15,000 people in the first 10 days) to an area in the east of Madagascar in the heart of a new protected area that adjoins a UNESCO World Heritage Site, the Zahamena National Park. Photo by Rupert Cook*

*The problem is not a lack of knowledge on ASM Impacts or how to technically manage or mitigate them: the problem is finding a politically and logistically feasible solution.*



# CONCLUSION

“ **Small-scale gold mining is now a global movement. Big problems remain but it represents a huge global development opportunity.** ”

— Dr. Kevin Telmer, Artisanal Gold Council

ASM exists in many diverse settings around the world and as such is a complex sector marked by a shifting set of problems. A one-size-fits-all approach is not the answer to dealing with ASM. In one country, a well-organized program of training might be needed and in another, a sudden migration of thousands of people in a mineral rush might call for immediate health and security responses. A common understanding of the many problems inherent in the ASM sector, in concert with a coordinated strategy to address issues as they arise, is necessary to improve conditions in ASM communities and reduce threats to the highly vulnerable populations.

## KNOWN POLICY RESPONSES TO ASM OCCURRING IN CRITICAL ECOSYSTEMS

There are many ways to respond to ASM in protected areas and critical ecosystems. To manage ASM in critical ecosystems, countries can use market-based interventions and sustainable supply chain initiatives centered on specific sites and aimed at achieving positive social and environmental outcomes by capacity building throughout the supply chain and use of standards and certification. Negotiated or conditioned access and voluntary agreements negotiated between governments or NGO partners and mining communities can specify environmental rules in exchange for authorized access to specific parts of a protected area. Selected de-gazettement of protected areas can allow existing artisanal



mining to continue. Governments can promote alternative livelihoods, via the introduction of new employment opportunities outside of protected areas. They can introduce responsible mining methods or “mining mindful” conservation strategies early on in conservation planning, such as park border considerations, as well as those for specialized staffing and government-provided services.

To stop ASM in protected areas or critical ecosystems, governments can evict artisanal miners from a protected area by force or threat of force in response to its illegality. Or they can gazette artisanal mining sites as new protected areas, or confer stricter protected status to mining sites.

## KEY CHALLENGES AFFECTING THE FEASIBILITY OF MANAGING ASM IN CRITICAL ECOSYSTEMS

Various factors can compound investigating and managing ASM in critical ecosystems. It can be difficult to convince governments and other stakeholders that engaging with miners does not signify condoning their behavior or presence. In addition, some solutions may not be possible; finding a workable solution then becomes even more challenging or requires clear prioritization backed by budgets, improved capacity, and planning. For reasons of local or national security, protected areas in remote areas or along international borders sometimes house ex-combatants and armed groups and may be perceived as sites where existing insurgents or the disaffected may gather to plan an uprising. Where this is the case, accessing these areas to investigate ASM is difficult owing to the level of politicization of the park.

Another factor making managing ASM in critical ecosystems difficult is that local people do not always accept or recognize protected areas. Moreover, in the development-conservation balance, addressing threats to critical ecosystems is not always among the top priorities of governments and consequently, incursions may continue unabated. In addition, there can be conflicting mandates that require sorting out, particularly when mining, conservation, and forestry laws directly conflict or where there is no coordination in practice.

Regarding environmental impacts, the issue is not a lack of knowledge of ASM’s impacts or how to manage them from a technical standpoint: the problem is how to do so in a way that is politically feasible in a precious ecosystem. This involves hard questions involving policy, engagement, incentives, assigning resources, and which options are logistically feasible and politically palatable. It is about constructive policies, engagement, and deep consideration as to how engagement may be best done in order to achieve the goal of minimizing the negative impacts ASM may have on ecological health where it occurs in critical ecosystems, while maximizing the development potential of artisanal mining.



*Significant degradation in a critical mangrove habitat resulting from an ASM rush for green garnets/ demantoid beginning in 2009, in the region of Diana, Madagascar. Photo by Rupert Cook*

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